

# Evaluating Central Banks' Tool Kit: Past, Present, and Future

**Eric Sims and Jing Cynthia Wu**

**Discussant: Annette Vissing-Jorgensen, University of California Berkeley**

## Main question:

- Is the ZLB an important problem, or can we achieve the same policy impact on output from QE, FG, NIRP as from a short-rate decrease above the ZLB?

## Tool:

- DSGE model. In general, very nicely done.

## Most important take-away:

- Don't worry. A modest amount of QE overcomes the ZLB.

## More precisely:

1. **A policy rate (IOER) reduction of 75 bps** (on impact, reverting to zero over about 2 years) has about the same peak output effect of 0.5% of GDP as:
  - **QE** buying private debt worth **4% of GDP**
  - **Fully credible FG** that **reduces target short rate by 180 bps** with IOER and deposit rate unchanged during ZLB period
  - **NIRP** that **reduces target short rate and IOER rate by 200 bps** (deposit rate unchanged).
  
2. **Endogenous QE can overcome ZLB**, for shocks to spreads/technology/govt spending.
  
3. **Not unwinding QE is bad for output during the crisis period.**
  - Intuition (?): Keeping Fed balance sheet high keeps spreads low.
  - Low spreads are bad for bank profitability. This reduces banks' ability to lend.

## More prior QE makes NIRP less expansionary.

- Intuition: NIRP is a tax on reserves. More QE=More reserves=Larger tax.
- Larger tax is bad for bank profitability. This reduces banks' ability to lend.

### COMMENT 1, QE.

- I am **not (yet) confident in the 4% QE number**.  
Suggestions for adding realism to this and other DSGE models.

### COMMENT 2, QE.

- Expand on the **exit result**. I am not (yet) sure it is robust.  
Suggestion for checking its relevance empirically.

### COMMENT 3, FG.

- Not very effective in the model, but this **ignores tail risk element of FG (“ready to act as needed”)**. Data suggests this has had large effects.

**COMMENT I, QE.** I am not (yet) confident in the 4% QE number.

This is a model of **one QE channel**. Relevant in **crisis times (QE1)**, but **not the whole story**, and **not as relevant in normal times (QE2, QE3)**.

---

The model is about **agency problems**. Banks' assets are limited by bank equity:

$$V_{i,t} \geq \theta_t (Q_t f_{i,t} + \Delta Q_{B,t} b_{i,t})$$

Value of running bank  $\geq$  Value of running away with some of the assets

Market equity  $\geq$  (Fraction banker can divert) $_t^*$  (Corp. loans $_t$  +  $\Delta_t$  Govt. bonds $_t$ )

- For  $\Delta_t < 1$  it's easier for the bank to divert corporate loans than govt bonds.
- In crisis times  $\theta_t$  is larger: For given market equity, bank can hold fewer assets.

Spreads are driven by the **tightness of the constraint** ( $\lambda_t$ , the Lagrange multiplier):

$$\begin{aligned}\mathbf{E}_t \Lambda_{t,t+1} \Omega_{t+1} \Pi_{t+1}^{-1} (R_{t+1}^F - R_t^d) &= \frac{\lambda_t}{1 + \lambda_t} \theta_t \\ \mathbf{E}_t \Lambda_{t,t+1} \Omega_{t+1} \Pi_{t+1}^{-1} (R_{t+1}^B - R_t^d) &= \frac{\lambda_t}{1 + \lambda_t} \theta_t \Delta\end{aligned}$$

The idea that bankers literally can divert vast amounts of assets seems unrealistic.

- But the setup captures the idea that spreads are high in crisis partly because of high risk-premia due to a shortage of risk-bearing capital at financial intermediaries.

But this equity constraint has a clearly counterfactual implication:

