

# Monetary Policy Across the Wealth Distribution

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## Motivation and background

- Federal Reserve's policy actions following the Global Financial Crisis ...
  - **Ultra-expansionary stance** with asset purchase programs and interest rate cuts.
- ...have drawn **harsh criticism regarding the role of monetary policy** in widening inequality.
  - Expansionary policy blamed for raising asset prices and fueling wealth inequality:

### The New York Times How Quantitative Easing Contributed to the Nation's Inequality Problem

BY WILLIAM D. COHAN    OCTOBER 22, 2014 1:56 PM    108

FINANCIAL TIMES

Monetary policy widens the gulf  
between poor and rich economies

Chris Giles JANUARY 11 2022

### THE WALL STREET JOURNAL *How the Fed Favors The 1%*

By Mark Spitznagel  
April 19, 2012 7:16 pm ET

The left's low-rate fantasy makes  
inequality worse

Rana Foroohar OCTOBER 3 2021

## Motivation and background

- Obstacles to understanding the effects of monetary policy on wealth inequality:
  - **Frequency** of accessible wealth data not suitable.

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  - **Frequency** of accessible wealth data not suitable.
- Direct consequence:
  - Studies on the effects of monetary policy on wealth inequality are **underdeveloped** relative to studies on income inequality.

In this paper we use a novel dataset to fill this gap.

## This paper I

### – Research questions:

- What is the effect of surprise changes in monetary policy on wealth inequality?
- Are these effects heterogeneous on household balance sheets across the distribution?

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- Are these effects heterogeneous on household balance sheets across the distribution?

## – Data and research design:

- **Distributional Financial Accounts of the United States:** new **quarterly** measures of the distribution of household wealth since 1989.
- Distinguish between conventional (**interest rate changes**) and unconventional (**large-scale asset purchases**) monetary policy.
- Structural VARs (and local projections) to estimate the distributional effects of monetary policy shocks.

## This paper II: results and contribution

- We document several facts about the **distributional consequences** of monetary policy:
  - 1 Interest rate cuts and asset purchases **raise net wealth** across the wealth distribution ...
  - 2 ...and **shifts wealth shares** in favor of the top tail:
    - interest rate cuts (asset purchases) have long-lasting (temporary) effects on wealth inequality.
  - 3 Wealthier households enjoy larger increases in capital gains after both shock.



## Related literature

- Monetary policy and inequality:
  1. mixed evidence on income (Andersen et al., 2023; Casiraghi et al., 2018; Coibion et al., 2017; Colciago et al., 2019; El Herradia and Leroyb, 2021; Furceri et al., 2018; Kappes, 2021; Lenza and Slacalek, 2021; Mumtaz and Theophilopoulou, 2017)
  2. mixed evidence on wealth (Albert and Gómez-Fernández, 2021; Andersen et al., 2023; Casiraghi et al., 2018; Feilich, 2021; Lenza and Slacalek, 2021), **our paper fits here.**
- Heterogeneous portfolio returns are critical factors for wealth accumulation (Bach et al., 2020; Benhabib et al., 2019; Hubmer et al., 2021).

# Road-map

Motivation and background

**Data: The Distributional Financial Accounts of the United States**

Econometric methodology: identification and models

Results: the distributional effects of monetary policy

Monetary policy and heterogeneous capital gains

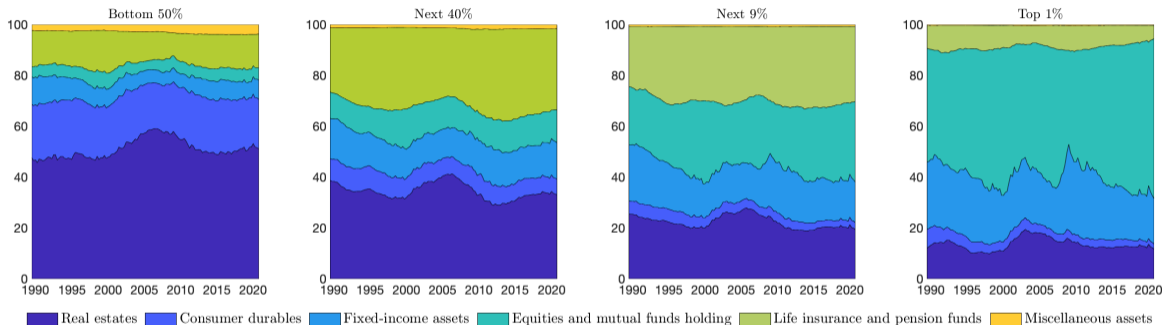
Concluding remarks

## The Distributional Financial Accounts of the United States

- New measure of the distribution of household wealth with detailed balance sheet information.
- Published by the Federal Reserve Board in mid-2019.
  - Sources: SCF - Forbes400 - Financial Accounts
  - Frequency: **quarterly**
- Trends in wealth inequality (wealth shares) comparable to other sources but major differences persist ([Blanchet et al., 2022](#); [Saez and Zucman, 2020](#)). [▶ Wealth shares](#)
- **This paper** is about the Bottom 50%, Next 40% (50-90%), Next 9% (90-99%) and Top 1% of the household wealth distribution. [▶ Portfolio heterogeneity](#)

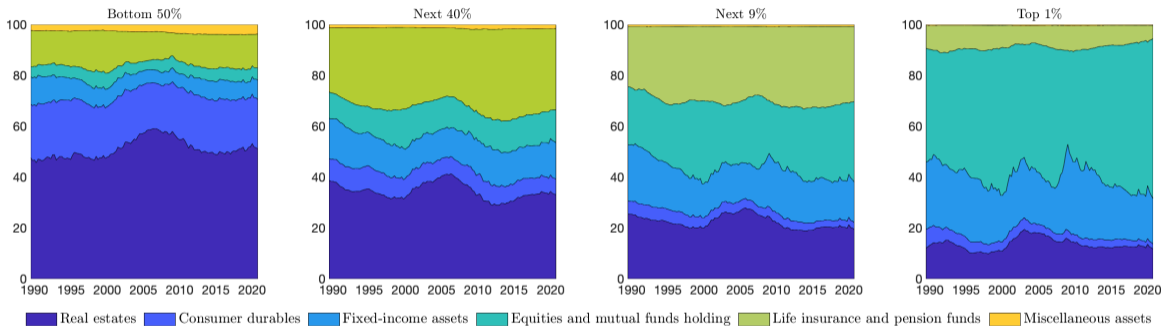
# Heterogeneous household portfolios across the wealth distribution

► Liabilities



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These differences are crucial because heterogeneity in household portfolios causes monetary policy to redistribute wealth (Brunnermeier et al., 2012).

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## The model

- Baseline Vector Autoregression (VAR) model:

$$\mathbf{y}_t = \mathbf{c} + \sum_{j=1}^4 \mathbf{B}_j \mathbf{y}_{t-j} + \mathbf{u}_t$$

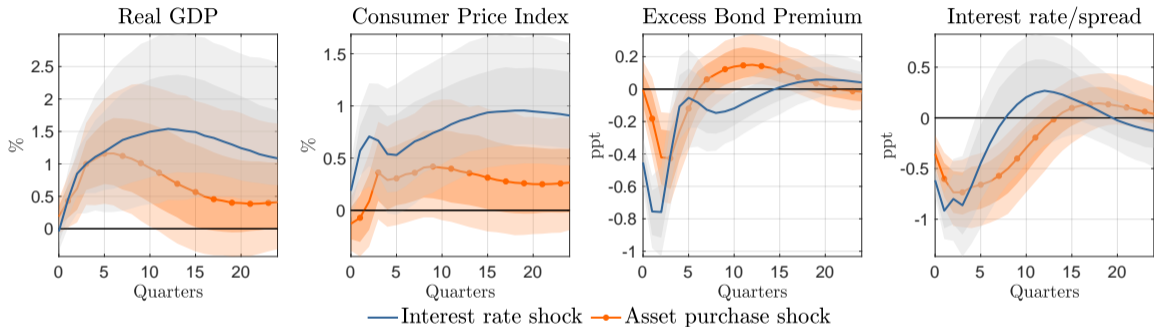
$\mathbf{y}_t = [\hat{s}_t^i, \text{Real GDP}_t, \text{CPI}_t, \text{Excess Bond Premium}_t, \text{Interest rate/spread}_t]'$  with  $i = \{FFR, LSAP\}$

- **Identification:** internal instrument approach ([Plagborg-Møller and Wolf, 2021](#)).

