State Dependency of Monetary Policy: The Refinancing Channel

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Motivation

- In the US, bulk of household borrowing is in fixed rate mortgages with refinancing option.
- The decision to refinance depends on potential interest savings relative to any costs involved.
- Show that the distribution of potential interest savings changes over time.
- This implies that the effects of monetary policy on refinancing are time-varying and state dependent.

Overview

- **Empirical:** Document state dependency of monetary policy.
  - Distribution of mortgage rates and potential interest savings from refinancing across borrowers varies over time.
  - The effect of monetary policy on refinancing is larger when there is a greater pool of potential savings.

- **Theoretical:** Heterogeneous agents model with costly refinancing.
  - Study the implications for raising of rates to allow for rate cutting in the future.

Data

- Core Logic Loan-Level Market Analytics database:
  - $>60\%$ market coverage of first mortgages back to 1995.
  - Loan-level panel data with information on amount, interest rate, LTV and purpose of loan (i.e. refi, purchase). Borrower characteristics (e.g. FICO, age, ZIP code).
  - Quarterly frequency.
  - Focus on the pre-2008 period.

Data

1. Define key concepts that are correlated with potential interest savings from refinancing.

2. Describe the distribution of potential savings and evolution over time.

3. Estimate the implications for refinancing decisions.

Data

- A key variable in our analysis is potential interest savings if the household refinanced to the current mortgage rate.
- Potential savings depends old and new mortgage rates, outstanding balances, and the household's refinancing strategy.
- We focus on two simple measures of potential savings:
  1. Interest rate gap
  2. Present value of potential saving
- Not sufficient statistics. But they are highly correlated with refinancing, and easy to compute in the data and model.

Data: Interest rate gap

$$r_t^{\text{gap}} = r_t^{\text{old}} - r_t^{\text{new}}$$

- r_t^{old} is the consumer's existing mortgage rate.
- r_t^{new} is the current market mortgage rate on a 30-year fixed rate loan. It is the rate they would get if they refinanced.
- $r_t^{\text{gap}} > 0$: consumer can save and pay a lower rate by refinancing.
- $r_t^{\text{gap}} < 0$: consumer pays a higher rate if they refinanced.
- t is quarterly.

Data: Present value of potential savings

- The interest rate gap is easy to compute in the data and model.
- It is also easy to compute gaps for different refinancing strategies: e.g. refinancing to a shorter duration mortgage.
- However, it does not include other factors that affect potential savings from refinancing: e.g. mortgage balance and duration.
- Therefore, we also consider the present value of potential savings under the following refinancing strategy:
  - loan is refinanced to a 30-year fixed rate mortgage, and
  - repaid over the remaining life of the existing mortgage.

Data: Present value of potential savings

- Consider a mortgage originated at date τ with a fixed interest rate r^{old} and maturity T.

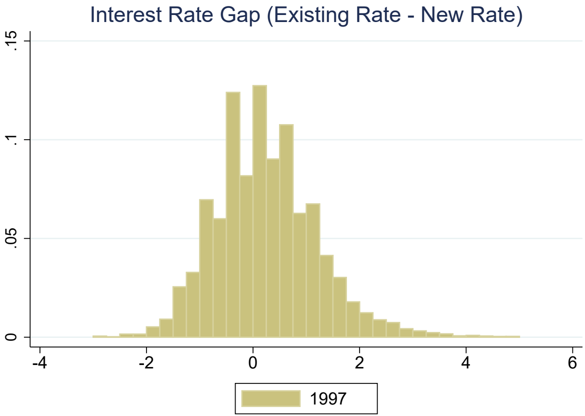
$$\text{Balance}_t = \sum_{k=1}^{\tau+T-t} \frac{\text{Payment}}{(1+r)^k}$$

- Hence

$$\text{Savings}_t = \sum_{k=1}^{\tau+T-t} \frac{\text{Payment}^{old} - \text{Payment}^{new}}{(1+r^{new})^k}.$$

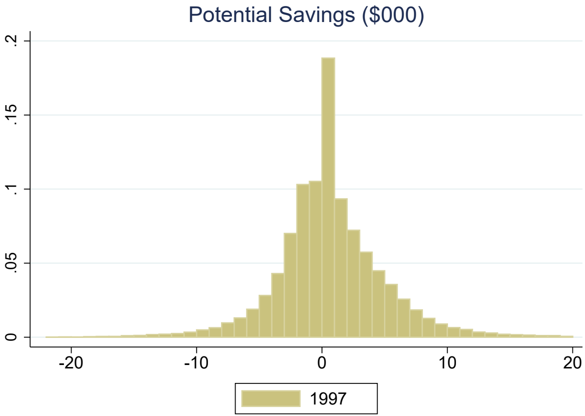
- $\text{Savings}_t > 0$: consumer saves on interest payments by refinancing.
- $\text{Savings}_t < 0$: consumer has higher interest payments if they refinanced.

Data: Distribution of interest rate gaps in 1997



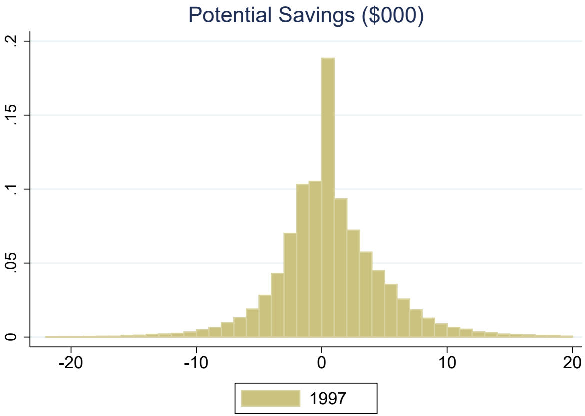
- In 1997, 60% of mortgages had a positive rate gap. The average rate gap is 22bps.

