

# The Macroeconomic Effects of Government Asset Purchases: Evidence from Postwar U.S. Housing Credit Policy

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\*The views in this paper are those of the authors and do not necessarily reflect the views of the Federal Reserve Bank of Dallas or the Federal Reserve System.

## Main Questions

1. Do agency mortgage purchases influence availability of housing credit?
2. Are there broader macroeconomic effects, financial spillovers?

## Methodological Approach

1. Construct novel series on agency mortgage purchases, holdings
2. Narrative analysis of policy interventions affecting agency holdings
  - Spirit of Romer and Romer (1989, 2010), Ramey (2011)
3. Obtain causal evidence exploiting pre-crisis regulatory shocks
  - Estimate Local Projections-IV dynamic responses to agency purchases

▶ Related Literature

## Government Agencies of Focus

Government-sponsored enterprises (GSEs) **Fannie Mae** and **Freddie Mac**:

- Chartered by Congress to support secondary mortgage markets
- Purchase and/or securitize mortgages, no direct lending
- Federal regulation of balance sheet activity, eligible purchases

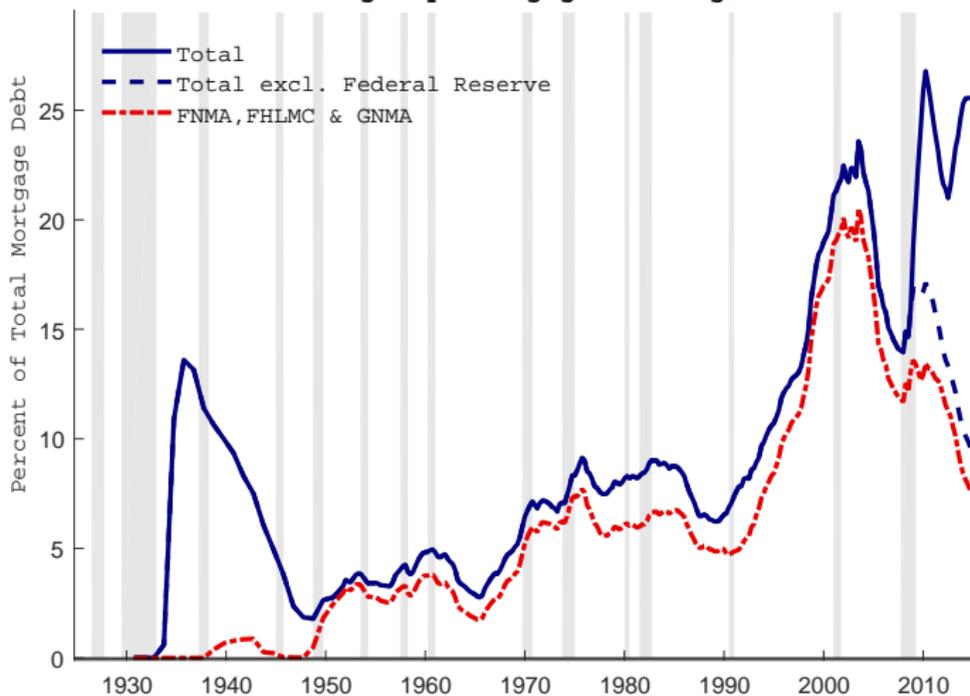
▶ Secondary Market Structure

Government agencies:

- **Ginnie Mae** (under HUD)
- Federal Reserve
- U.S. Treasury Department

Others: Federal Home Loan Banks, FHA, VA, HOLC, RTC, Farm Credit System, FDIC, PHA

## Agency Mortgage Holdings



Sources: Flow of Funds, agency publications, Federal Reserve Bulletin.

Notes: Grey bars are NBER-dated recessions.

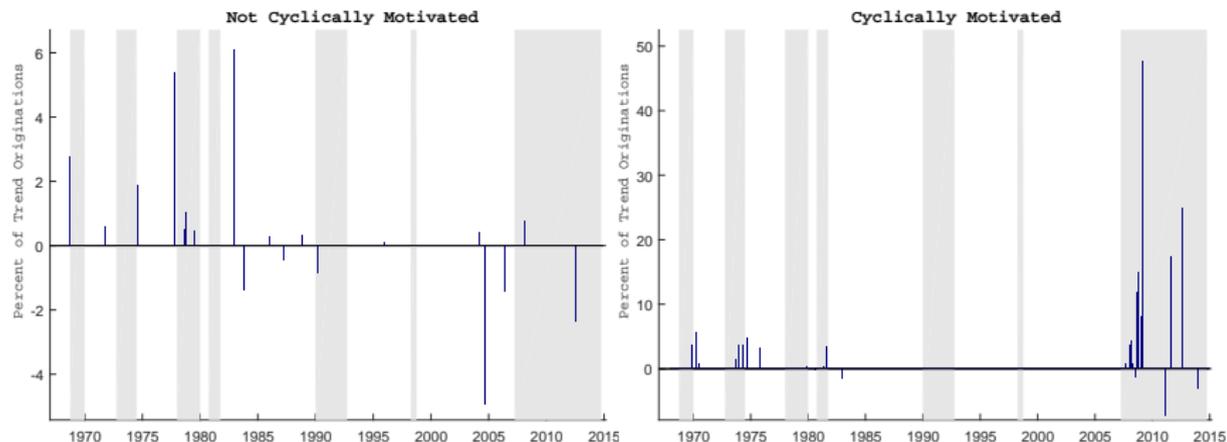
## “A Narrative Analysis of Mortgage Asset Purchases by Federal Agencies”

Fieldhouse and Mertens (2017)