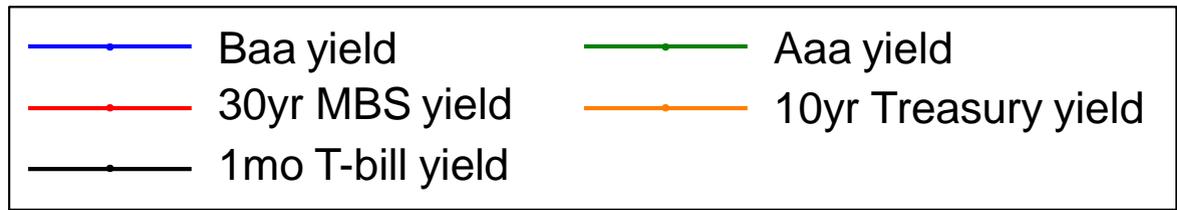
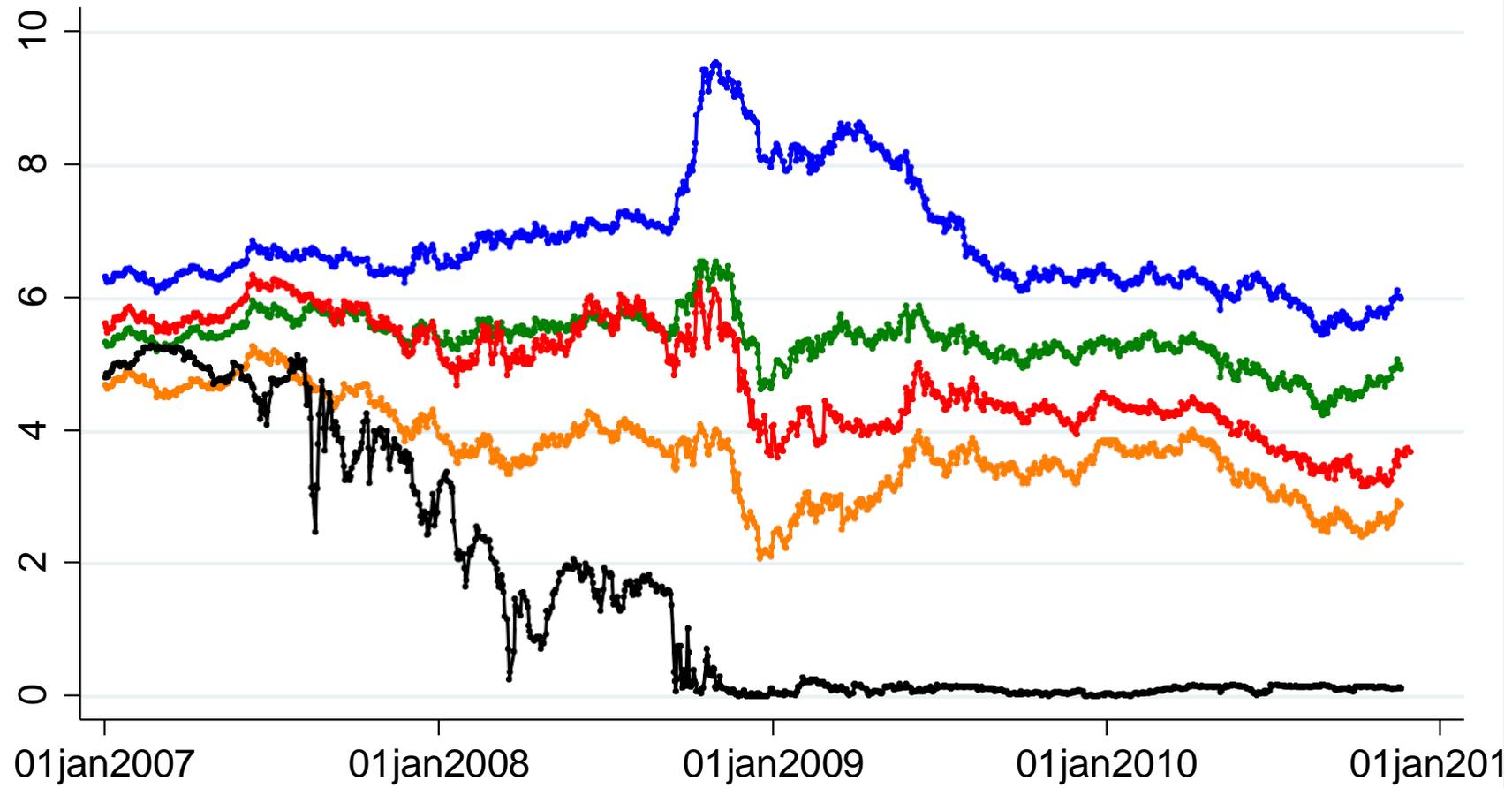
- Spreads are approximately linked by:

$$E_t (R_{t+t}^B - R_t^d) = \Delta E_t (R_{t+t}^F - R_t^d)$$

- The same feature (divertability) drives spreads and effectiveness of QE.  
Any LSAP (private or government) leads to a  $1/\Delta=3$  times larger effect on corporate spreads than government spreads.
- This is a known implication of this setup (discussed by Gertler and Karadi (2013)).  
We now have enough QE evidence to document that this is missing key elements of how QE works.

- Effect of QE in cross-section **not proportional to initial spreads**: Look at QE1
- And purchases of **govt bonds move govt yields more**: QE2
- And purchases of **MBS move MBS yields more**: QE3

	QE1	QE2	MEP	QE3
	MBS & Treasury	Treasury only	MBS & Treasury	MBS only
<i>Treasury Yields</i>				
5-year	-74	-17	+3	-6
10-year	-107	-18	-7	-3
30-year	-73	-9	-17	1
<i>Corporate Bonds</i>				
Aaa	-77	-9	-16	4
Baa	-81	-7	-15	0
IG CDS 10 year			+9	0
<i>Agency MBS</i>				
15-year	-88	-9	-7	-16
30-year	-107	-12	-23	-16
<i>Fed Funds Futures</i>				
12 <sup>th</sup> month	-33	-4	0	0
24 <sup>th</sup> month	-40	-11	-1	-3
<i>Implied Signaling Effect</i>				
5-year	-35	-18	0	-1
10-year	-20	-12	0	-1