Data: Distribution of potential savings in 1997



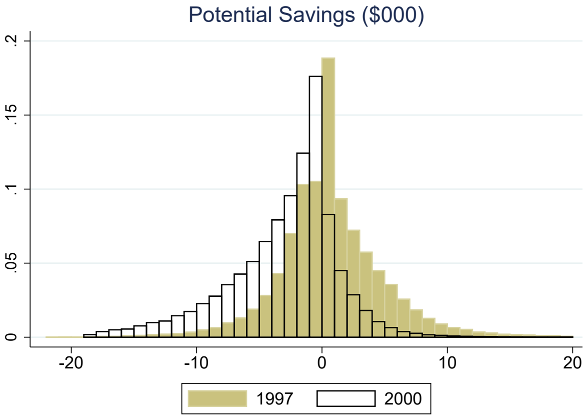
- In 1997, 60% of mortgages had positive potential savings, with average savings of $3,100.

Data: Distribution of potential savings in 1997



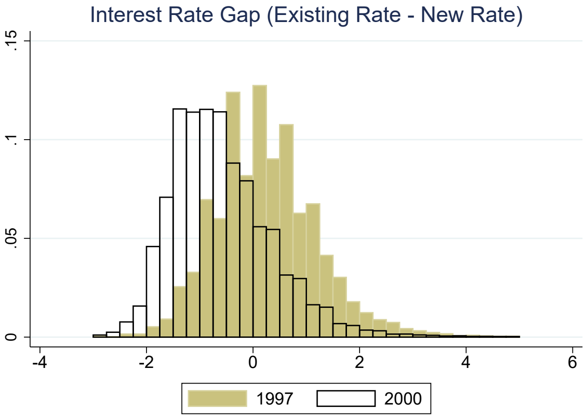
- Declines in the current market rate will shift the distribution to the right, all else equal. We will see this leads to more refinancing.

Data: Distribution of potential savings in 1997 and 2000



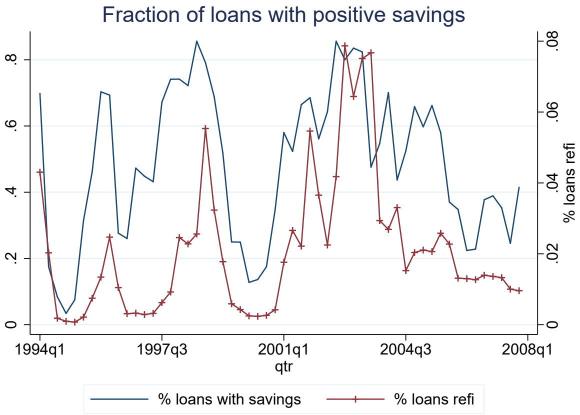
- In 1997, 60% of mortgages had positive potential savings, with average savings of $3,100. In 2000, 20% of mortgages had a positive rate gap, with average savings of $2,000.

Data: Distribution of interest rate gaps in 1997 and 2000



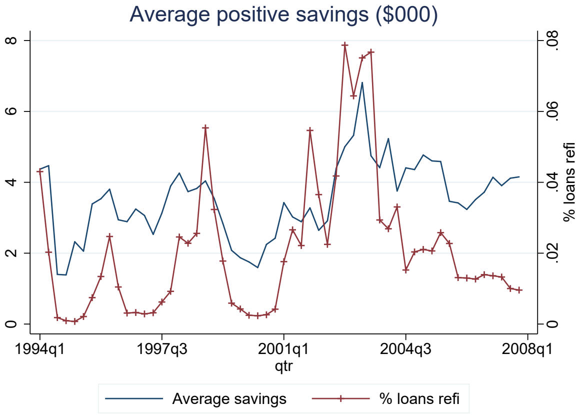
- In 1997, 60% of mortgages had a positive rate gap. In 2000, 23% of mortgages had a positive rate gap.

Refinancing and the fraction of loans with positive savings



- High correlation between refinancing and fraction of loans with positive savings. Real mortgage rate

Refinancing and average positive savings



- High correlation between refinancing and average positive savings.

Real mortgage rate Post 2007

State dependency and the efficacy of monetary policy

- Distribution of potential interest savings changes over time.
- More refinancing when potential savings in the period is higher.
- What does this imply for the transmission of monetary policy on refinancing activity over time?

State dependency and the efficacy of monetary policy

For county c in quarter t, we estimate

$$\rho_{c,t+4} = \beta_0 + \beta_1 \Delta R_t^M + \beta_2 \Delta R_t^M \times \psi(savings)_{c,t-1} + \beta_3 \psi(savings)_{c,t-1} + \beta_4 X_{ct} + \lambda_c + \eta_{ct}.$$

where

- $\rho_{c,t+4}$ is the fraction of loans that refinance over the year,
- ΔR_t^M is the change in mortgage rate offered in the market,
- $\psi(savings)_{c,t-1}$ is a moment of the existing distribution
  - average potential savings,
  - fraction of loans with positive savings.
- X_{ct} denotes the county-level demographic variables, including house prices, unemployment rate.