1. Identify significant policy changes expected to affect agency portfolios
2. Quantify projected impact on agency holdings
3. Pinpoint timing of policy news being made public
4. Classify each as either cyclically or non-cyclically motivated
5. Restrict sample, starting January 1967

## Final Product of Narrative Analysis: Policy Instruments

Projected (annualized) impact on agency holdings, scaled to avg. trend originations:



Notes: Shaded areas are credit crunch periods

- 17 months w/ non-cyclically motivated regulatory events pre-crisis (19 total)
- 15 months w/ cyclically motivated regulatory events pre-crisis (28 total)

▶ Non-Cyclical

▶ Cyclical

▶ Great Recession

## Cumulative Dollar Credit Multipliers: Regression Specification

Cumulative impact on credit aggregates  $y_t$  at horizon  $h$  is estimated by LP-IV:

$$\frac{y_{t+h} - y_{t-1}}{X_t} = \alpha_h + \gamma_h \frac{\sum_{j=0}^h p_{t+j}}{X_t} + \varphi_h(L)Z_{t-1} + u_{t+h} \quad (1)$$

$p_t$ : commitments or purchases, instrumented with non-cyclical policies

$X_t$ : trend log real personal income as scale factor

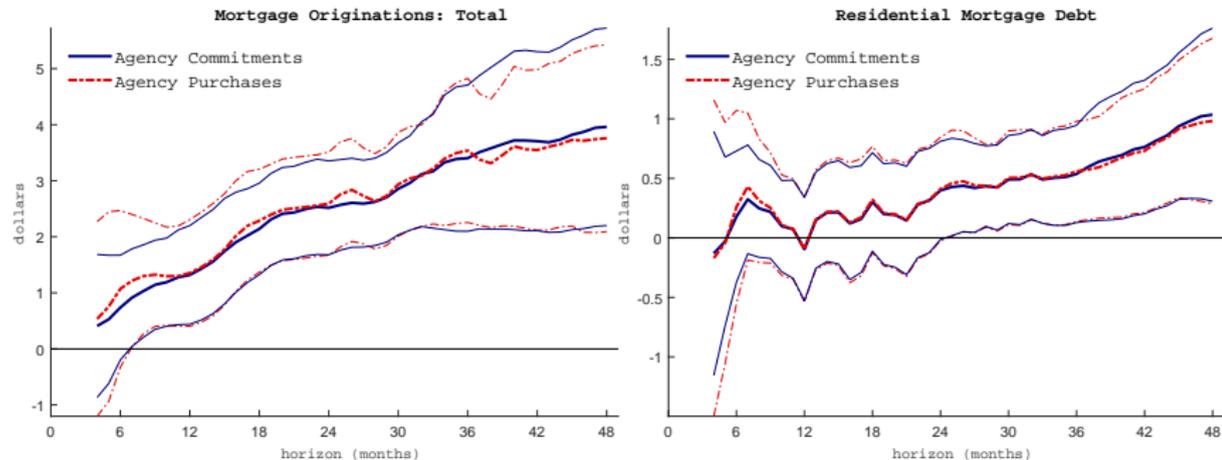
$\gamma_h$ : cumulative dollar credit multiplier over horizon  $h$ , estimated by 2SLS

Controls  $Z_t$ : 12 lags of scaled agency purchases and commitments, growth of a nominal house price index, core PCE price index, mortgage debt, housing starts, and log real originations, 3-month T-bill rate, 10-year Treasury rate, conventional mortgage rate, BAA-AAA spread, unemployment rate, real personal income growth

▶ First Stage

▶ LP-IV ID Assumptions

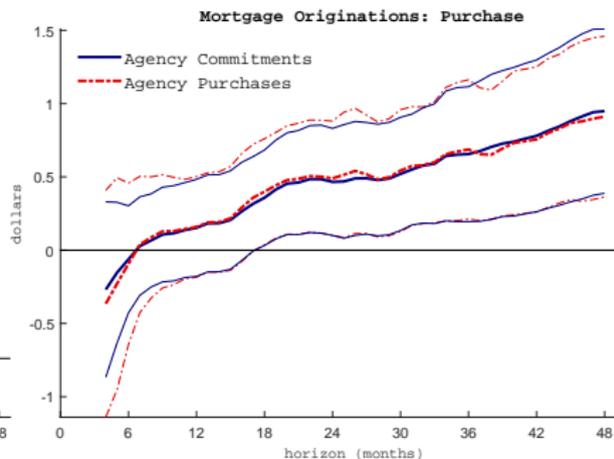
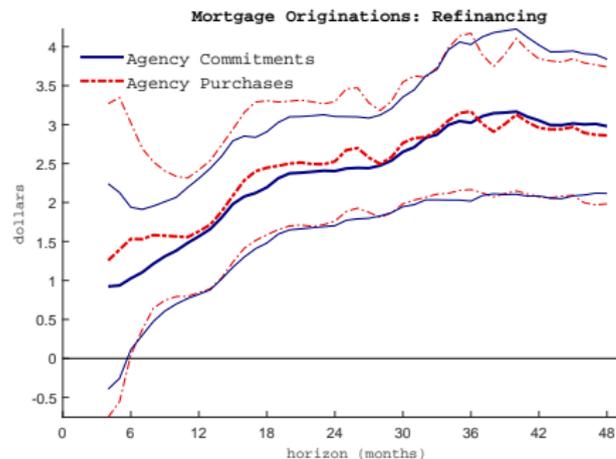
## Response to a One Dollar Increase in Agency Purchases: Mortgage Credit