## Why does the model not fit (all) the QE data?

### I. There is **more than one channel** for QE.

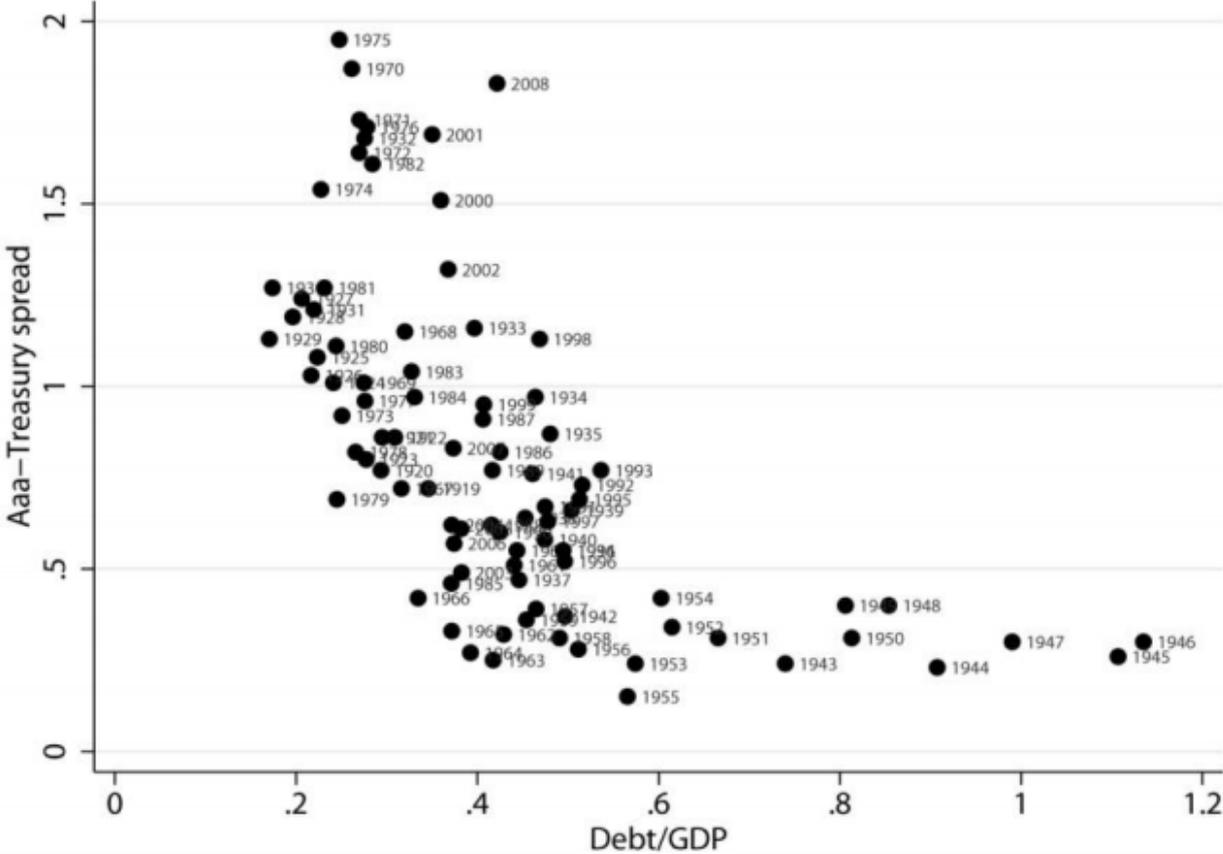
The model has one **general channel for QE**: Intermediaries' equity constraint

- That was probably very important in QE1 at the **peak of the crisis**: High spreads on MBS and QE lowering price of pre-payment risk.
- But **specific channels** matter too, e.g., scarcity channel for safe assets, scarcity channel for current-coupon MBS.

### 2. Corporate spreads are partly due to **default risk**, not only risk premia: Baa yields. More shortly.

QE2: Why did Treasury yields react more than corporate and MBS yields when Treasury purchases were announced? Scarcity channel for safe assets.

- Clientele-demand for long-term safe assets (1925-2009). Some investors (insurance companies and pension funds?) value absolute certainty of nominal repayment.