State dependency and the efficacy of monetary policy

For county c in quarter t, we estimate

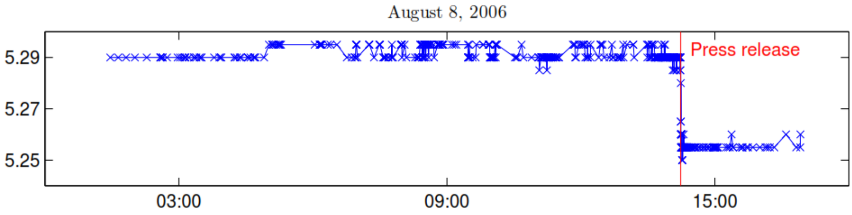
$$\rho_{c,t+4} = \beta_0 + \beta_1 \Delta R_t^M + \beta_2 \Delta R_t^M \times \psi(savings)_{c,t-1} + \beta_3 \psi(savings)_{c,t-1} + \beta_4 X_{ct} + \lambda_c + \eta_{ct}.$$

Potential challenges to identification:

- Shocks and unobservable variables affecting both refinancing propensities and mortgage rates.
- Instrument using high frequency data on Federal Funds futures and Treasury yields, and its interactions with $\psi(savings)_{c,t-1}$. First stage

Monetary policy shocks

Shock measured using Fed Funds futures and 2-year Treasuries.



Source: Gorodnichenko and Weber (2015)

Approach as in Kuttner (2001), Rigobon and Sacks (2004), Nakamura and Steinsson (2013), Gorodnichenko and Weber (2015), Gertler and Karadi (2015), etc Shocks

State dependency of monetary policy

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	Regression on Futures (I)	Regression on Δ 2-yr Treasury (II)	IV using Futures (III)	IV using Δ 2-yr Treasury (IV)	IV using Futures (V)	IV using Δ 2-yr Treasury (VI)
ΔR(t)			-0.006	0.098***	0.045	0.069***
			(0.037)	(0.017)	(0.030)	(0.017)
ΔR(t) x Average savings			0.021***	0.063***	0.026***	0.061***
			(0.011)	(0.011)	(0.010)	(0.012)
Ɛ(t)	0.116***	0.093***				
	(0.043)	(0.007)				
Ɛ(t) x Average savings	0.027**	0.012**				
	(0.013)	(0.002)				
SPF Controls	No	No	No	No	Yes	Yes

- (I) and (II) implies that an additional \$1K of potential savings increases the fraction of mortgages refinanced by 1.2-2.7 ppts in response to a 1ppt expansionary monetary policy shock.

State dependency of monetary policy

For county c in quarter t, we estimate

$$\rho_{c,t+4} = \beta_0 + \beta_1 \Delta R_t^M + \beta_2 \Delta R_t^M \times \psi(savings)_{c,t-1} + \beta_3 \psi(savings)_{c,t-1} + \beta_4 X_{ct} + \eta_{ct}.$$

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Ɛ(t)	0.116***	0.093***				
	(0.043)	(0.007)				
Ɛ(t) x Average savings	0.027**	0.012**				
	(0.013)	(0.002)				
SPF Controls	No	No	No	No	Yes	Yes

- (III) and (IV) implies that an additional \$1K of potential savings increases the fraction of mortgages refinanced by 1.2-6.3 ppts in response to a 1ppt decline in rates.

State dependency of monetary policy

For county c in quarter t, we estimate

$$\rho_{c,t+4} = \beta_0 + \beta_1 \Delta R_t^M + \beta_2 \Delta R_t^M \times \psi(savings)_{c,t-1} + \beta_3 \psi(savings)_{c,t-1} + \beta_4 X_{ct} + \eta_{ct}.$$

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	(0.043)	(0.007)				
Ɛ(t) x Average savings	0.027**	0.012**				
	(0.013)	(0.002)				
SPF Controls	No	No	No	No	Yes	Yes

- (V) and (VI) shows that results are robust to including additional controls for expectations of growth, inflation and unemployment rates from the Survey of Professional Forecasters.

State dependency of monetary policy

For county c in quarter t, we estimate

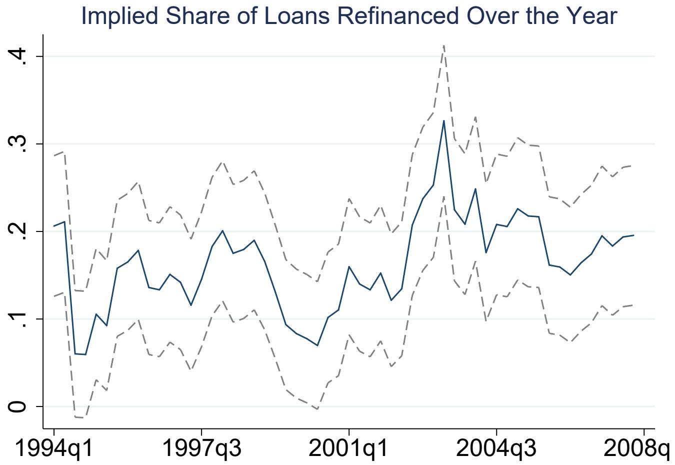
$$\rho_{c,t+4} = \beta_0 + \beta_1 \Delta R_t^M + \beta_2 \Delta R_t^M \times \psi(savings)_{c,t-1} + \beta_3 \psi(savings)_{c,t-1} + \beta_4 X_{ct} + \eta_{ct}.$$