Notes: Finer lines are 95% Newey and West (1987) confidence bands

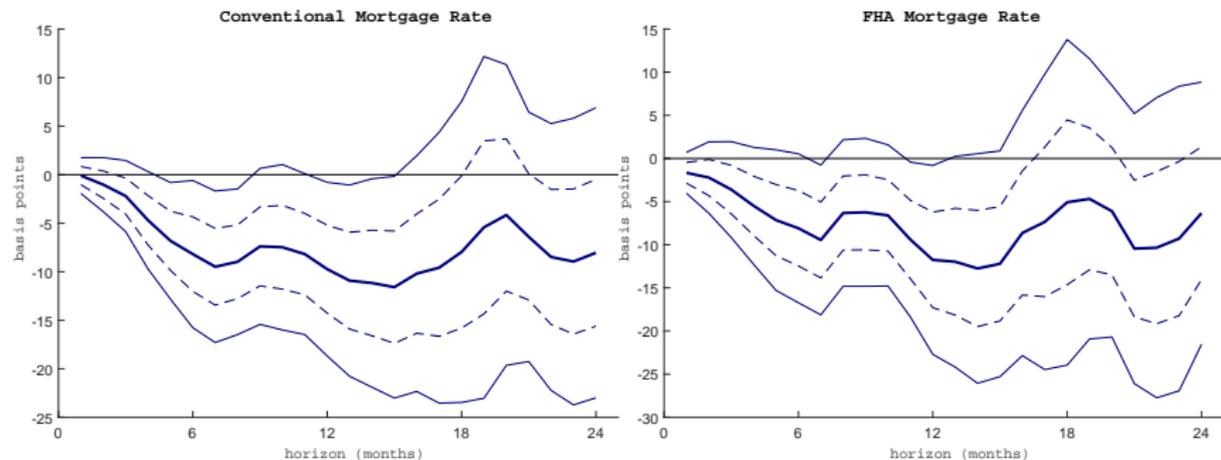
► Agency vs. Private Holdings

## Response to a One Dollar Increase in Agency Purchases: Refinancing



Notes: Finer lines are 95% Newey and West (1987) confidence bands.  
Sample excludes May 1985 – Dec. 1986 because of missing data on refinance shares.

## Impulse Responses to News Shocks: Mortgage Rates

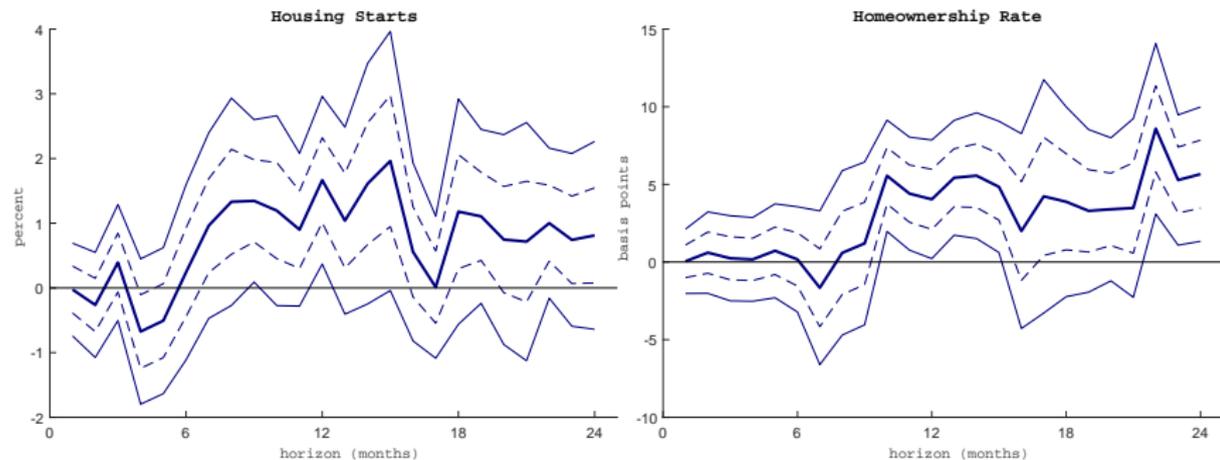


Notes: Finer lines are 68% and 95% Newey and West (1987) confidence bands.