- Shocks are ordered first in vector  $\mathbf{y}_t$  and VAR identified with Cholesky.
- **Conventional monetary policy:** interest rate shock ([Jarociński and Karadi, 2020](#)).
- **Unconventional monetary policy:** large-scale asset purchase shock ([Swanson, 2021](#)). [▶ Details](#)

- **Estimation:** Bayesian techniques ([Giannone et al., 2015](#)).

## Macroeconomic effects of monetary policy



### *Response of macroeconomic variables to monetary policy shocks*

Impulse responses are scaled to imply a 1% response of real GDP after 3 quarters. Interest rate/spread is the 1-year Treasury rate or term spread (10-year minus 3-month Treasury yield). The estimation samples are 1989Q3-2019Q4 (conventional policy) and 1991Q3-2019Q2 (unconventional policy). Shaded areas are 68% and 90% posterior coverage bands.



## Estimating the distributional effects of monetary policy

- We augment the baseline model  $y_t$  with distributional variables from the DFA.
- **Group-level models with Distributional Financial Accounts data:**

$$\tilde{y}_t = [y_t, \text{DFA}_{1t}^i, \text{DFA}_{2t}^i, \dots, ]'$$

where  $\text{DFA}_{jt}^i$  is the (real) level of asset/liability  $j$  of each group  $i = \text{Bottom 50\%, \dots, Top 1\%}$ .

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where  $\text{DFA}_{jt}^i$  is the (real) level of asset/liability  $j$  of each group  $i = \text{Bottom 50\%, \dots, Top 1\%}$ .

- We include: real estate, pension entitlements, corporate equities and investment fund shares, equity in noncorporate business, home mortgages, net wealth (assets - liabilities).
- These balance sheet components make up:
  - between 88% and 94% of total assets.
  - more than 90% of total liabilities (72% for the Top 1%).

# Road-map

Motivation and background

Data: The Distributional Financial Accounts of the United States

Econometric methodology: identification and models

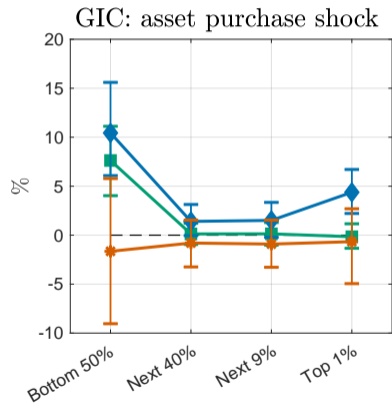
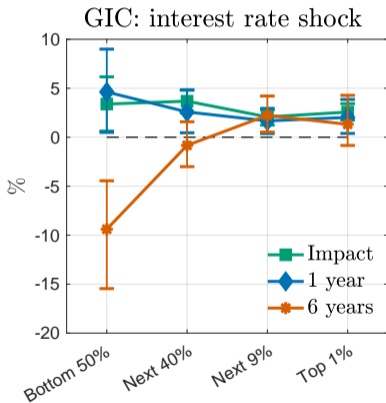
**Results: the distributional effects of monetary policy**

Monetary policy and heterogeneous capital gains

Concluding remarks

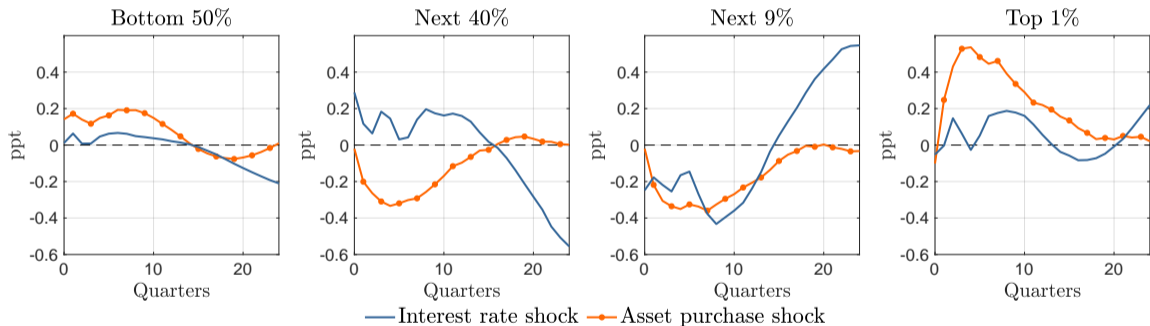
# The distributional consequences for wealth shares

## 1. Estimate the effects of both shocks on wealth levels:



# The distributional consequences for wealth shares

## 1. Calculate the implied responses of wealth shares:



*Response of implied wealth shares to monetary policy shocks*

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## Monetary policy and inequality

There are many channels that links monetary policy to inequality (McKay and Wolf, 2023):

- **Labor income:** as households are differently exposed to fluctuations in labor market conditions.
- **Nominal wealth redistribution:** surprise inflation redistribute from savers to borrowers.
- **Mortgage payments:** Mortgagors can safeguard against interest rate fluctuations by refinancing their existing mortgage contract (true at least for the US).
- **Asset prices:** heterogeneity in the composition of household portfolios imply heterogeneous capital gains.

## Measuring capital gains

- We start from the observation that, at the aggregate level, changes in any asset  $j$  between two periods can be decomposed as follows:

$$\underbrace{A_{j,t+1} - A_{j,t}}_{\text{Economic flow}} = \underbrace{F_{j,t}}_{\text{Transactions}} + \underbrace{R_{j,t}}_{\text{Revaluations}} + \underbrace{V_{j,t}}_{\text{Other changes in volume}}$$

- The above accounting identity applies also to aggregate wealth. We take a measure of Revaluation from holding gains and losses (capital gains)  $\Rightarrow$  Financial Accounts of the U.S.



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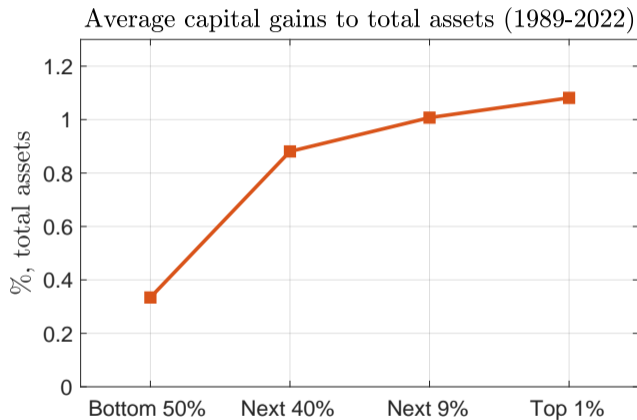
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- Then, we distribute total capital gains to each group  $i$  based on their wealth shares:

$$R_t^i = \left( \frac{W_t^i}{W_t} \right) R_t$$

- Following [Fagereng et al. \(2020\)](#): we compute capital gains (% total assets)  $r_t^i = \frac{R_t^i}{A_{t-1}^i}$

## Heterogeneous capital gains



- Capital gains feature scale dependence: wealthier households enjoy higher capital gains.