	Regression on Futures (I)	Regression on Δ 2-yr Treasury (II)	IV using Futures (III)	IV using Δ 2-yr Treasury (IV)	IV using Futures (V)	IV using Δ 2-yr Treasury (V)
ΔR(t)			-0.169	-0.040*	-0.164*	-0.048*
			(0.081)	(0.023)	(0.082)	(0.023)
ΔR(t) x Fraction positive savings			0.132***	0.267***	0.497***	0.298***
			(0.027)	(0.043)	(0.128)	(0.046)
Ɛ(t)	-0.110	-0.010				
	(0.106)	(0.012)				
Ɛ(t) x Fraction positive savings	0.403***	0.112***				
	(0.139)	(0.017)				
SPF Controls	No	No	No	No	Yes	Yes

- An additional 10 ppt increase in fraction of loans with positive potential savings increases the share of loans refinanced by 1.3-5 ppts in response to a 1ppt decline in rates.

Implied refinancing rate to a 1ppt expansionary shock

$$\beta_0 + \beta_1 \epsilon_t + \beta_2 \epsilon_t \times \text{(Average Savings)}_t$$



Real outcomes

Besides state dependency in refinancing, explore state dependency of

- Employment responses
- Auto sale responses.

Household model: set-up

1. Life-cycle
2. Idiosyncratic income risk and aggregate shocks
3. Assets: - liquid one-period asset
   - illiquid housing and fixed rate mortgage
4. Fixed costs of adjusting the mortgage and housing
5. Borrowing constraints: short-term constraint; mortgage constraint

Demographics and preferences

- Households can live up to $T = 60$ periods: Work for 40, retired for 20. Probability of survival π_a.
- Preferences

$$\frac{\left(c_{jat}^{\alpha} \cdot h_{jat}^{1-\alpha}\right)^{1-\sigma} - 1}{1-\sigma}$$

Bequest motive

$$B\left(W_{jat}^{1-\sigma} - 1\right)/(1-\sigma)$$

Labor income

- Labor income process for household j of age a at time t:

$$\log(y_{jat}) = \chi_{ja} + \eta_{jat} + \phi_a(y_t/y)$$

χ_{ja} = age-dependent component and η_{jat} = idiosyncratic component

$$\eta_{jat} = \rho_\eta \eta_{j,a-1,t-1} + \psi_{jt}$$

- Retirement income modeled as in Guvenen and Smith (2014).

Structure of fixed-rate mortgages

Household j who enters a loan at age a in date 0:

- Has a fixed rate R_{ja0} and payment M_{ja0}.
- Principal evolves as: $b_{j,a+1,t+1} = b_{jat}(1 + R_{ja0}) - M_{ja0}$.
- Mortgages are amortized over remaining life of the individual.
- Maximum allowable mortgage: $b_{ja0} \leq (1 - \phi)p_0 h_{ja0}$.
- Fixed cost F applies to refinancing and new loans.

Value function

Value function of household with state set z (suppressing j and t):

$$V(z) = \max u(c, h') + \beta E\left[V(z')\right]$$

where

$$h' = h^r 1(rent) + h'^o \left(1 - 1(rent)\right)$$

Choice variables

- Housing: $1(rent)$ and if so h^r
- Loan adjustment: b' and h'^o
- Other: c and s'

States

- Individual states: a, s, h^o, b, R, y
- Aggregate states: S

Budget constraints

$$V(z) = \max\{V(z)^{\text{own \& adjust}}, V(z)^{\text{own \& noadjust}}, V(z)^{\text{rent}}\}$$

- if own home and adjust loan:

$$c + s' - b' + b(1+R) + p\left[h'^{o} - (1-\delta)h^{o}\right] = y + (1+r)s - F$$

$$\text{where } R' = r^{d(a)}$$

- if own home and do not adjust loan:

$$c + s' = y + (1+r)s - M$$

$$\text{where } h'^{o} = (1-\delta)h^{o} \text{ and } R' = R$$

- if rent:

$$c + s' + p^{r}h^{r} = y + (1-\delta)ph^{o} + (1+r)s - b(1+R)$$

Borrowing constraints

Short-term asset constraint

$$s' \geq -\underline{s}$$

Mortgage constraint

$$b' \geq -(1-\phi)ph'^{o}$$

which applies if loan is new or refinanced

Exogenous aggregate state variables

- Aggregate state variables

$$S = B_0 + B_1 \cdot S_{-1} + u$$

where $S = [\log y, \log(p), r]$ and $u = \Gamma(\epsilon) + \phi$

$\epsilon \sim N(0, \sigma_\epsilon)$ and $\phi \sim N(0, V)$.