► Mortgage Spreads

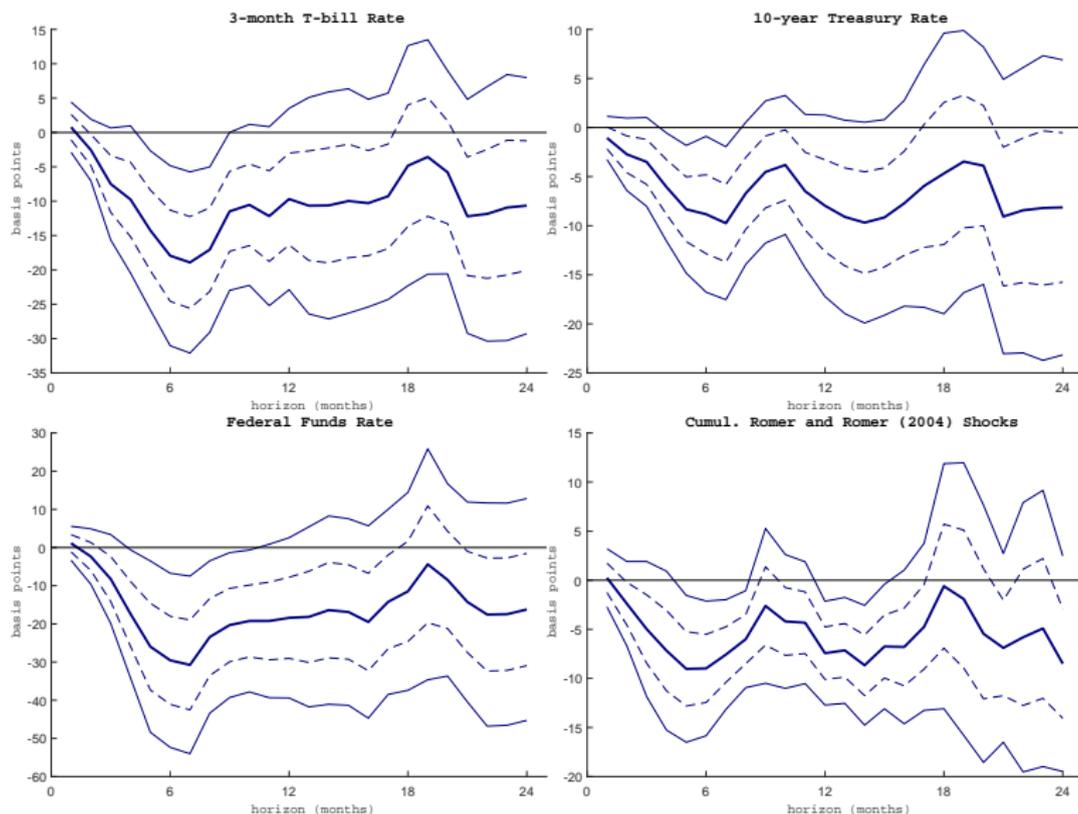
► Regression Modification

## Impulse Responses to News Shocks: Housing Activity



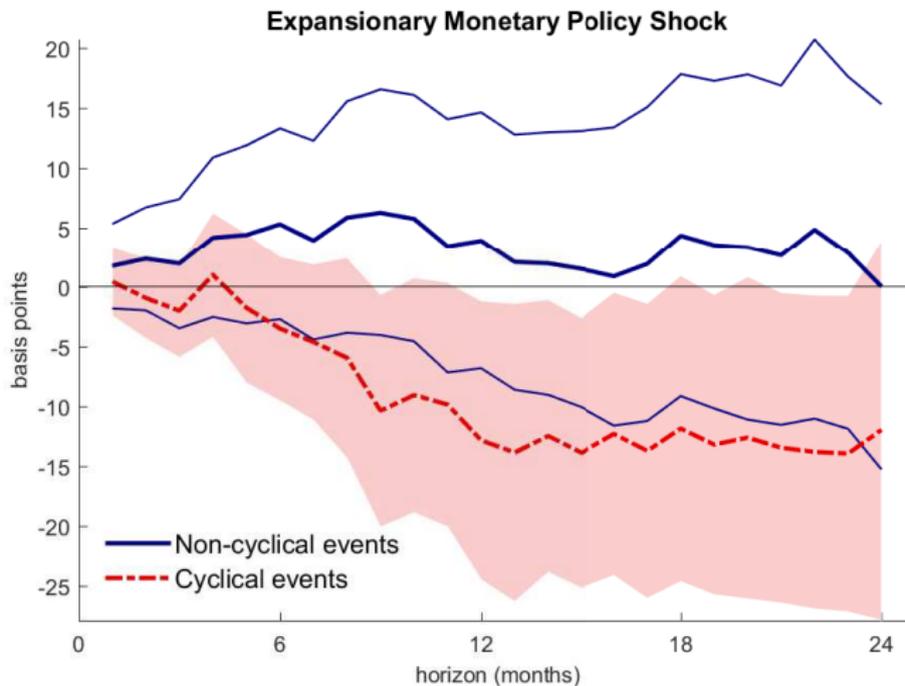
Notes: Finer lines are 68% and 95% Newey and West (1987) confidence bands.

# Impulse Responses to News Shocks: Treasury Yields and Monetary Policy



Notes: Finer lines are 68% and 95% Newey and West (1987) confidence bands.

## Credit Policy Responses to Romer and Romer (2004) Shocks



## Main Takeaways

- Neutrality of agency purchases is rejected

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  1. Increased volume of mortgage lending, refinancing
  2. Reductions in mortgage rates, Treasury yields
  3. Increases in housing starts, homeownership rates

## Main Takeaways

- Neutrality of agency purchases is rejected
- Positive regulatory shocks to agency mortgage purchases lead to:
  1. Increased volume of mortgage lending, refinancing
  2. Reductions in mortgage rates, Treasury yields
  3. Increases in housing starts, homeownership rates
- Significant interactions between credit policy, monetary policy
  1. Non-cyclically motivated credit policies predict changes in funds rate
  2. Cyclically motivated credit policies lean against Fed tightening

## **Appendix Slides**

## Related Empirical Work

### Impact on mortgage credit and residential investment:

Arcelus and Meltzer ('73), Meltzer ('74), Jaffee and Rosen ('78), Hendershott and Villani ('77,'80), Smith, Rosen, and Fallis ('88)...