## Monetary policy, asset prices, and differential wealth growth

- **Channel:** monetary policy can lead to differential wealth growth via **capital gains** if:
  - (1) Portfolios are heterogeneous (we show this).
  - (2) Asset prices respond to monetary policy shocks ([Bernanke and Kuttner, 2005](#)).

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  - (1) Portfolios are heterogeneous (we show this).
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- Testing for the (**portfolio composition**) **channel**:
  - (1) Does monetary policy have heterogeneous effects on capital gains across the distribution?
  - (2) Do monetary policy shocks explain fluctuations in capital gains?

# Monetary policy, asset prices, and differential wealth growth

- Testing for the channel 1/2:

(1) does monetary policy have heterogeneous effects on capital gains along the distribution?

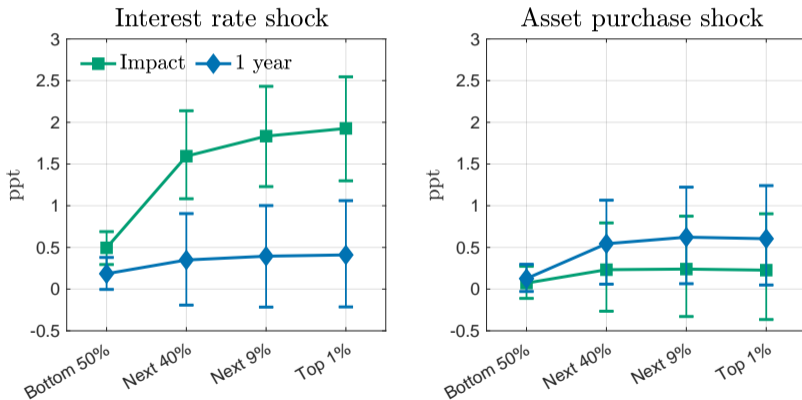


Figure: Effect of monetary policy on total capital gains (% tot assets)

# Monetary policy, asset prices, and differential wealth growth

- Testing for the channel 2/2:

(2) does monetary policy explain fluctuations in capital gains?

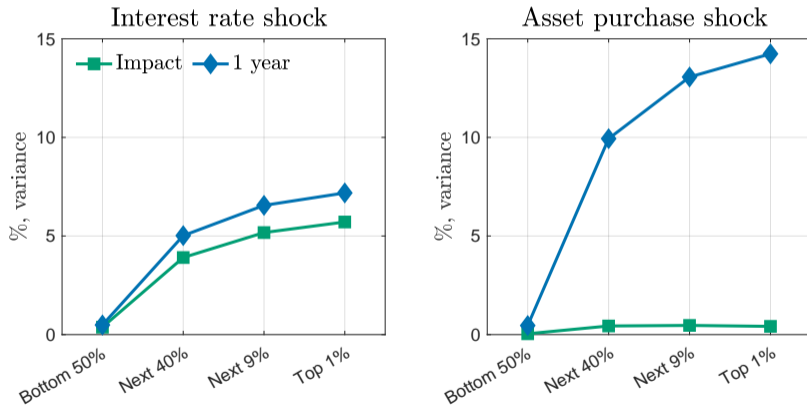


Figure: Explanatory power of monetary policy for total capital gains

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- We estimate the **distributional consequences of monetary policy**:
  - using the Distributional Financial Accounts of the United States.
  - and distinguish between conventional and unconventional monetary policies.
- Does monetary policy have distributional consequences? **Yes**.
  - Expansionary monetary policy shifts the distribution of wealth towards the top tail.
  - Interest rate cuts have long-lasting effects on wealth inequality.
- **Portfolio composition channel**: monetary policy contributes to wealth accumulation at the top through heterogeneous capital gains.

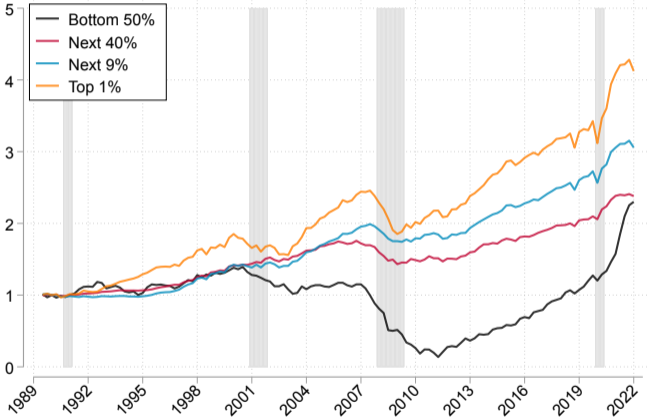


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**Thank you for your attention!**  
Comments and suggestions are welcomed.

# Winners and losers: the unequal growth of wealth



The chart shows real wealth growth since 1990Q1. Real wealth (deflated using CPI) is set equal to 1 in 1990Q1.

**Table:** Distribution of assets, liabilities and wealth (1989-2022)

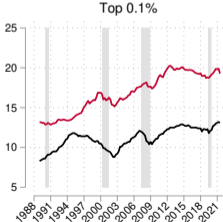
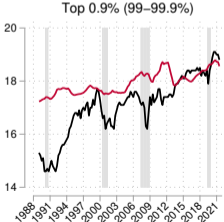
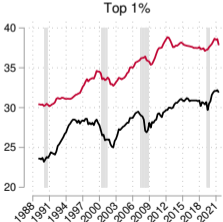
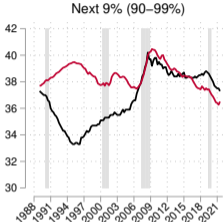
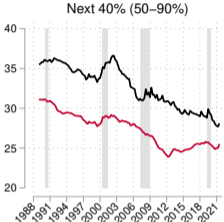
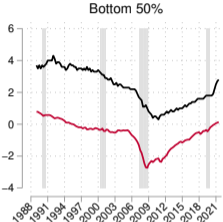
	Bottom 50%	50-90%	90-99%	Top 1%	99-99.9%	Top 0.1%
<b>Assets</b>	6.98	34.29	33.97	24.77	15.15	9.62
<b>Nonfinancial assets</b>	15.27	44.42	27.24	13.07	9.19	3.88
Real estate	13.50	45.04	28.70	12.76	9.52	3.24
Consumer durable goods	22.94	41.97	20.92	14.16	7.63	6.54
<b>Financial assets</b>	2.95	29.40	37.24	30.41	18.04	12.37
Checkable deposits and currency	11.45	37.52	32.34	18.69	12.36	6.34
Time deposits and short-term investments	3.99	37.65	36.46	21.91	14.07	7.84
Money market fund shares	1.37	23.65	41.45	33.52	22.24	11.29
US government and municipal securities	1.16	15.00	31.40	52.43	27.59	52.43
Corporate and foreign bonds	0.82	15.63	30.92	52.63	24.22	28.41
Loans	0.64	10.21	32.77	56.37	31.62	24.75
Corporate equities and mutual fund holdings	1.15	15.28	35.83	47.74	27.94	19.80
Equity in noncorporate business	1.73	16.89	31.87	49.51	26.96	22.55
Life insurance reserves	9.80	42.08	28.74	19.39	13.56	5.83
Pension entitlements	3.40	45.02	43.62	7.96	6.44	1.52
Miscellaneous assets	20.08	47.62	23.37	8.93	6.61	2.31
<b>Liabilities</b>	33.48	43.56	18.13	4.85	4.13	0.72
Home mortgages	27.73	47.17	20.58	4.52	4.04	0.47
Consumer credit	53.23	37.09	7.96	1.72	1.37	0.35
Deposit institution loans n.e.c.	29.90	29.52	16.01	24.57	15.81	8.76
Other loans and advances	22.69	21.63	31.30	24.38	18.76	5.62
Deferred and unpaid life insurance premiums	10.33	42.76	29.19	17.72	14.03	3.69
<b>Wealth</b>	2.33	32.70	36.75	28.22	17.07	11.16