- Mortgage rate on a d period loan

$$r^d = \alpha_{0,d} + \alpha_{1,d} r + \alpha_{2,d} y$$

- Rental rate

$$log(p^R) = \lambda_0 + \lambda_1 r + \lambda_2 y + \lambda_3 \log(p)$$

Actual vs fitted series Coefficients

Model calibration

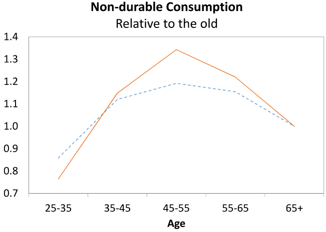
Exogenously set parameters:

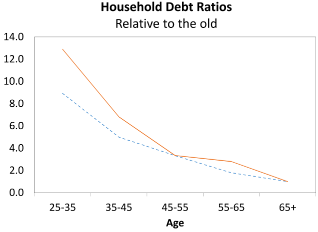
- Model is annual
- Intertemporal elasticity $\sigma = 2$
- Depreciation rate of housing $\delta = 3\%$
- Collateral constraint $\phi = 0.2$
- Income process with $\rho = 0.91, \sigma_y = 0.21$ (Hurst et al, 2014)
- Income exposure to aggregate shocks: ϕ_a from CPS

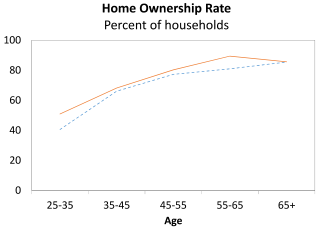
Calibrated parameters:

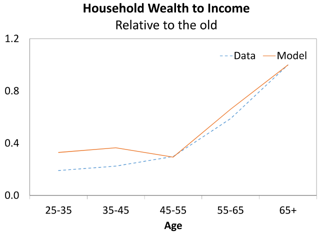
- Utility parameter $\alpha = 0.88$ and discount rate $\beta = 0.962$ chosen to match $W/Y = 2.3$ and homeownership rate $= 66\%$.
- $F =$ approximately $5K$ (3% of median house price) chosen to match average quarterly fraction of loans refinanced of 4.5%.

Model fit: Life-cycle moments









Model fit: Refinancing and Potential Savings Correlation

Model fit: State dependency of monetary policy

- Start the simulation from steady state.
- Feed in actual prices and real variables from 1995 to 2007.
- Compute household's decisions.
- Regress refinancing propensities on monetary policy shocks and its interactions with potential savings moments.

	Regression on shocks	
	Data	**Model**
	(I)	**(II)**
Ɛ(t)	0.116	0.052
	(0.043)	(0.011)
Ɛ(t) x Average savings	0.027	0.021
	(0.013)	(0.001)
Ɛ(t)	-0.110	0.022
	(0.106)	(0.002)
Ɛ(t) x Fraction positive savings	0.403	0.329
	(0.139)	(0.017)

State dependency of monetary policy

To highlight the state dependency of monetary policy, consider the effect of a 1ppt rate cut following:

- a sequence of rate hikes vs. maintaining a constant rate
- a sequence of deep rate cuts vs a shallow rate cut cycle

State dependency of monetary policy: Example 1

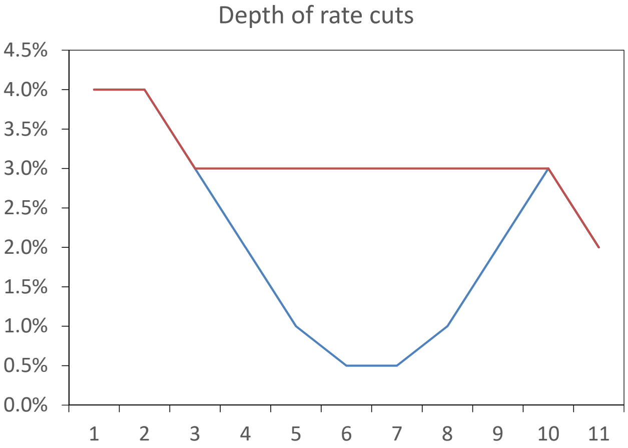
Expectations

State dependency of monetary policy: Example 1

	Rate Path Prior to a 1ppt rate cut	Fraction refinanced	Fraction positive savings	Change in consumption
(i)	Flat at 4%	94%	44%	2.1%
(ii)	Rising each year from 4% to 8% over 5 periods	25%	1%	1.2%

- Rate hikes prior leads to lower refinancing to future rate cuts.

State dependency of monetary policy: Example 2

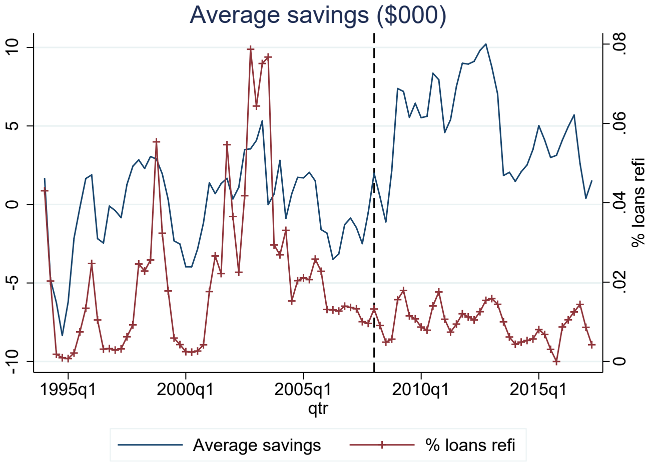


Conclusion

- There is substantial variation in the distribution of rates and potential savings from refinancing over time.
- The refinancing response depends on the distribution of rates.
- The effect of monetary policy depends on the distribution of rates and potential savings at the time of the rate cut:
  - Rate hikes prior leads to lower refinancing to future rate cuts.
  - Deeper rate cuts in the past leads to lower refinancing responses to future rate cuts.

Spare slides

More people refinance when savings are higher



Focus on the pre-2008 period.

County-level refinancing and savings distribution

We estimate at the county-level:

$$\text{Fraction refi}_{ct} = \beta_0 + \beta_1 \psi(\text{Savings})_{ct} + \gamma X_{ct} + \eta_{ct}$$

- We consider different moments of the savings distribution $\psi_c t$: Fraction of loans with positive savings and average savings in county c at time t.
- X_{ct}: county-level controls (house price growth, unemployment rate).