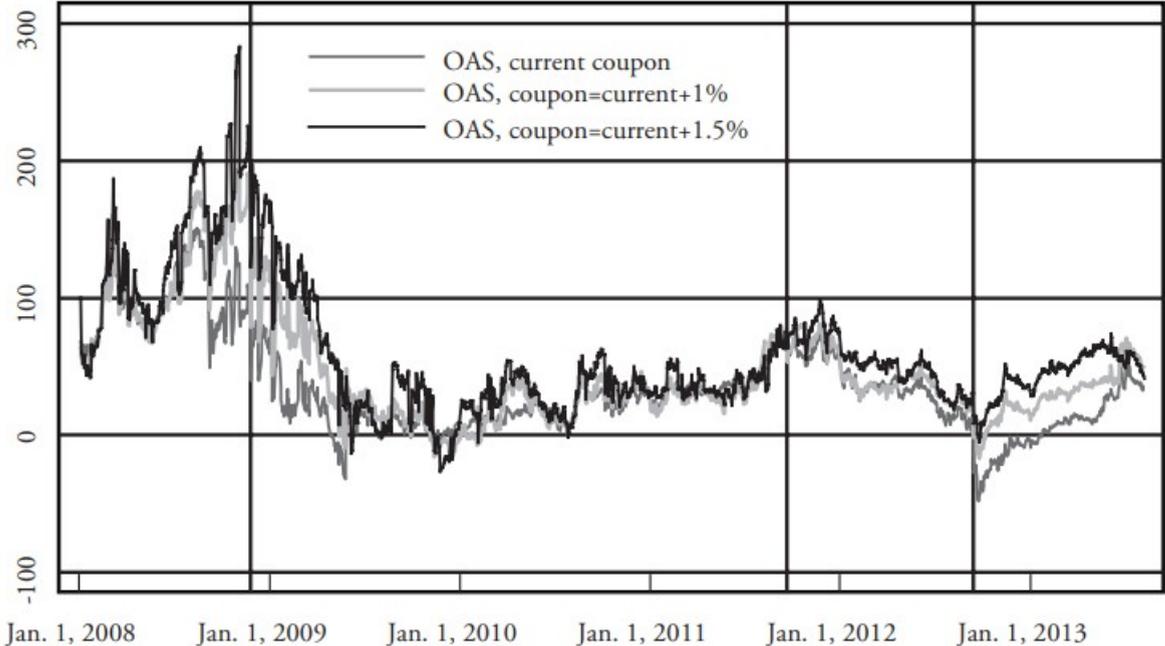


Krishnamurthy and Vissing-Jorgensen (2012)

QE3: Why did MBS yields react more than corporate and Treasury yields when MBS purchases were announced? Scarcity channel for current-coupon MBS.

- QE3 affected the scarcity of production (current-coupon) MBS rather than generally alleviated financial intermediaries' equity constraint.

**Option-Adjusted Spreads (OAS Relative to Treasuries), In Basis Points, on FNMA MBS January 2008 to June 2013**



Source: Krishnamurthy and Vissing-Jorgensen (2013)

Thus, a realistic model of QE – unfortunately – is not simple.

- Signaling
- Risk premia: Prepayment risk, default risk, duration risk
- Scarcity channel for safe assets
- Scarcity channel for current-coupon MBS
- Expected default
- Liquidity effects

Not only are there many channels. Which matters most is time-varying.

The fact that there is more than one channel for QE *does not* mean that QE in practice is more effective than in the model.

- **Example:** If risk premia are small in normal times, and scarcity channels important, the model is not useful for guiding amount of QE needed in normal times.

Question: Given difficulties of calibrating how much QE is needed for a given stimulus – and how this changes over time -- should we think more about yield curve controls?

- Similar to targeting interest rates rather than monetary aggregates when money demand is unstable.

Reasons YCC may not be a good alternative to QE:

- Loss of balance sheet control
- Target yield needs to be consistent with forward guidance (otherwise Fed will need to buy all bonds targeted).
- But can we credibly give that long guidance, and should we?

YCC more of a short to medium term instrument – complement to FG.

**COMMENT I, QE.** I am not (yet) confident in the 4% QE number.

Accounting for default risk will increase the 4% number substantially.

---

- Corporate spreads would not be zero even if intermediaries were unconstrained: Default risk, not only high risk premia (agency problems).
- Example:
  - Model ( $\theta_t$  and  $\Delta$ ) calibrated to match a 300 bps corporate spread (over short rate) and 100 bps government bond spread (over short rate).
  - But suppose there is 200 bps default risk.
  - Then  $\Delta$  should be calibrated to 1/3 for both corporate and govt bonds.
  - Private LSAPs would be as (in)effective as government LSAPs:  
Would need QE of 12% of GDP rather than 4%.

**Suggestion:**

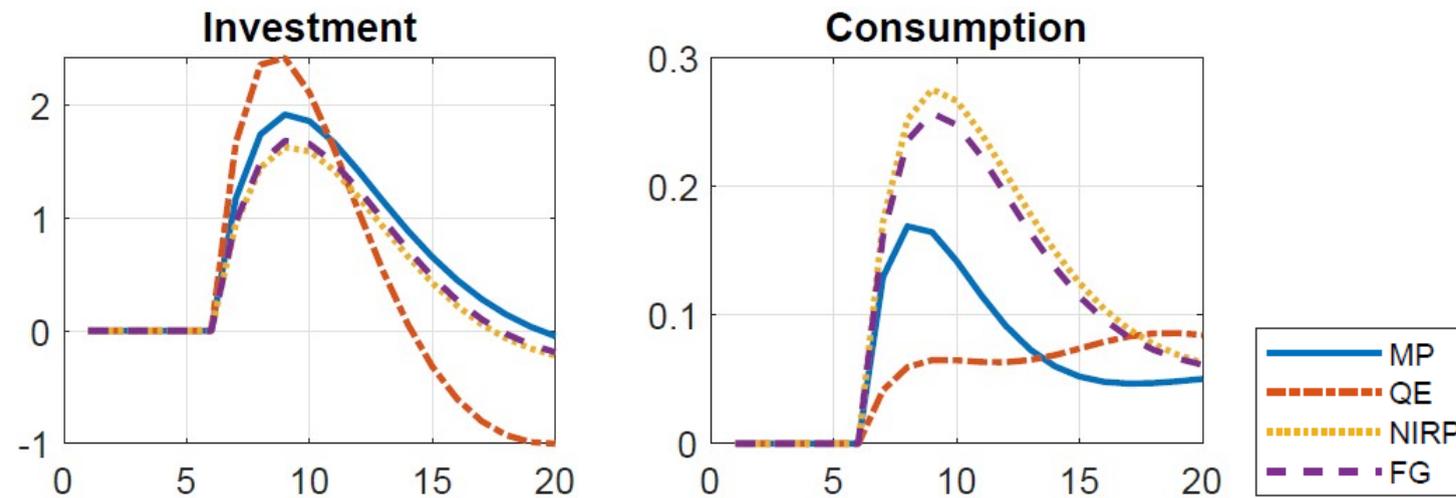
- Calibrate to Gilchrist-Zakrajsek's "excess bond premium" instead of spread.