**Table: Portfolio heterogeneity (1989 - 2022)**

	Bottom 50%	50-90%	90-99%	Top 1%	99-99.9%	Top 0.1%
<b>Assets (% of total)</b>						
<b>Nonfinancial assets</b>	71.64	42.31	26.23	17.32	19.83	13.34
Real estate	51.20	34.71	22.33	13.65	16.59	8.99
Consumer durable goods	20.44	7.60	3.89	3.67	3.24	4.35
<b>Financial assets</b>	28.36	57.69	73.77	82.68	80.17	86.66
Checkable deposits and currency	1.80	1.18	1.07	0.85	0.92	0.74
Time deposits and short-term investments	4.24	8.15	8.07	6.65	7.03	6.05
Money market fund shares	0.38	1.34	2.36	2.72	2.90	2.47
US government and municipal securities	0.58	1.49	3.20	7.53	6.26	9.56
Corporate and foreign bonds	0.12	0.46	0.89	2.14	1.52	3.13
Loans	0.08	0.28	0.92	2.17	1.99	2.49
Corporate equities and mutual fund holdings	2.58	7.10	17.14	31.43	29.97	33.74
Equity in noncorporate business	2.49	4.96	9.52	20.36	18.18	23.77
Life insurance reserves	2.25	1.97	1.36	1.22	1.40	0.94
Pension entitlements	10.81	29.32	28.53	7.22	9.54	3.53
Miscellaneous assets	3.02	1.44	0.70	0.37	0.45	0.25
<b>Liabilities (% of total)</b>						
Home mortgages	59.36	77.53	81.19	66.63	70.17	48.63
Consumer credit	36.67	19.49	10.12	8.21	7.60	11.11
Deposit institution loans n.e.c.	0.86	0.52	0.46	2.35	1.84	5.02
Other loans and advances	3.02	2.19	7.79	21.86	19.50	33.89
Deferred and unpaid life insurance premiums	0.09	0.27	0.45	0.95	0.89	1.35
<b>Wealth-to-Asset ratio</b>	27.91	81.21	92.11	97.08	95.95	98.88

# Wealth shares

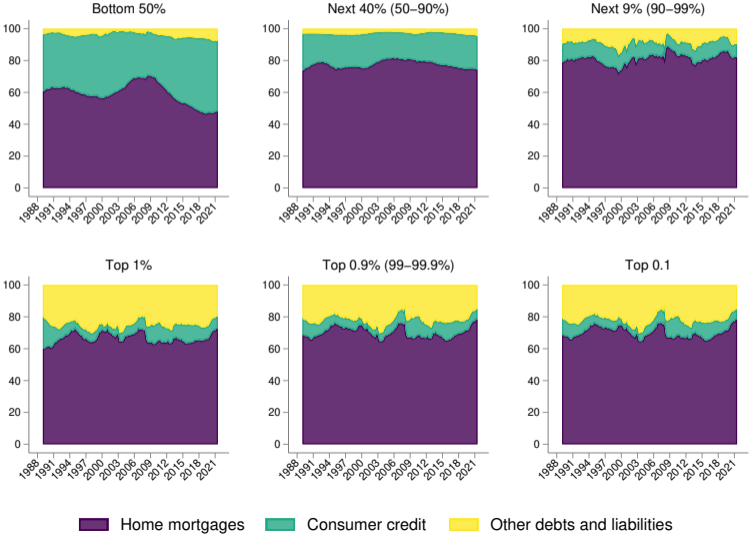
[▶ Back](#)



— Distributional Financial Accounts — Blanchet, Saez and Zucman (2022)

# Households across the wealth distribution have heterogeneous liabilities

► Bacl



## Robustness

- **Sample:** unconventional policy shock to zero for the pre-GFC sample. [▶ Details](#)
- **Model:** local projections and smooth local projections approach

$$y_{t+h} = \alpha_h + \beta_h \text{shock}_t + \Phi_h(L)x_{t-1} + u_{t+h} \quad \text{for } h = 0, 1, 2, \dots$$

- Wealth levels - Conventional MP
- Wealth levels - Unconventional MP [▶ Details](#)

## Macroeconomic and distributional effects of monetary policy

- Vector autoregression (VAR) models:

$$\mathbf{y}_t = \mathbf{c} + \sum_{j=1}^p \mathbf{B}_j \mathbf{y}_{t-j} + \mathbf{u}_t \quad \text{with} \quad \mathbf{u}_t \sim \mathcal{N}(\mathbf{0}, \mathbf{\Omega})$$

with  $p = 4$  quarters and  $\mathbf{y}_t$  including macroeconomic, financial and distributional variables.

- **Identification:** internal instrument approach ([Plagborg-Møller and Wolf, 2021](#)). [▶ Details](#)
  - **Conventional monetary policy:** federal funds rate shock ([Jarociński and Karadi, 2020](#)).
  - **Unconventional monetary policy:** large-scale asset purchase shock ([Swanson, 2021](#)).
  - Shocks are ordered first in vector  $\mathbf{y}_t$  and VAR identified with Cholesky.
- **Estimation:** Bayesian techniques ([Giannone et al., 2015](#)). [▶ Back](#)



## Identification of monetary policy [▶ Back](#)

- Monetary policy shocks from external sources that use the high-frequency approach to identification.
- **Conventional monetary policy**
  - Extract a monthly monetary policy shock using the (pure) monetary policy surprises of [Jarociński and Karadi \(2020\)](#) in a monthly proxy-SVAR.<sup>1</sup> [▶ Details](#)
  - $\hat{s}_t^{FFR}$ : conventional monetary policy or federal funds rate shocks. [▶ Figure](#)
- **Unconventional monetary policy**
  - Use the **large-scale asset purchase factor** of [Swanson \(2021\)](#): *The component of FOMC announcements that conveys information about asset purchases above and beyond changes in the federal funds rate itself* (ibid., p. 37). [▶ Details](#)
  - $\hat{s}_t^{LSAP}$ : unconventional monetary policy or asset purchase shock. [▶ Figure](#)

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<sup>1</sup>Pure monetary policy surprises determine a negative co-movement between interest rate and stock price changes.

## Identification of conventional monetary policy - details [▶ Back](#)

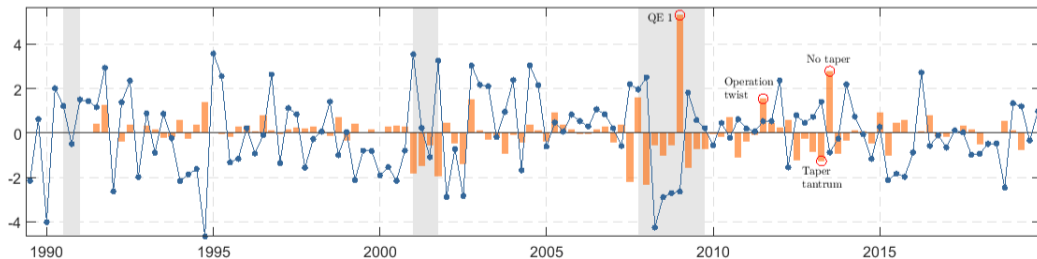
- Key assumption supporting high-frequency approach: interest rate surprises around announcements contain information only about monetary policy.
- Monthly proxy-SVAR:
  - Proxy is the pure monetary policy shock of [Jarociński and Karadi \(2020\)](#).
  - Endogenous variables are: 1-year government bond rate (policy variable), log of industrial production, log of CPI, excess bond premium ([Gilchrist and Zakrajšek, 2012](#)).
  - Identification sample: February 1990 - June 2019.
  - Estimation sample: July 1988 - March 2020.
  - Model estimated with 12 lags.
- Why using a proxy-SVAR as first step?
  - We can retrieve a sequence of monetary policy shocks that matches the length of series in the DFA.
  - The relevance condition of the instrument holds in monthly data.