### Impact on mortgage rates:

Hendershott and Shilling ('89), González-Rivera ('01), Naranjo and Toevs ('02), Lehnert, Passmore, and Sherlund ('08)

### Following QE:

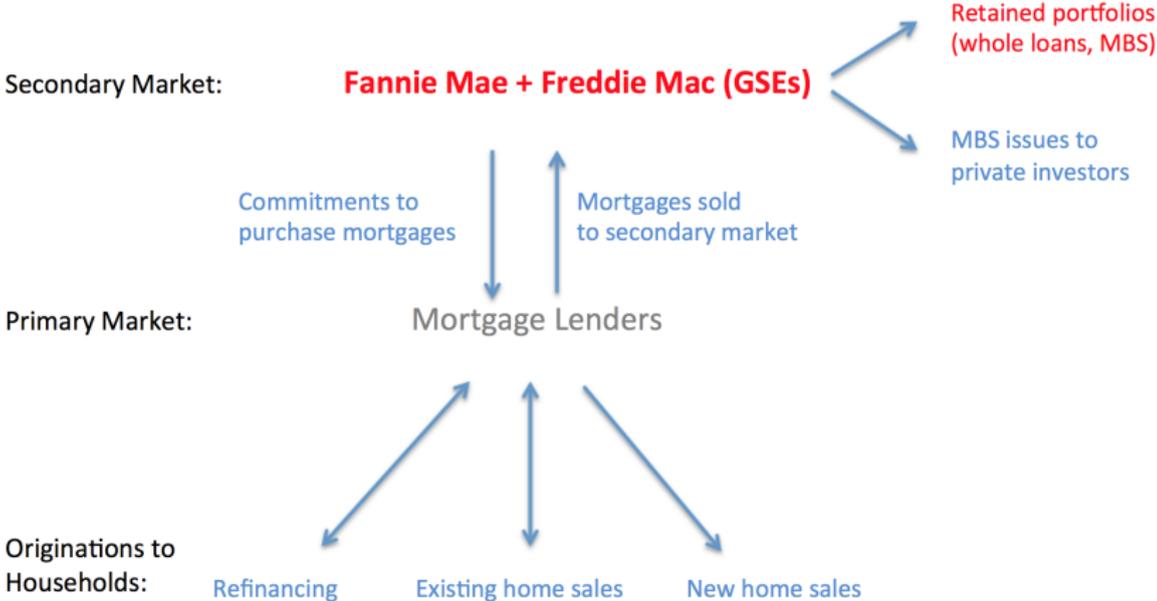
Gagnon et al. ('11), Krishnamurthy and Vissing-Jørgensen ('11), Patrabansh, Doerner, and Asin ('14), Hancock and Passmore ('15), Stroebel and Taylor ('12)...

Di Maggio, Kermani, and Palmer ('16), Chakraborty, Goldstein, and MacKinlay ('16), Darmouni and Rodnyansky ('17)

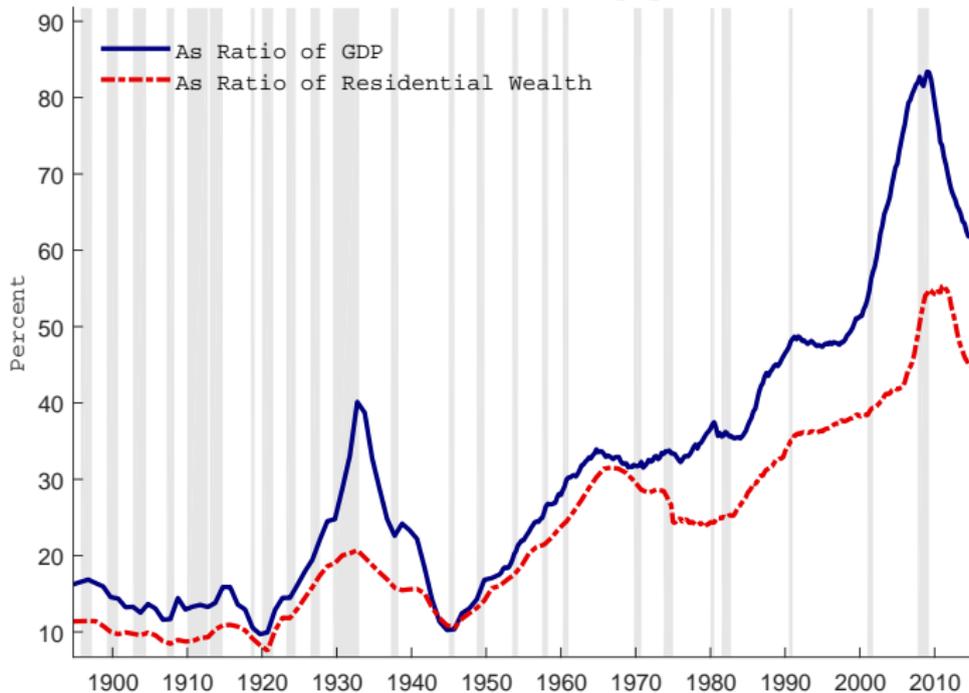
### Credit supply shocks:

Peek, Rosengren, and Tootell (2003), Gilchrist and Zakrajšek ('12), Bassett, Chosak, Driscoll, and Zakrajšek ('12), Mian, Sufi, and Verner ('17)...

# U.S. Secondary Mortgage Market Structure



## Residential Mortgage Debt



Source: Financial Accounts of the United States, Historical Statistics of the United States

Notes: Grey bars are NBER-dated recessions.