**COMMENT I, QE.** I am not (yet) confident in the 4% QE number.

Realistic model needs to include housing (refinancing, wealth effects) to get realistic effects of QE on consumption.

---

Model: No role for housing → QE has little effect on consumption.



Data: Key QE transmission mechanism is changing mortgage rates and their effect on consumption via home equity extraction and lower mortgage payments.

- Di Maggio, Kermani and Palmer (2016): Fixed-rate mortgages
  - Compare refinancing for mortgages eligible to for Fed purchase (those below GSE conforming loan limit) to mortgages not eligible for Fed purchase.
  - QEI lead to a much larger increase in refinancing activity for eligible mortgages. QEI → Refinancing of around \$600B → Consumption effect of \$76B, mainly via cash-out refinancing.

Translates to 0.25% GDP effect per 4% QE as pct of GDP.  
Large relative to current paper's output effect of 0.5%.

Similarly, a **conventional transmission mechanism** is changing rates on adjustable rate mortgages:

- **Di Maggio, Kermani, Keys, Piskorski, Ramcharan, Seru and Rao (2017): ARMs.**
  - Exploit **exogenous timing of the automatic reset** of ARMs originated in 2005-2007 resetting in 2010-2012.
  - **Monthly payments on average drop 53%** of which the majority is consumed.

**COMMENT I, QE.** I am not (yet) confident in the 4% QE number.

Real government debt is not constant.

---

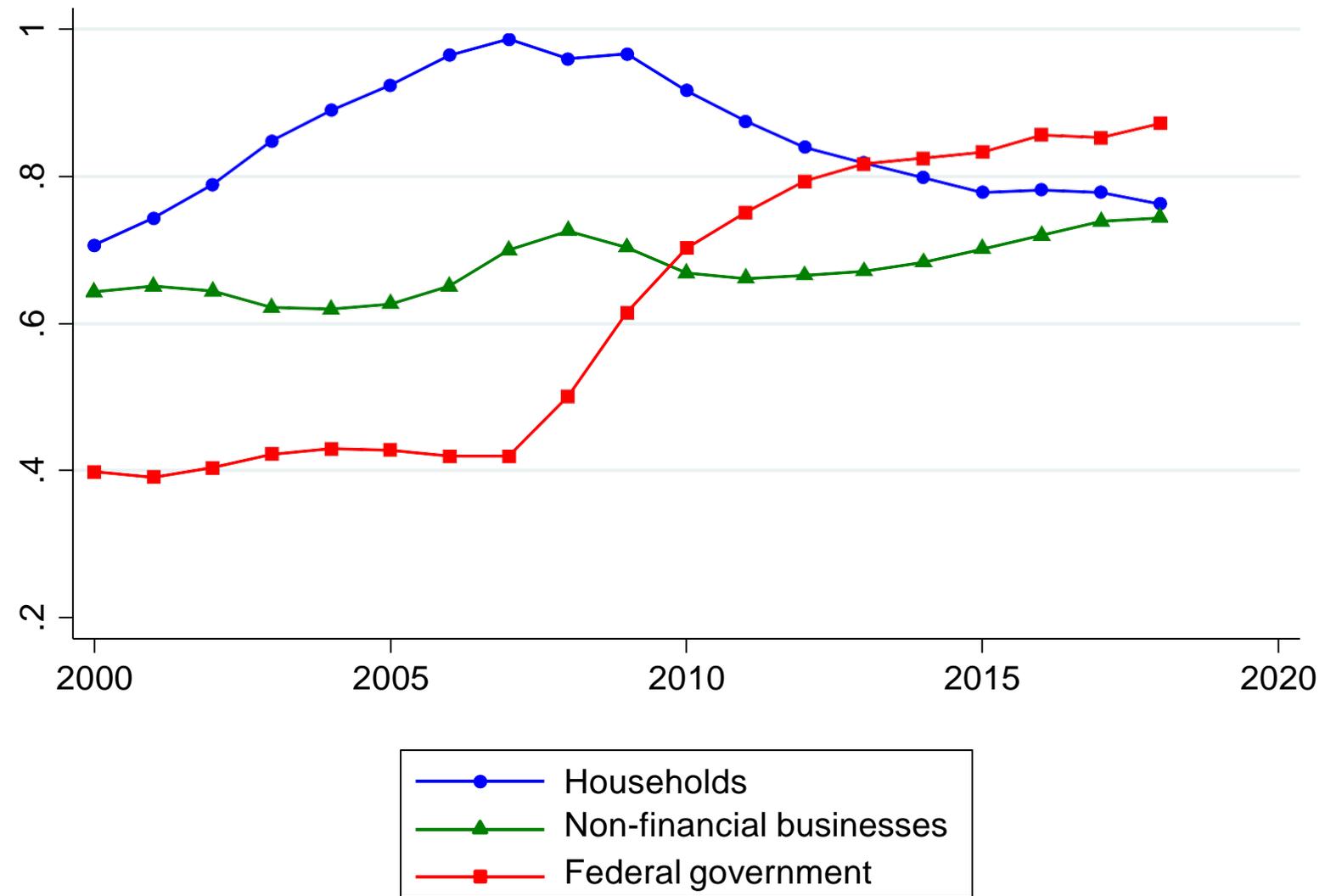
**Model:** Government debt fixed in real terms

- Monetary transmission: Lower real rates affect investment, consumption

**In practice:** Government also seeks to fight recession

- Monetary transmission via fiscal policy?  
Example: Treasury QE creates fiscal space.
- We normally ignore this because it is politically sensitive if policies interact.  
But what if they do?