## Identification of unconventional monetary policy - details [▶ Back](#)

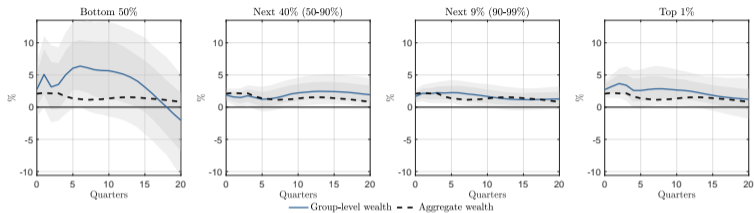
- The unconventional monetary policy shock is the large-scale asset purchase factor of [Swanson \(2021\)](#).
- The factor is one of the three principal components with the greatest explanatory power for asset price changes around FOMC announcements from July 1991 to June 2019.
- The factor is orthogonal to the other two principal components which capture changes in the federal funds rate and forward guidance.
- The large-scale asset purchase factor has no effect on current fed funds rate.
- The size of the large-scale asset purchase factor is minimized from 1991–2008.

## Monetary policy shocks [▶ Back](#)

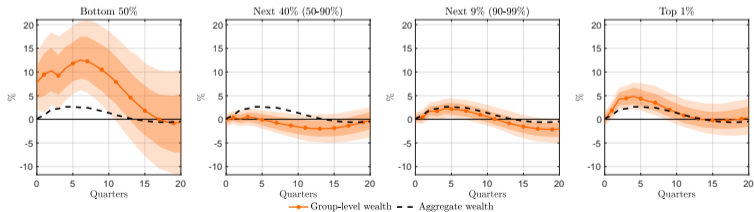
- $\hat{s}_t^{FFR}$ : conventional monetary policy or federal funds rate shocks.
- $\hat{s}_t^{LSAP}$ : unconventional monetary policy or asset purchase shock.
- Obtain quarterly monetary policy shocks by summing over the months in each quarter.



## Group-level vs aggregate response of wealth

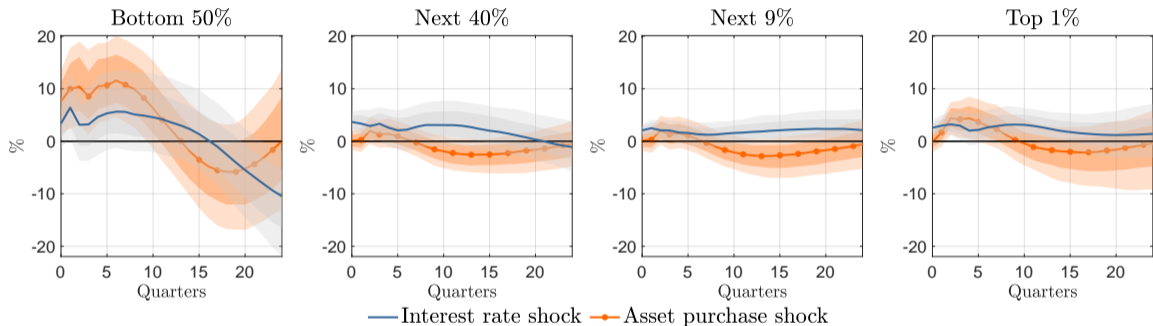


### Conventional monetary policy



### Unconventional monetary policy

## The effects of monetary policy on wealth levels



### *Response of **wealth** (assets - liabilities) to monetary policy shocks*

The chart shows the response of real wealth to conventional and unconventional monetary policy shocks. Impulse responses are scaled to imply a 1% response of real GDP. Shaded areas are 68% and 90% posterior coverage bands. [▶ Back to wealth shares](#)

	Bottom 50%	Next 40%	Next 9%	Top 1%
<b>Conventional monetary policy</b>				
2 years after the shock	<b>1.27</b> [-0.21, 2.88]	<b>7.44</b> [-0.60, 17.41]	<b>43.02</b> [3.94, 83.29]	<b>433.92</b> [56.61, 958.01]
5 years after the shock	<b>-0.45</b> [-2.32, 1.12]	<b>8.29</b> [0.32, 19.09]	<b>28.17</b> [-7.88, 69.11]	<b>187.98</b> [-273.89, 677.22]
<b>Unconventional monetary policy</b>				
2 years after the shock	<b>2.51</b> [0.99, 4.50]	<b>-4.48</b> [-14.36, 5.97]	<b>30.44</b> [-11.56, 82.35]	<b>418.89</b> [38.32, 950.34]
5 years after the shock	<b>-0.14</b> [-2.57, 2.32]	<b>-1.07</b> [-16.77, 11.47]	<b>-45.22</b> [-110.03, 2.93]	<b>55.17</b> [-498.85, 674.69]

Table: Dollar change in real wealth over short- and long-run (in thousands of 2015\$)

	Bottom 50%	Next 40%	Next 9%	Top 1%
<b>Conventional monetary policy</b>				
2 years after the shock				
<i>Real estate</i>	<b>1.19</b> [0.18, 2.30]	<b>4.91</b> [-0.85, 11.10]	<b>18.93</b> [7.68, 33.45]	<b>54.66</b> [-16.70, 134.78]
<i>Home mortgages</i>	<b>1.00</b> [0.06, 1.90]	<b>1.84</b> [-0.18, 3.95]	<b>1.60</b> [-2.49, 5.90]	<b>1.68</b> [-5.21, 9.03]
5 years after the shock				
<i>Real estate</i>	<b>1.49</b> [0.19, 3.39]	<b>7.63</b> [0.45, 17.63]	<b>17.08</b> [2.88, 37.83]	<b>53.84</b> [-48.67, 183.29]
<i>Home mortgages</i>	<b>2.04</b> [0.46, 4.26]	<b>3.14</b> [-0.01, 7.45]	<b>4.03</b> [-0.17, 9.31]	<b>3.30</b> [-7.89, 16.56]
<b>Unconventional monetary policy</b>				
2 years after the shock				
<i>Real estate</i>	<b>0.65</b> [-0.54, 1.92]	<b>-7.31</b> [-14.02, -1.22]	<b>-1.03</b> [-14.73, 13.92]	<b>7.37</b> [-56.16, 81.58]
<i>Home mortgages</i>	<b>-0.48</b> [-1.66, 0.64]	<b>-3.49</b> [-6.43, -1.17]	<b>6.14</b> [2.82, 11.02]	<b>-4.04</b> [-9.98, 2.14]
5 years after the shock				
<i>Real estate</i>	<b>-0.48</b> [-2.86, 1.50]	<b>-3.37</b> [-16.25, 6.50]	<b>-10.89</b> [-35.41, 10.85]	<b>73.56</b> [-25.77, 227.75]
<i>Home mortgages</i>	<b>-1.17</b> [-4.42, 0.99]	<b>-2.28</b> [-7.65, 1.72]	<b>-1.04</b> [-7.07, 6.09]	<b>5.69</b> [-4.49, 18.87]