County-level refinancing and savings distribution

$$\text{Fraction refi}_{ct} = \beta_0 + \beta_1 \psi(\text{Savings})_{ct} + \gamma X_{ct} + \eta_{ct}$$

	Refi over the next year			
	(I)	(II)	(III)	(IV)
Fraction of loans with savings > 0	0.269***		0.189***	
	(0.010)		(0.014)	
Average positive savings ($000)		0.035***		0.024***
		(0.001)		(0.002)
County Fixed Effects	Yes	Yes	Yes	Yes
Local area controls				
- House prices	No	No	Yes	Yes
- Unemployment rate	No	No	Yes	Yes

- Effects are large and significant. 2-3 years
- If average savings rise by $10K, 19-27% more mortgages refinance.

Household-level refinancing and savings distribution

$$1(refi)_{ht} = \beta_0 + \beta_1 \psi(\text{Savings})_{ht} + \gamma X_{ht} + \eta_{ht}$$

	Refi over the next year			
	(I)	(II)	(III)	(IV)
1(savings>0)	0.101***		0.100***	
	(0.003)		(0.003)	
Savings ($000)		0.009***		0.01***
		(0.001)		(0.001)
County Fixed Effects	Yes	Yes	Yes	Yes
Demographic controls	No	No	Yes	Yes

- Effects are large and significant. 2-3 years
- If average savings rise by $10K, 10% more mortgages refinance.

Household-level refinancing and savings

Savings ($000s)	Refi over the next year (I)	(II)	(II, b)
0 to 5	0.074*	0.011	0.034
	(0.012)	(0.012)	(0.025)
5 to 10	0.107***	0.036***	0.061***
	(0.013)	(0.014)	(0.028)
10 to 15	0.168***	0.080***	0.109***
	(0.014)	(0.015)	(0.030)
15 to 20	0.240***	0.130***	0.164***
	(0.014)	(0.016)	(0.032)
20 to 25	0.307***	0.183***	0.217***
	(0.015)	(0.033)	(0.059)
>25	0.351***	0.222***	0.257***
	(0.031)	(0.035)	(0.062)
Demographic controls	Yes	Yes	Yes
Fixed effects	None	Time	Time, plus local area controls
Local area controls:			
-- County house price growth	n.a.	n.a.	0.139***
			(0.027)
-- County unemployment rate	n.a.	n.a.	-0.246***
			(0.054)
R-squared	0.098	0.155	0.149
N	1,107,711	1,107,711	325,415

2-3 years

Fed actions affect the level of saving

Fed rate cuts can affect mortgage rates and therefore potential savings

$$\triangle \text{Mortgage rate}_t = \alpha_0 + \sum_k \alpha_k \epsilon_{t-k} + \eta_t$$

$$\psi\,(\text{Savings})_{ct} = \beta_0 + \sum_k \beta_k \triangle \text{Mortgage rate}_{t-k} + \eta_{ct}$$

for moment ψ of the savings distribution in county c quarter t.

	30-year	15-year	1-year	30-year	15-year	1-year
	(I)	(II)	(III)	(IV)	(V)	(VI)
Mortgage Rate	**Response to futures shock**			**Response to Δ 2-yr Treasury Rate**		
In changes	0.599***	0.585***	0.944***	1.133***	1.111***	0.596***
	(0.281)	(0.249)	(0.343)	(0.415)	(0.380)	(0.609)

2-3 years

Fed actions affect the level of saving

Fed rate cuts can affect mortgage rates and therefore potential savings

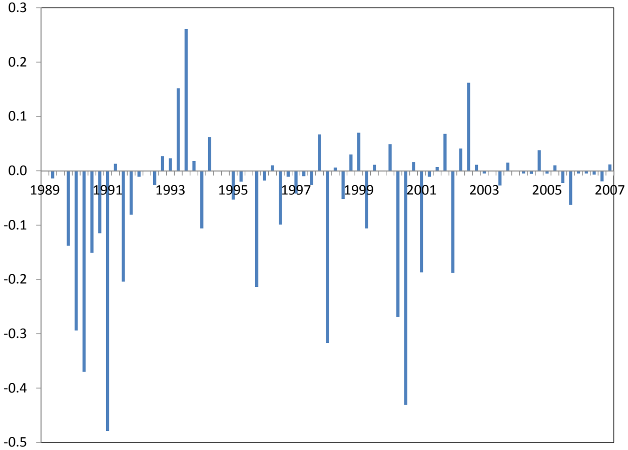
$$\triangle \text{Mortgage rate}_t = \alpha_0 + \sum_k \alpha_k \epsilon_{t-k} + \eta_t$$

$$\psi\,(\text{Savings})_{ct} = \beta_0 + \sum_k \beta_k \triangle \text{Mortgage rate}_{t-k} + \eta_{ct}$$

for moment ψ of the savings distribution in county c quarter t.