## Debt outstanding, ratio to GDP (Financial Accounts, D.3)



A possible approach to add a fiscal channel: Martin and Philippon (2017)

- Government seeks to stabilize employment but is constrained by its cost of funds.
- Government spending ( $g=G/Y$ ) and transfers ( $z=Z/Y$ ) follow

$$\begin{aligned}g_{j,t} &= \bar{g}_{j,t} + \gamma^n (n_{j,t} - \bar{n}) + \gamma^\rho \rho_{j,t} \\z_{j,t} &= \bar{z}_{j,t} + \gamma^n (n_{j,t} - \bar{n}) + \gamma^\rho \rho_{j,t} \\ &\quad \frac{\gamma^n \quad \gamma^\rho}{-0.8 \quad -2.5}\end{aligned}$$

$n$  is a measure of employment.

$\rho$  is the government's funding cost.

**COMMENT 2, QE.** Expand on the **exit result**. I am not (yet) sure it is robust.  
**Suggestions for checking its relevance empirically.**

---

Standard intuition about length of QE:

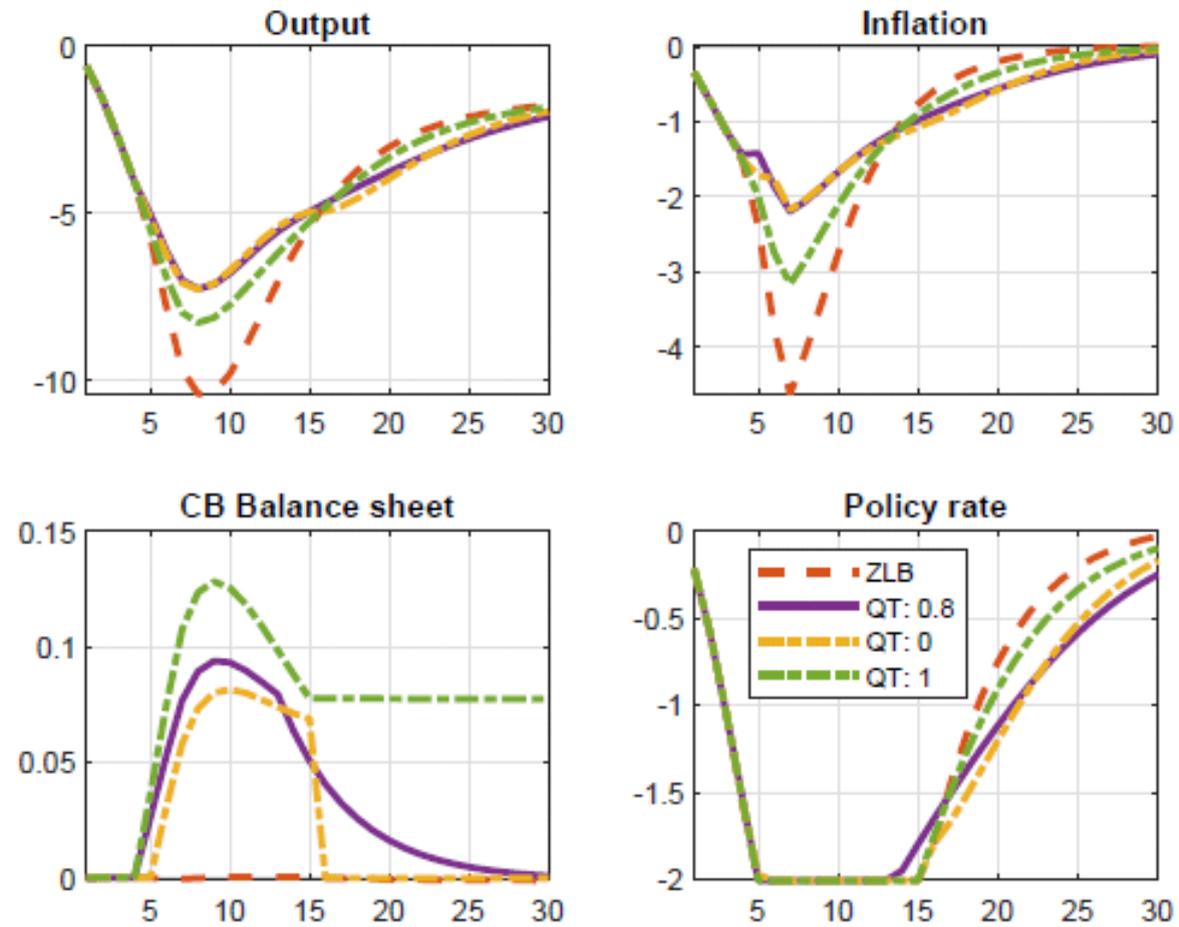
- If QE works by affecting **risk premia**, then the longer you promise to hold the bonds, the more you lower yields upfront
- **Greenwood, Hanson and Vayanos (2016)** in setting with duration risk:  
**Longer-lasting QE affects the duration risk premium for a larger part of the bond's life and thus leads to a larger yield decline.**

**Current paper:** Standard thinking **ignores the effect of bank equity on the price of risk.**

- Promising to staying longer may not lower yields more upfront.
- QE **adds risk-bearing capacity of the Fed**
- But **removes risk-bearing capacity of the banks** if it lowers bank equity.