## Cumulative Dollar Credit Multipliers: First Stage

$$\frac{\sum_{j=0}^h p_{t+j}}{X_t} = \tilde{\alpha}_h + \tilde{\gamma}_h \frac{m_t}{X_t} + \tilde{\varphi}_h(L)Z_{t-1} + \tilde{u}_{t+h} \quad (2)$$

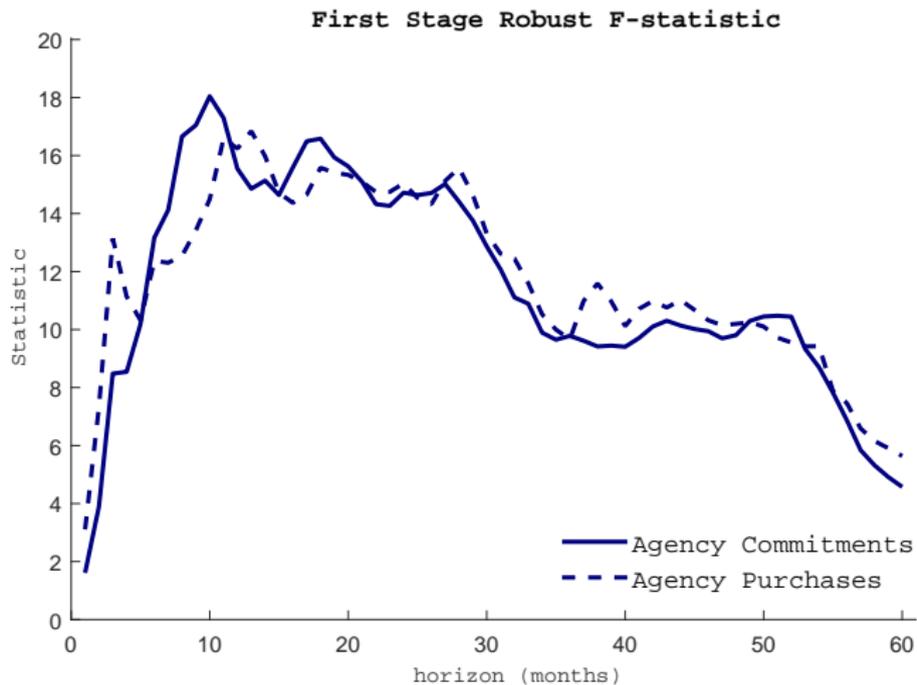
$p_t$ : total agency commitments or purchases (in real dollars)

$m_t$ : non-cyclically motivated narrative measure (in real dollars)

$X_t$ : trend log real personal income as scale factor

Controls  $Z_t$ : 12 lags of scaled agency purchases and commitments, growth of a nominal house price index, core PCE price index, mortgage debt, housing starts, and log real originations, 3-month T-bill rate, 10-year Treasury rate, conventional mortgage rate, BAA-AAA spread, unemployment rate, real personal income growth

## Cumulative Dollar Credit Multipliers: Instrument Relevance



We report IV estimates for month 4 to 48

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## Local Projections-IV as in Ramey (2016), Stock and Watson (2017)

Let  $m_t$  be a time series of instrumental variables, e.g., exogenous policy changes proxying an unobserved shock to  $Y_{1,t}$ .  $m_t$  can be used to estimate

$$Y_{i,t+h} = \Theta_{h,i1} Y_{1,t} + \varepsilon_{i,t+h}$$

provided the following conditions hold:

$$E(\varepsilon_{1,t} m'_t) \neq 0 \quad (\text{relevance})$$

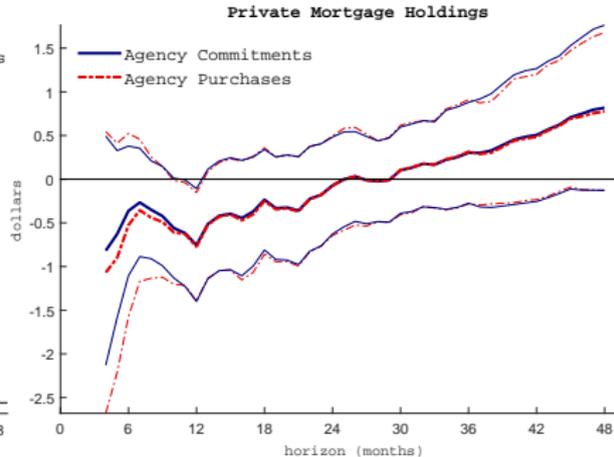
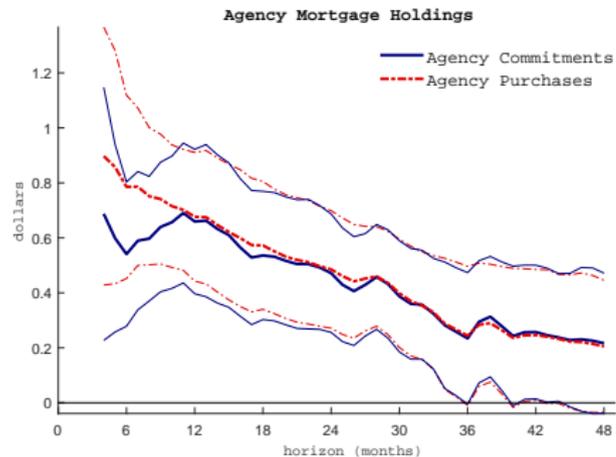
$$E(\varepsilon_{-1,t} m'_t) = 0 \quad (\text{contemporaneous exogeneity})$$

$$E(\varepsilon_{t+j} m'_t) = 0 \text{ for } j \neq 0 \quad (\text{lead/lag exogeneity})$$

First stage:  $Y_{1,t} = \delta m_t + u_{1,t}$ ,  $\hat{Y}_{1,t} = \hat{\delta} m_t$

Impulse responses identified up to a scale factor

## Response to a One Dollar Increase in Agency Purchases: Mortgage Holdings



Notes: Finer lines are 95% Newey and West (1987) confidence bands

## Impulse Responses to News Shocks: Regression Specification

$$y_{t+h} - y_{t-1} = \alpha_h + \delta_h \left( \frac{12}{8} \times \frac{\sum_{j=0}^7 p_{t+j}}{\tilde{X}_t} \right) + \varphi_h(L)Z_{t-1} + u_{t+h} \quad (3)$$