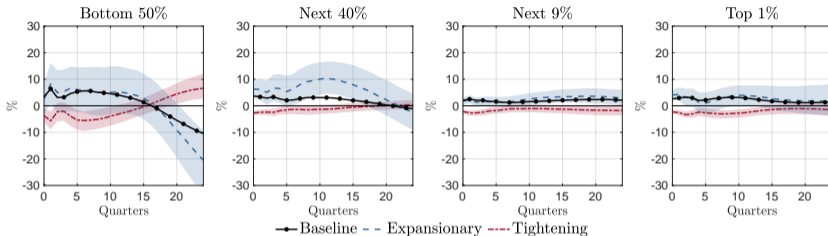
Table: Dollar change in real housing assets and liabilities over short- and medium-run (in thousands of 2015\$)



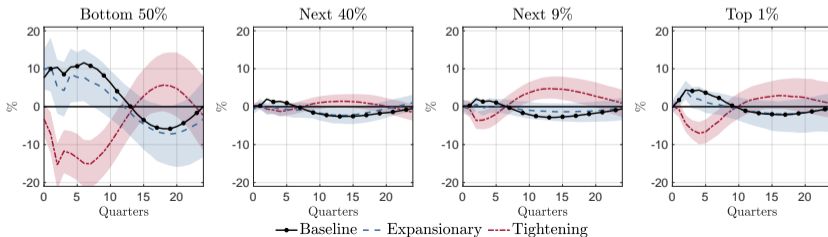
	Bottom 50%	Next 40%	Next 9%	Top 1%
<b>Conventional monetary policy</b>				
2 years after the shock				
<i>Corporate equities</i>	<b>0.07</b> [-0.10, 0.26]	<b>1.50</b> [-1.14, 1.64]	<b>8.03</b> [-20.10, 34.49]	<b>259.58</b> [-93.16, 675.07]
<i>Noncorporate equities</i>	<b>0.00</b> [-0.09, 0.10]	<b>0.77</b> [0.01, 1.64]	<b>3.76</b> [-5.12, 13.05]	<b>123.97</b> [24.53, 239.29]
5 years after the shock				
<i>Corporate equities</i>	<b>-0.03</b> [-0.18, 0.11]	<b>0.71</b> [-1.18, 1.91]	<b>-1.78</b> [-22.22, 16.26]	<b>52.34</b> [-296.23, 397.13]
<i>Noncorporate equities</i>	<b>0.08</b> [0.00, 0.18]	<b>0.79</b> [-0.03, 1.91]	<b>4.10</b> [-4.01, 13.61]	<b>63.96</b> [-87.28, 234.38]
<b>Unconventional monetary policy</b>				
2 years after the shock				
<i>Corporate equities</i>	<b>0.26</b> [0.10, 0.49]	<b>1.83</b> [-1.08, -0.37]	<b>27.80</b> [3.97, 61.22]	<b>328.03</b> [12.56, 756.44]
<i>Noncorporate equities</i>	<b>0.12</b> [0.01, 0.25]	<b>-1.21</b> [-2.25, -0.37]	<b>14.95</b> [6.42, 26.97]	<b>83.33</b> [-7.83, 217.17]
5 years after the shock				
<i>Corporate equities</i>	<b>0.00</b> [-0.20, 0.26]	<b>0.11</b> [-3.61, 1.24]	<b>-18.05</b> [-50.70, 7.05]	<b>-19.46</b> [-438.59, 375.65]
<i>Noncorporate equities</i>	<b>-0.03</b> [-0.17, 0.11]	<b>0.00</b> [-1.45, 1.24]	<b>-12.57</b> [-25.98, -3.29]	<b>54.35</b> [-118.54, 270.29]

Table: Dollar change in equity instruments over short- and medium-run (in thousands of 2015\$)

# Asymmetric effects of monetary policy on wealth levels



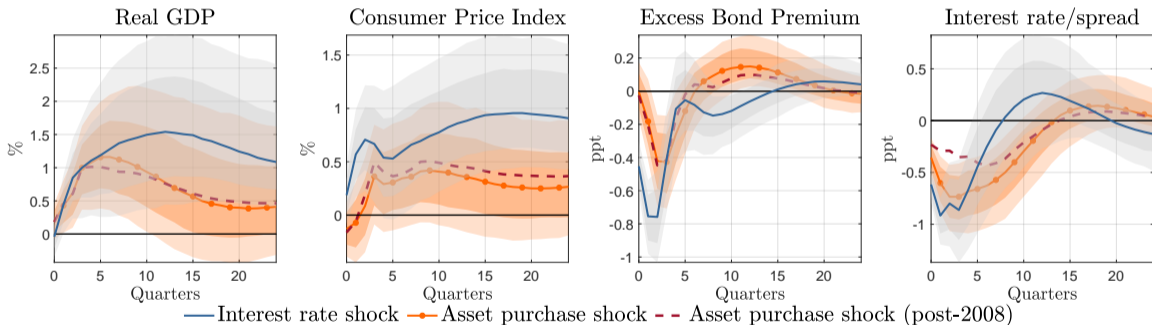
## Conventional monetary policy



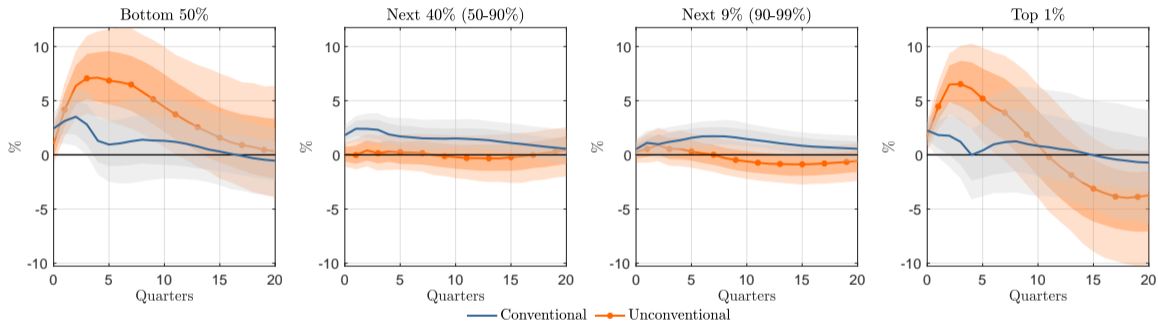
## Unconventional monetary policy

## Macroeconomic effects of monetary policy - robustness

[▶ Back](#)



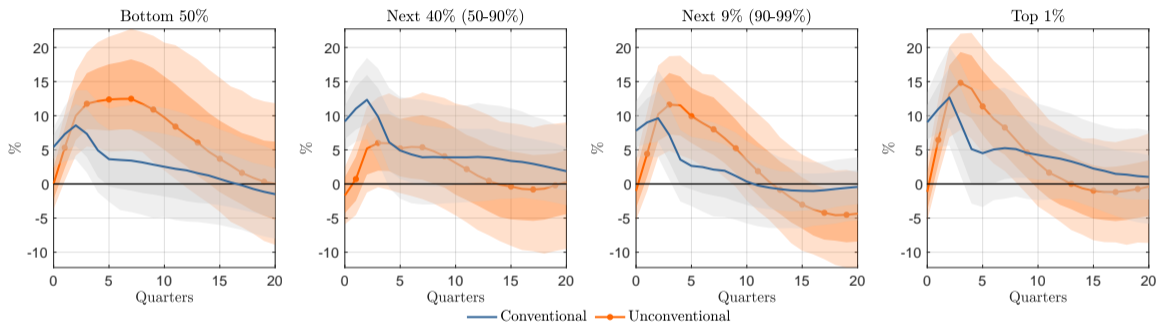
## Pension entitlements [▶ Back](#)



### *Pension entitlements*

*The charts show the response of pension entitlements (accrued benefits to be paid in the future from defined benefit (DB) plans and defined contribution (DC) pension plans, and annuities sold by life insurers directly to individuals) to conventional and unconventional monetary policy shocks. Impulse responses are scaled to imply a 1% response of real GDP. Shaded areas are 68% and 90% posterior coverage bands.*

