

A Lesson from the Great Depression that the Fed
Might have learned:
A Comparison of the 1932 Open Market
Purchases with Quantitative Easing

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Motivation

- Significant challenges with discerning effects of QE1 on the economy
 - Conducted in a severely depressed economy
 - Novel features: ZLB environment, purchases of non-Treasury assets, signalling and forward guidance, interest rate on excess reserves
 - Empirical analyses: *Bauer and Rudebusch (2014)*, *D'Amico and King (2012)*, *Doh (2010)*, *Hamilton and Wu (2012)*, *Krishnamurthy and Vissing-Jorgensen (2011)*, *Swanson (2011)*
 - Theoretical: *Baumeister and Benati (2010)*, *Chen, Cúrdia and Ferrero (2012)*

Motivating Questions

- Was the structure of the open-market operation announcement in QE1 important?

"Moreover, to help improve conditions in private credit markets, the Committee decided to purchase up to \$300 billion of longer-term Treasury securities over the next six months"
(FOMC Statement, March 18, 2009)

- Does the duration of debt being purchased by the Fed matter?
- Is the size of debt being held by the public important?

What we do

- Propose to examine the effectiveness of QE1 through the lens of another OMO conducted by the Fed:
 - Conducted at the height of the Great Depression
 - Fed's balance sheet increases holdings of long-term bonds (\$1 billion in 1932\$ or \$16 billion in 2009\$), and then divests Note holdings in 4-month period
 - Novel features: Yields were in the zero-bound range, largest operation at the time, **pure OMO, no forward guidance** (or Interest on Ex Reserves)
 - "By entering upon a **policy of controlled credit expansion**, designed to turn the deflation in bank credit and to stimulate a rise in prices, the Federal Reserve System has undertaken **the boldest of all central bank efforts to combat the depression.**"
 - The New York Times, quoted in the Commercial and Financial Chronicle, April 16, 1932.

Strategy and Contributions

- Empirical:
 - Event study analysis
 - Narrative record
- Theoretical:
 - Significant evidence on segmentation in financial markets in 1920s and 30s
 - DSGE model with two types of investors
 - Consider the OMO and importance of the program's announcement structure, duration of debt and size of total debt

Context for the 1932 Operation

- Fed does very little at the start of the Great Depression; does not prevent three banking panics
 - Organizational disarray (*Friedman and Schwartz, 1963*); Reliance on nominal interest rates and discount window as policy guide - member bank borrowing and short-term nominal rates had not declined (*Meltzer, 2003*); Absence of clear lender of last resort policy and adherence to Gold Standard (*Bordo and Wheelock, 2013*)
- Governor Harrison of New York Fed proposes and helps initiate purchases of government securities on April 13, 1932
 - \$100 million for 5 weeks
 - Second round of purchases of \$500 million is agreed upon on May 17, 1932
- By July 1932, Harrison's pleas for the program's continuation are overwhelmed by dissent within the Fed system

1932 Operation vs. QE1: Similarities

- Conducted at the time of severely depressed economic activity
- Large scale OMOs; 1932 OMO was an unprecedented increase in the Fed's holdings of US Treasuries over 4-month period
- Would continue for a specified period of time

1932 Operation vs. QE1: Differences and their Implications

- Gold Standard in 1932 vs. Floating exchange rate in 2008
 - Although the U.S. was on the GS, the OMO did not threaten the credibility of the Fed's commitment to the GS or cause expectations of devaluation (*Hsieh and Romer, 2006 and Bordo, Choudhari and Schwartz, 2002*)
- No forward guidance in 1932; only discussions in the Open Market Policy Conference
 - However, financial markets observed and understood that the balance sheet of the Fed was changing (narrative evidence from the NY Times)
- QE entailed purchases of non-Treasury assets, conducted at the time of IOER
 - Restrict our analysis to comparing effects of the OMOs

Empirical Strategy

- Construct weekly series of holdings of Treasury assets by the Federal Reserve, decomposed into different maturities from Fed Bulletins
- Corresponding series of Treasury yields
- There is no "announcement" of the open-market operation \implies the strategy used in QE1 studies cannot be used
- Instead, identify weeks in which Fed's holdings of Treasury assets changed by 5% or more
- In contrast to other analyses which look at changes in total debt holdings (*Meltzer (2003)*, *Hsieh and Romer (2006)*)