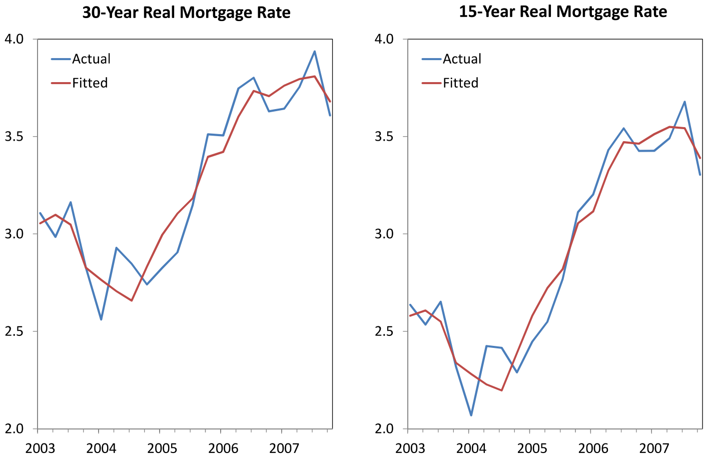
	Fraction with positive savings	Average savings
Δ Mortgage Rate (OLS)	0.345**	3.249*
	(0.108)	(1.712)
Δ Mortgage Rate (IV with Futures shock)	0.601***	5.539***
	(0.160)	(1.707)
Δ Mortgage Rate (IV with Treasury rate)	0.703***	7.110***
	(0.131)	(1.588)
Ɛ(t), Futures shock	0.126***	2.167***
	(0.102)	(1.002)
Ɛ(t), Treasury rate change	0.421**	3.917
	(0.163)	(2.140)

Identification of monetary policy shocks



Back to FF shocks

Actual and fitted interest rates



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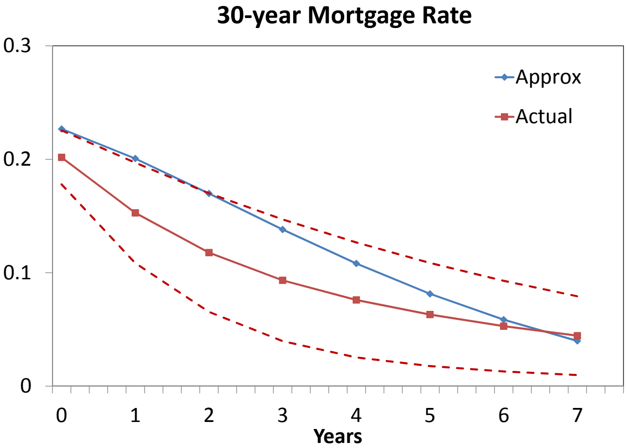
Interest rate responses to a 1ppt monetary policy shock



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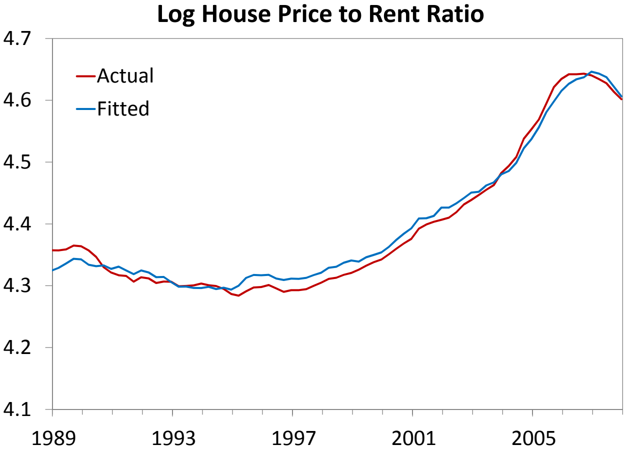
Actual and fitted log HP-to-rent ratio



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Aggregate processes: coefficients

Variables	$\log y_t$	$\log p_t$	r_t
$\log y_{t-1}$	0.9200	0.2857	-0.6344
	(0.0398)	(0.1011)	(7.3927)
$\log p_{t-1}$	0.002	0.9827	0.9629
	(0.005)	(0.0118)	(0.864)
r_{t-1}	-0.0001	-0.0013	0.9173
	(0.0002)	(0.0005)	(0.035)
constant	-0.0097	-4.5682	0.0930
	(0.1634)	(0.4146)	(30.323)

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Monetary policy shocks and aggregate variables

$$u_t = \Gamma_0 + \Gamma^+ \epsilon_t^+ + \Gamma^- \epsilon_t^- + \phi_t$$

	$u_t^{\log y_t}$	$u_t^{\log p_t}$	$u_t^{r_t}$
Γ^-	0.006	0.004	0.648
	(0.003)	(0.008)	(0.393)
Γ^+	0.001	-0.012	0.296
	(0.008)	(0.021)	(1.072)

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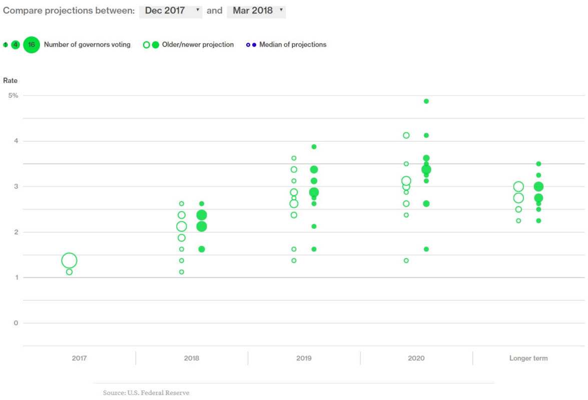
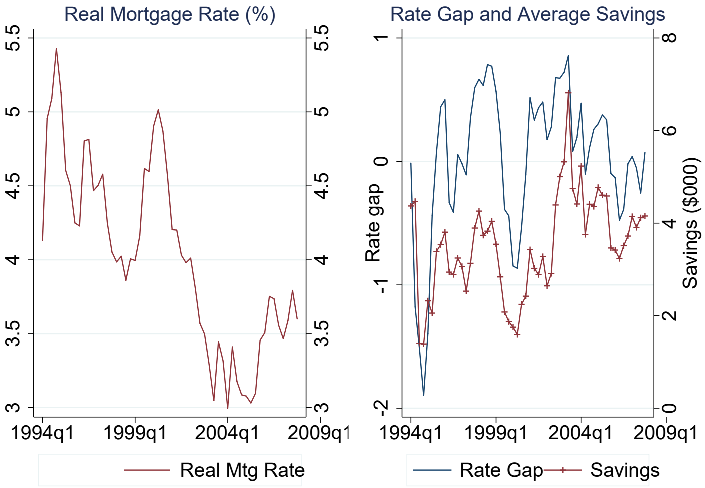
Experiment