QE understood to be permanent leads to worse recession, slightly better recovery.

Figure 9: Quantitative tightening



I think the **model mechanics** are (this should be spelled out in detail in the paper):

- **Investment** depends on the **long real corporate rate**
- The **long real corporate rate** is affected by the **spread**
- The **spread** depends on the tightness of the **intermediary equity constraint**
- Constraint is **tighter** if the **franchise value (continuation value)** of banking is **lower**
- **Banks make money on spreads**, so **not exiting QE is bad** for continuation value.

**Suggestion:**

- **Convince us using event study data, that QE really is bad for bank equity.**
  - QE lowers **default risk** on loans. QE may well have benefitted banks.
  - If longer QE has larger effect on default risk, the result may not hold.
- **Adding default to the model** (a simple function of state of economy and rates) again seems central for realism.

Federal Reserve

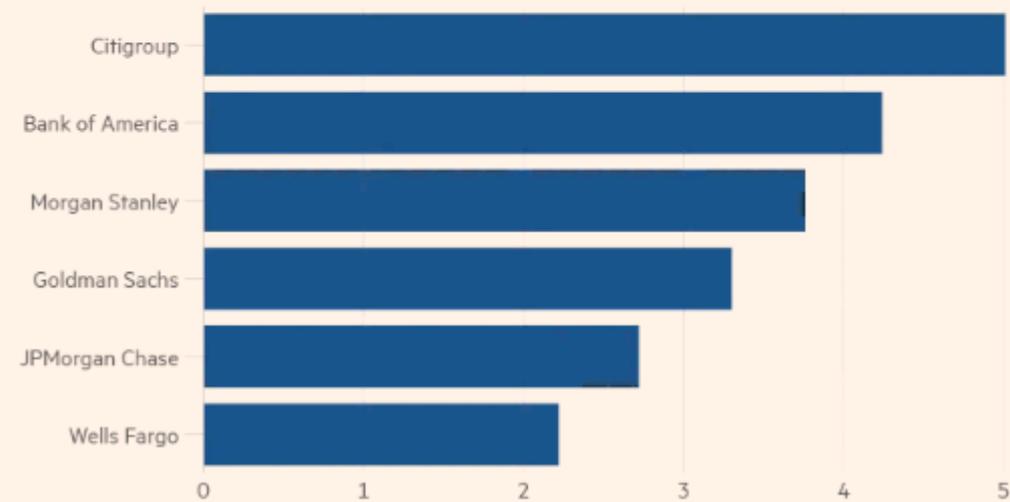
## Powell says Fed ready to act if trade wars hit economy

US central bank chairman puts tariffs on list of concerns that could lead to looser policy