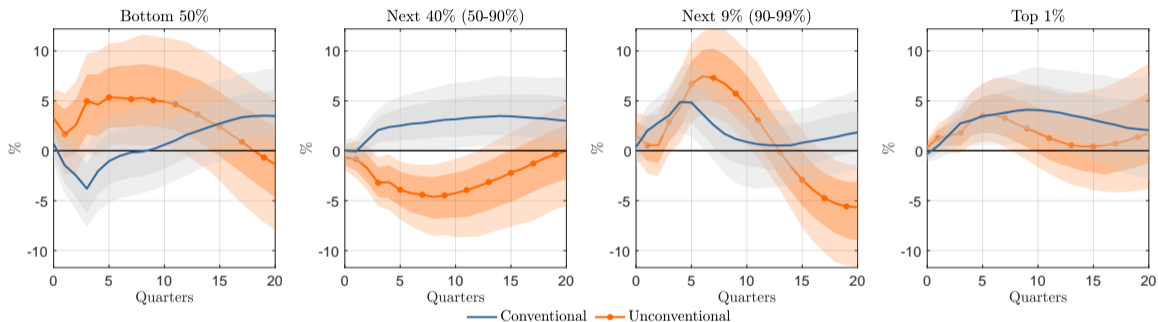
## Corporate equities and mutual fund shares [▶ Back](#)



### Corporate equities and mutual fund shares

The charts show the response of corporate equities and mutual fund shares (holdings of corporate equities and mutual fund shares excluding equities and mutual fund shares owned through DC pensions) to conventional and unconventional monetary policy shocks. Impulse responses are scaled to imply a 1% response of real GDP. Shaded areas are 68% and 90% posterior coverage bands.

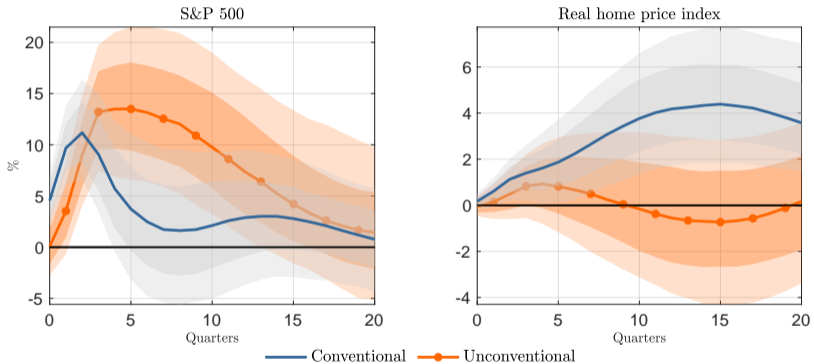
## Equities in noncorporate business [▶ Back](#)



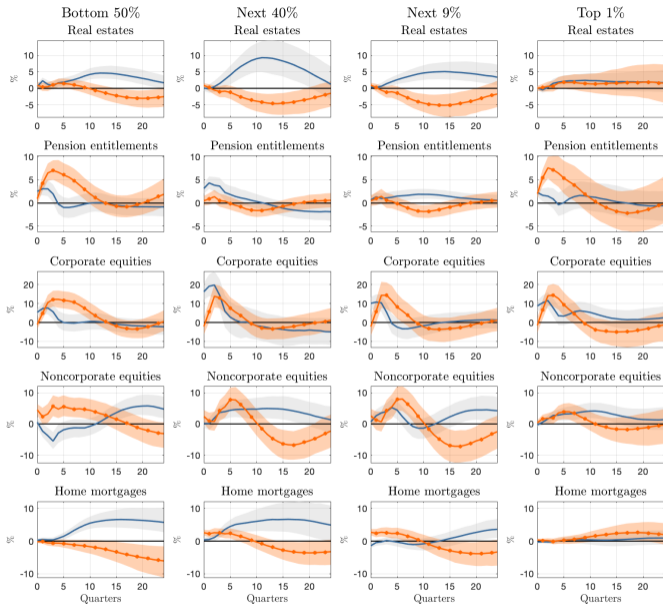
### *Equity in noncorporate business*

*The charts show the response of proprietors' equity in noncorporate business (Includes non-publicly traded businesses and real estate owned by households for renting out to others) to conventional and unconventional monetary policy shocks. Impulse responses are scaled to imply a 1% response of real GDP. Shaded areas are 68% and 90% posterior coverage bands.*

# Asset price response



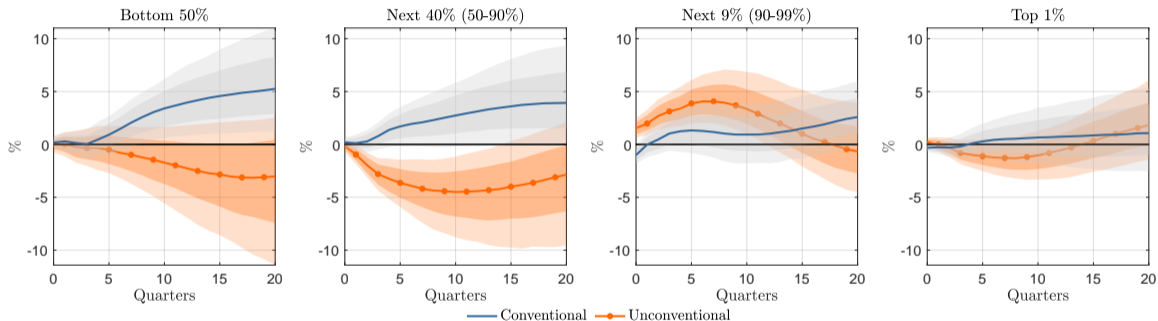
[▶ go back](#)



— Interest rate shock — Asset purchase shock



## Home mortgages [▶ Back](#)

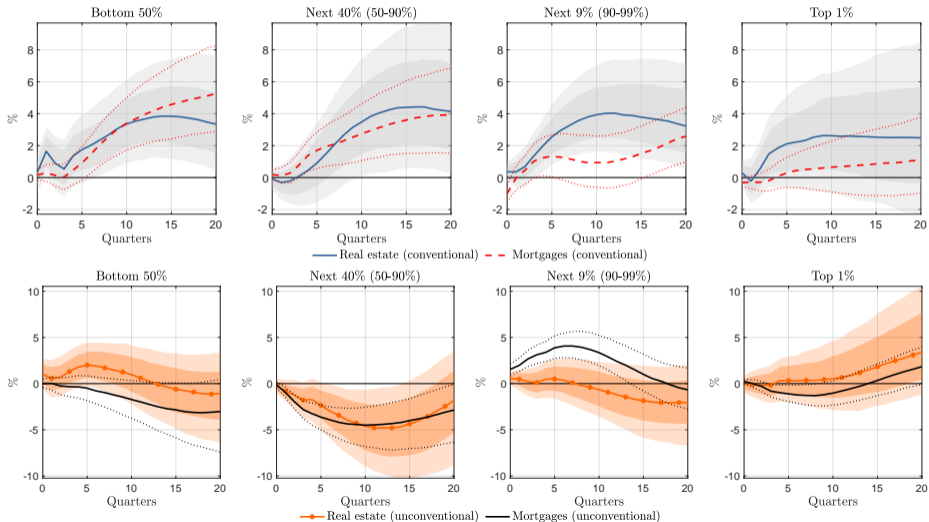


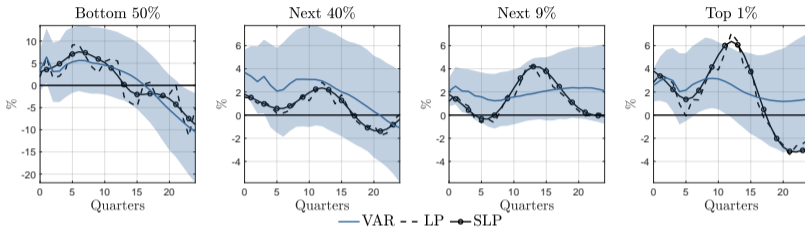
### Home mortgages

The charts show the response of (residential) home mortgages to conventional and unconventional monetary policy shocks. Impulse responses are scaled to imply a 1% response of real GDP. Shaded areas are 68% and 90% posterior coverage bands.