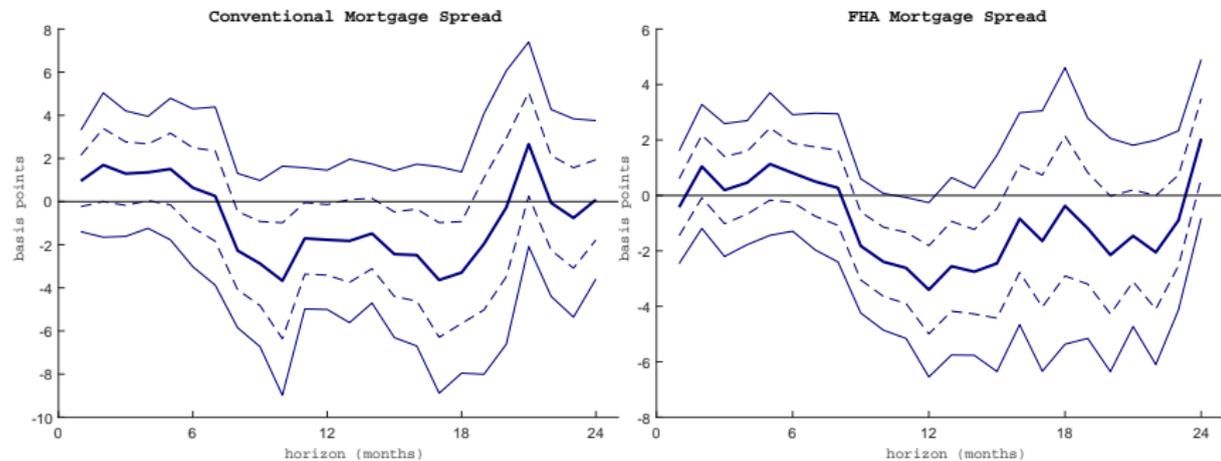
$y_t$ : outcome variable of interest

$p_t$ : agency commitments, 8-month sum proxies expected near-term purchases

$\tilde{X}_t$ : long-run trend of log real originations as scale factor

$\hat{\delta}_h$ : response to a 1 ppt increase in agency origination share, anticipated  $h$  periods before, estimated by 2SLS instrumenting  $p_t$  with non-cyclical policies

# Mortgage Spreads



Notes: Finer lines are 68% and 95% Newey and West (1987) confidence bands.

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**Table B1: Narrative Measures of Policy Changes: Non-Cyclically Motivated, 1967–2006**

Policy Description	Agency	Impact	News	Effective	Classification
HUDA 1968: Increased Debt-to-Capital Ratio	FNMA	+\$1.39 billion	Oct. 1968	Oct. 1968	Non-Cyclical
Conforming Mortgage Program Approval	FNMA	+\$0.4 billion	Nov. 1971	Feb. 1972	Non-Cyclical
HCDA 1974: Conforming Loan Limit	FNMA	+\$1.14 billion	Aug. 1974	Aug. 1974	Non-Cyclical
HCDA 1974: Conforming Loan Limit	FHLMC	+\$0.46 billion	Aug. 1974	Aug. 1974	Non-Cyclical
HCDA 1977: Conforming Loan Limit	FNMA	+\$4.82 billion	Oct. 1977	Oct. 1977	Non-Cyclical
HCDA 1977: Conforming Loan Limit	FHLMC	+\$0.21 billion	Oct. 1977	Oct. 1977	Non-Cyclical
HCDA 1977: Tandem Program Expansion	GNMA	+\$3.75 billion	Oct. 1977	Oct. 1977	Non-Cyclical
FY1979 Approps: Special Assistance	GNMA	+\$1.0 billion	Sep. 1978	Oct. 1978	Non-Cyclical
HCDA 1978: Mortgagee Expansion	FHLMC	+\$2.0 billion	Oct. 1978	May 1979	Non-Cyclical
FY1980 Approps: Special Assistance	GNMA	+\$1.0 billion	July 1979	Nov. 1979	Non-Cyclical
Increased Debt-to-Capital Ratio	FNMA	+\$6.25 billion	Dec. 1982	Dec. 1982	Non-Cyclical
FY1984 Supp. Approps: Tandem Repeal	GNMA	-\$2.92 billion	Nov. 1983	Nov. 1983	Non-Cyclical
Second Mortgage Program Approval	FHLMC	+\$1.0 billion	Jan. 1986	Jan. 1986	Non-Cyclical
Decreased Debt-to-Capital Ratio	FNMA	-\$2.7 billion	Apr. 1987	Dec. 1987	Non-Cyclical
Public Listing: Stock Split Capitalization	FHLMC	+\$1.62 billion	Nov. 1988	Nov. 1988	Non-Cyclical
FHEFSSA 1992: Capital Requirements	FNMA	-\$4.25 billion	Mar. 1990	Mar. 1990	Non-Cyclical
Affordable Housing Goals of 1995	FHLMC	+\$0.61 billion	Dec. 1995	Jan. 1996	Non-Cyclical
Affordable Housing Goals of 2004	FNMA	+\$7.6 billion	Apr. 2004	Jan. 2005	Non-Cyclical
Affordable Housing Goals of 2004	FHLMC	+\$7.6 billion	Apr. 2004	Jan. 2005	Non-Cyclical
Accounting Scandal: Capital Surcharge	FNMA	-\$141.4 billion	Sep. 2004	Sep. 2004	Non-Cyclical
Portfolio Growth Limit Imposed	FHLMC	-\$42.8 billion	June 2006	July 2006	Non-Cyclical