How quickly should the Fed raise interest rates?

- One argument is to have room to cut rates in the future.
- Consider the effect of different monetary policy paths on refinancing.



Data: Mortgage rate gap and potential savings



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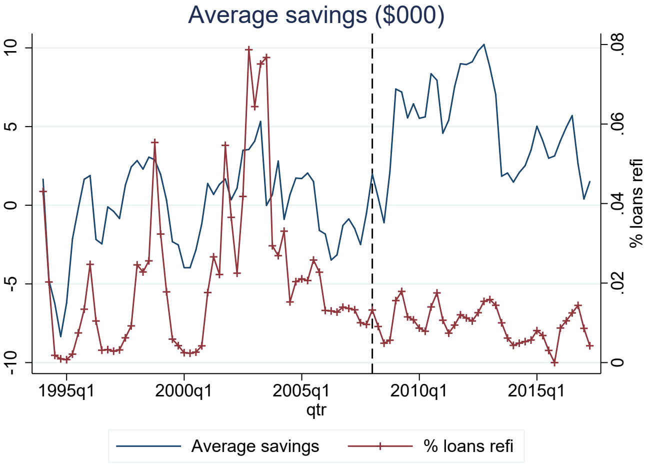
Refinancing relationship breaks down post 2007



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First stage estimates

For county c in quarter t, we estimate

$$\rho_{c,t+4} = \beta_0 + \beta_1 \Delta R_t^M + \beta_2 \Delta R_t^M \times \psi(savings)_{c,t-1} + \beta_3 \psi(savings)_{c,t-1} + \beta_4 X_{ct} + \eta_{ct}.$$

First stage when $\psi(savings)_{c,t-1}$ is average potential savings:

First stage y-variable:	ΔR(t)	ΔR(t) x Average savings	ΔR(t)	ΔR(t) x Average savings
Regressed on shock type:	**Futures shock (II)**	**Futures shock (II)**	**Δ 2-yr Treasury Rate (III)**	**Δ 2-yr Treasury Rate (IV)**
Ɛ(t)	0.695***	-1.291*	0.621***	0.507***
	(0.215)	(0.668)	(0.008)	(0.039)
Ɛ(t) x Average savings	0.311***	2.186***	0.034***	0.246***
	(0.051)	(0.227)	(0.004)	(0.024)
R-squared	0.3203	0.2933	0.4428	0.493

First stage estimates

For county c in quarter t, we estimate

$$\rho_{c,t+4} = \beta_0 + \beta_1 \Delta R_t^M + \beta_2 \Delta R_t^M \times \psi(savings)_{c,t-1} + \beta_3 \psi(savings)_{c,t-1} + \beta_4 X_{ct} + \eta_{ct}.$$

First stage when $\psi(savings)_{c,t-1}$ is fraction with potential savings:

First stage y-variable:	**ΔR(t)**	**ΔR(t) x Fraction positive savings**	**ΔR(t)**	**ΔR(t) x Fraction positive savings**
Regressed on shock type:	**Futures shock (II)**	**Futures shock (II)**	**Δ 2-yr Treasury Rate (III)**	**Δ 2-yr Treasury Rate (IV)**
Ɛ(t)	0.870	-0.174	0.748***	0.077***
	(0.702)	(0.252)	(0.014)	(0.008)
Ɛ(t) x Fraction positive savings	-0.033	1.048***	0.328***	0.370***
	(0.832)	(0.301)	(0.022)	(0.014)
R-squared	0.1112	0.0422	0.1725	0.14

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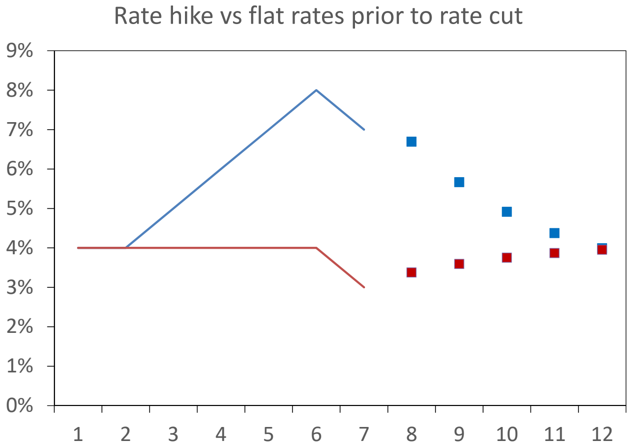
State dependency of monetary policy: Example 1



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