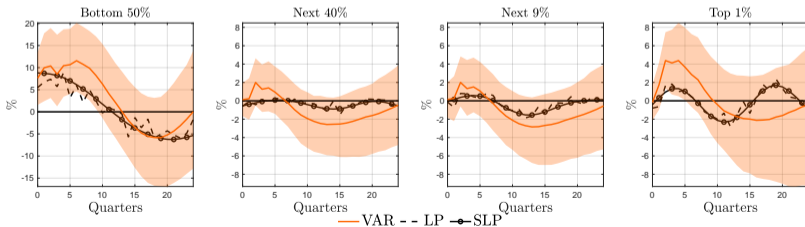
# Real estate and home mortgages

[▶ Back](#)





*Response to conventional monetary policy shocks*

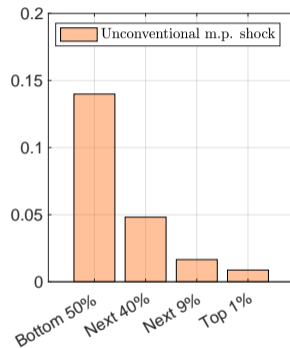
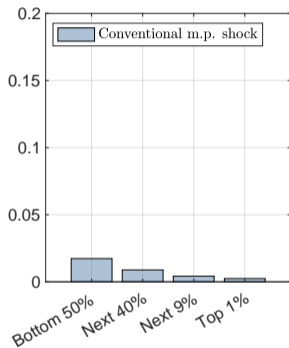


*Response to unconventional monetary policy shocks*

## Monetary policy and capital gains from real estate II: importance

- Forecast error variance decomposition.
- A very small share of variance explained by monetary policy.

▶ [Back to corporate equities](#)



*Share of variance (%) of capital gains explained by monetary policy*

## Capital gains computation [▶ Back](#)

The change in the aggregate level (or stock) of asset  $j$  across periods can be decomposed as follows:

$$\underbrace{A_{j,t} - A_{j,t-1}}_{\text{Economic flow}} = \underbrace{F_{j,t}}_{\text{Transactions}} + \underbrace{R_{j,t}}_{\text{Revaluations}} + \underbrace{O_{j,t}}_{\text{Other changes in volume}} \quad (1)$$

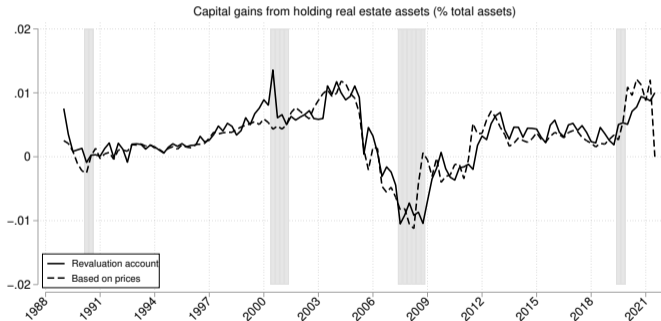
Capital gains from holding asset  $j$  for each wealth group, are computed by distributing the aggregate revaluation  $R_{j,t}$  using as weights the share of each group holding of asset  $j$  on the aggregate:

$$\begin{aligned} R_{j,t} &= \left( \frac{A_{j,t}^{\text{Bottom50}}}{A_{j,t}} \right) R_{j,t} + \left( \frac{A_{j,t}^{\text{Next40}}}{A_{j,t}} \right) R_{j,t} + \left( \frac{A_{j,t}^{\text{Next9}}}{A_{j,t}} \right) R_{j,t} + \left( \frac{A_{j,t}^{\text{Top1}}}{A_{j,t}} \right) R_{j,t} \\ &= \tilde{\Pi}_{j,t}^{\text{Bottom50}} + \tilde{\Pi}_{j,t}^{\text{Next40}} + \tilde{\Pi}_{j,t}^{\text{Next9}} + \tilde{\Pi}_{j,t}^{\text{Top1}} \end{aligned} \quad (2)$$

where  $\tilde{\Pi}_{j,t}^i$  is nominal capital gains from holding asset  $j$  for group  $i$  based on the Revaluation Account.

## Comparing aggregate capital gains from real estate [▶ Back](#)

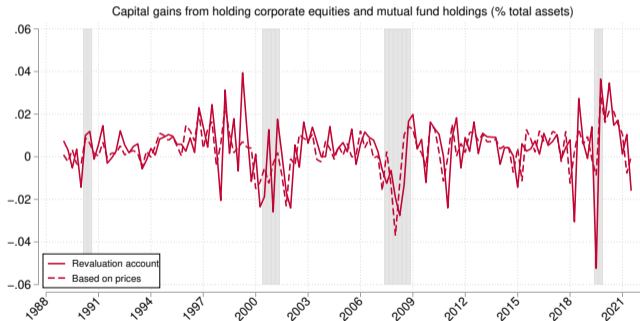
- Price based (% total assets):  $\frac{\Pi_{j,t}}{A_t} = \left( \frac{p_{j,t+1}}{p_{j,t}} - 1 \right) \left( \frac{A_{j,t}^{\text{Bottom50}} + A_{j,t}^{\text{Next40}} + A_{j,t}^{\text{Next9}} + A_{j,t}^{\text{Top1}}}{A_t} \right)$
- Revaluation Account based (% total assets):  $\frac{\tilde{\Pi}_{j,t}}{A_t} = \tilde{\Pi}_{j,t}^{\text{Bottom50}} + \tilde{\Pi}_{j,t}^{\text{Next40}} + \tilde{\Pi}_{j,t}^{\text{Next9}} + \tilde{\Pi}_{j,t}^{\text{Top1}}$



For computing capital gains based on the Revaluation Account we use the Households and Nonprofit Organizations; Real Estate at Market Value, Revaluation (FR155035005) series. For computing price-based capital gains we use the Case-Shiller House Price Index.

## Comparing aggregate capital gains from corporate equities and fund shares [▶ Back](#)

- Price based (% total assets):  $\frac{\Pi_{j,t}}{A_t} = \left( \frac{p_{j,t+1}}{p_{j,t}} - 1 \right) \left( \frac{A_{j,t}^{\text{Bottom50}} + A_{j,t}^{\text{Next40}} + A_{j,t}^{\text{Next9}} + A_{j,t}^{\text{Top1}}}{A_t} \right)$
- Revaluation Account based (% total assets):  $\frac{\tilde{\Pi}_{j,t}}{A_t} = \tilde{\Pi}_{j,t}^{\text{Bottom50}} + \tilde{\Pi}_{j,t}^{\text{Next40}} + \tilde{\Pi}_{j,t}^{\text{Next9}} + \tilde{\Pi}_{j,t}^{\text{Top1}}$



For computing capital gains based on the Revaluation Account we combine the Households and Nonprofit Organizations; Corporate Equities; Asset, Revaluation (FR153064105) and the Households and Nonprofit Organizations; Mutual Fund Shares; Asset, Revaluation (FR153064205) series from the same table. For computing price-based capital gains we use the

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