**Table B2: Narrative Measures of Policy Changes: Cyclically Motivated, 1967–2006**

Policy Description	Agency	Impact	News	Effective	Classification
Increased Debt-to-Capital Ratio	FNMA	+\$1.13 billion	Dec. 1969	Dec. 1969	Cyclical
HUDA 1969: Special Assistance	GNMA	+\$0.75 billion	Dec. 1969	Dec. 1969	Cyclical
Treasury-Guaranteed Capitalization	FNMA	+\$2.6 billion	Apr. 1970	Apr. 1970	Cyclical
EHFA 1970: Special Assistance	GNMA	+\$0.38 billion	July 1970	July 1970	Cyclical
FHA/VA Tandem Authorization	GNMA	+\$1.5 billion	Sep. 1973	Sep. 1973	Cyclical
FHA/VA Tandem Authorization	GNMA	+\$3.3 billion	Jan. 1974	Jan. 1974	Cyclical
Subsidized Mortgage Purchase Program	FHLMC	+\$1.5 billion	May 1974	May 1974	Cyclical
FHA/VA Tandem Authorization	GNMA	+\$1.65 billion	May 1974	May 1974	Cyclical
EHPA 1974: Tandem Program	GNMA	+\$3.88 billion	Oct. 1974	Oct. 1974	Cyclical
FY1976 Approps: Tandem Program	GNMA	+\$2.5 billion	Oct. 1975	Oct. 1975	Cyclical
HCDA 1979: Conforming Loan Limit	FHLMC	+0.86 billion	Dec. 1979	Dec. 1979	Cyclical
FY1981 Approps: Special Assistance	GNMA	-\$0.2 billion	Sep. 1980	Dec. 1980	Cyclical
ARM Program Approval	FHLMC	+\$0.37 billion	May 1981	July 1981	Cyclical
ARM Program Approval	FNMA	+\$0.4 billion	June 1981	Aug. 1981	Cyclical
Second Mortgage Program Approval	FNMA	+\$5.0 billion	Sep. 1981	Nov. 1981	Cyclical
FY1982 Approps: Special Assistance	GNMA	+\$0.17 billion	Dec. 1981	Dec. 1981	Cyclical
FY1983 Approps: Special Assistance	GNMA	-\$1.47 billion	Dec. 1982	Dec. 1982	Cyclical

**Table B3: Narrative Measures of Policy Changes: 2007–2014**

Policy Description	Agency	Impact	News	Effective	Classification
Portfolio Limit Increase	FNMA	+\$17.15 billion	Sep. 2007	Sep. 2007	Cyclical
Portfolio Limit Increase	FHLMC	+\$2.14 billion	Sep. 2007	Sep. 2007	Cyclical
ESA 2008: Jumbo Loan Limit	FNMA	+\$41.57 billion	Feb. 2008	Apr. 2008	Cyclical
ESA 2008: Jumbo Loan Limit	FHLMC	+\$41.57 billion	Feb. 2008	Apr. 2008	Cyclical
Removal of Portfolio Limit	FNMA	+\$9.28 billion	Feb. 2008	Mar. 2008	Non-Cyclical
Removal of Portfolio Limit	FHLMC	+\$9.05 billion	Feb. 2008	Mar. 2008	Non-Cyclical
Reduced Capital Surcharge	FNMA	+\$53.33 billion	Mar. 2008	Mar. 2008	Cyclical
Reduced Capital Surcharge	FHLMC	+\$43.33 billion	Mar. 2008	Mar. 2008	Cyclical
Reduced Capital Surcharge	FNMA	+\$17.75 billion	May 2008	May 2008	Cyclical
HERA 2008: Jumbo Loan Limit	FNMA	-\$13.34 billion	July 2008	Jan. 2009	Cyclical
HERA 2008: Jumbo Loan Limit	FHLMC	-\$13.34 billion	July 2008	Jan. 2009	Cyclical
Conservatorship: Portfolio Limit Increase	FNMA	+\$67.5 billion	Sep. 2008	Sep. 2008	Cyclical
Conservatorship: Portfolio Limit Increase	FHLMC	+\$66.75 billion	Sep. 2008	Sep. 2008	Cyclical
MBS Purchase Program Launch	Treasury	+\$80.0 billion	Sep. 2008	Sep. 2008	Cyclical
QE1 Launch	Fed	+\$250.0 billion	Nov. 2008	Dec. 2008	Cyclical
ARRA 2009: Jumbo Loan Limit	FNMA	+\$13.34 billion	Feb. 2009	Feb. 2009	Cyclical
ARRA 2009: Jumbo Loan Limit	FHLMC	+\$13.34 billion	Feb. 2009	Feb. 2009	Cyclical
HASP: Portfolio Limit Increase	FNMA	+\$50.0 billion	Feb. 2009	May 2009	Cyclical
HASP: Portfolio Limit Increase	FHLMC	+\$50.0 billion	Feb. 2009	May 2009	Cyclical
QE1 Expansion	Fed	+\$750.0 billion	Mar. 2009	Mar. 2009	Cyclical
MBS Purchase Program Sales	Treasury	-\$120.0 billion	Mar. 2011	Mar. 2011	Cyclical
Agency MBS Reinvestment	Fed	+\$262.0 billion	Sep. 2011	Sep. 2011	Cyclical
Third SPSPA Amendment	FNMA	-\$22.16 billion	Aug. 2012	Aug. 2012	Non-Cyclical
Third SPSPA Amendment	FHLMC	-\$22.16 billion	Aug. 2012	Aug. 2012	Non-Cyclical
QE3 Launch	Fed	+\$480.0 billion	Sep. 2012	Sep. 2012	Cyclical
QE3 Taper	Fed	-\$60.0 billion	Dec. 2013	Jan. 2014	Cyclical