## US bank stocks jump as Fed flags willingness to support economy

Citi, eyeing its biggest rise since 2016, led bank stocks on Tuesday

One-day performance, %



Intraday June 4

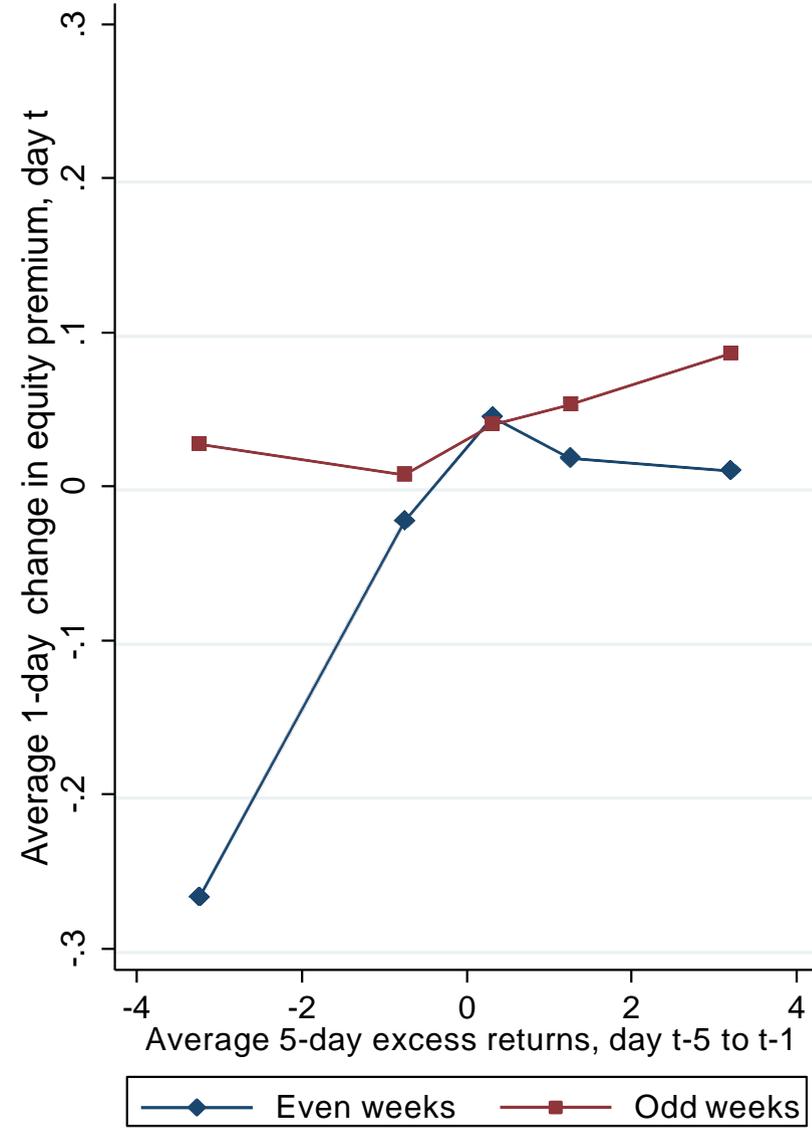
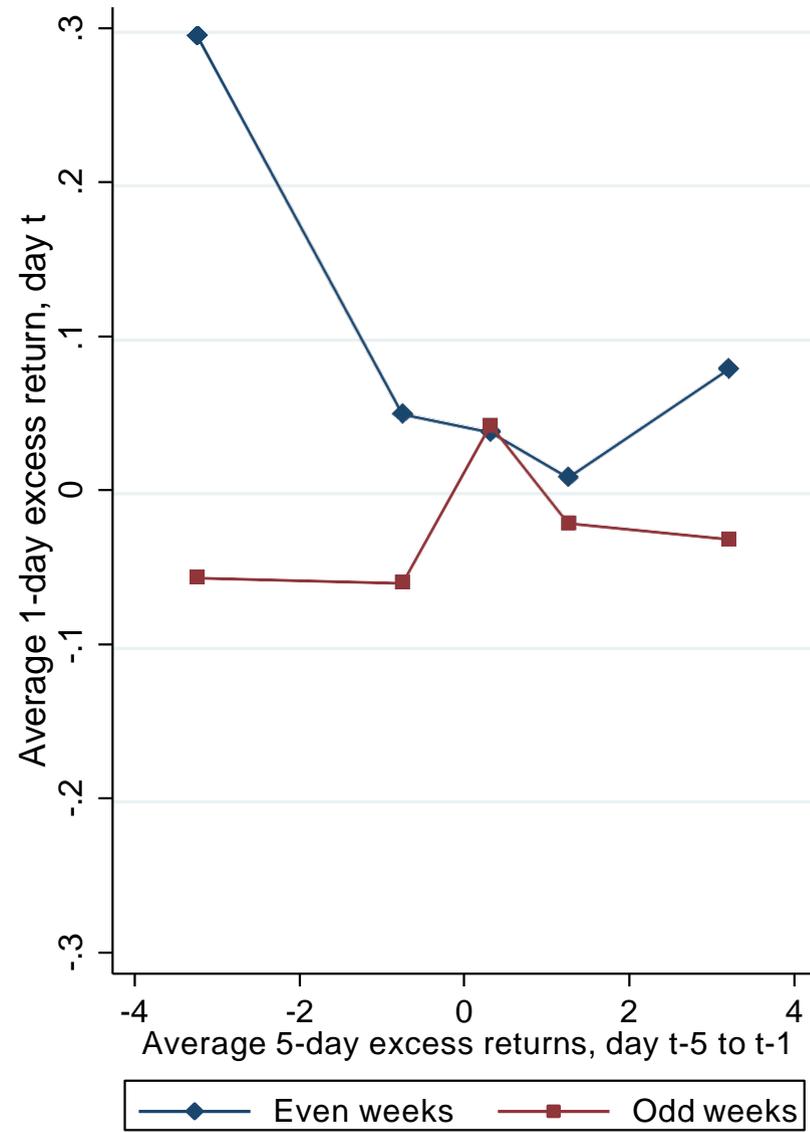
**COMMENT 3, FG.** Not very effective in the model, but this ignores tail risk element of FG. Data suggests this is very effective.

---

**Powell:**“... the most important policy message may be about how the central bank will respond to the unexpected rather than what it will do if there are no surprises”

**Cieslak, Morse and Vissing-Jorgensen (2019):** Effect of monetary policy on stocks consistent with guidance about the unexpected being very effective.

- Following market drops, in weeks of Fed decision making, the market rebounded and risk premia fell (1994-2016)
- Interpretation:
  - The Fed gave guidance that it would accommodate if things got worse. “Ready to act as needed” – tail risk FG – a Fed put.
  - The Fed put was stronger than markets expected over this period.



Monetary policy literature has not focused enough on such effects of removing tail risk because of its focus on Fed funds futures (and Treasuries):

- If a promise of a lower policy rate in the bad state lowers probability of bad state:
  - You may not see the accommodation in futures rates: They could increase, since the policy rate in the good state is high.
  - The stock market unambiguously goes up: Removal of the bad state is good for stocks via both lower risk premium and higher expected cash flows.