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Changes in Holdings of Notes and Corresponding Yields

Week	% Δ Note Holdings	Changes in yields on 3-5 year notes (in b.p.)
April 27, 1932	11.7	-36
May 4, 1932	16.5	-11
May 11, 1932	38.2	3
May 18, 1932	7.6	-10
June 15, 1932	11.7	8
June 22, 1932	15.2	20
June 29, 1932	19.3	13
August 3, 1932	20.3	3
August 10, 1932	8.7	-17
August 17, 1932	5.1	13
Cumulative change		-14

Changes in Holdings of Bonds and Corresponding Yields

Week	% Δ Bond Holdings	Changes in yields on Bonds (in b.p.)
April 20, 1932	7.8	-8
May 25, 1932	5.4	8
June 1, 1932	5.9	3
June 8, 1932	8.4	-1
Cumulative change		2

QE1: Effects on Yields

Week	Changes in yields on			
	10-year Bonds (in b.p.)		5-year Notes	1-year Notes
	K-V	GRRS	K-V	K-V
November 25, 2008	-36	-22	-23	-2
December 1, 2008	-25	-19	-28	-13
December 16, 2008	-33	-26	-15	-5
January 28, 2009	28	14	28	4
March 18, 2009	-41	-47	-36	-9
Cumulative change	-107	-104	-74	-25

Source: Krishnamurthy and Vissing-Jorgensen (2011) and Gagnon, Raskin, Remache and Sack (2010)

QE1: Effects on Yields

Week	Change in yields on		
	10-year Bonds	5-year Notes	1-year Notes
November 25, 2008	-28	-6	-3
December 1, 2008	-44	-43	-24
December 16, 2008	-18	-20	-1
January 28, 2009	19	16	6
March 18, 2009	-17	-18	-6
Cumulative change	-88	-71	-28

Calculations based on weekly windows

Narrative Record from the New York Times

- Feb 28, 1932:
 - [T]he Federal Reserve has given unmistakable signs [...], of its intentions to relax credit. [...] **Open market buying of government securities appears to be the only effective means whereby the Federal Reserve can pump out credit**
- Apr 13, 1932
 - The Federal Reserve system has been engaged since the final week in February in an easy-money campaign [...]. This policy has already resulted in [...] **a relaxation of bank credit so considerable as to cause a drop of 1-1/3% per cent in open market bill rates.** [...] Whether the time is not now ripe for the Federal Reserve to **enlarge its campaign by stepping up the rate of weekly purchases of "governments"** to say \$75,000,000

Narrative Record from the New York Times

- Apr 15, 1932
 - Interest in the weekly bank statement converged upon the single item of United States Government securities which showed a rise of \$100,010,000, **lifting the system's holdings to a high record** at \$985,024,000
- Apr 22, 1932
 - The weekly bank statement was **favorable beyond the general expectations of Wall Street in the indications it gave of the progress of the Federal Reserve's new policy.** [...] Loans and investments, which had been falling sharply, went up \$148,000,000, the rise in loans amounting to \$64,000,000 and that in investments to \$84,000,000
- May 13, 1932
 - This brings purchases for the last five weeks up to \$500,000,000 and indicates that **there has been no slackening in the credit expansion program**

Narrative Record from the New York Times

- July 19, 1932
 - The **adjournment of Congress** has recalled the prediction in some quarters that **when this event occurred the Federal Reserve System would terminate its policy of keeping money easy** through the purchase of United States Government securities. There are indications that this may prove to be the case.
- Aug 13, 1932
 - With gold returning to the country and currency coming back from circulation, **there appears to be no further need for continued purchases** of United States Government securities by the Federal Reserve Banks.
- Aug 19, 1932
 - Open market purchases of United States Government securities by the Federal Reserve Banks, [...] **came to the expected end this week**

Effects on the Economy

- Analyze the effects of the OMO on the economy using a segmented markets model
- Evidence of segmentation in the 1920s and 1930s:
 - Non-bank public had limited access to the government securities markets which was dominated by a few investment banks (Garbade, 2012)
 - Variations in discount rates across Federal Reserve districts: 50-150 b.p.
 - Loan rates varied: NY banks charged 3.82% on commercial loans; this was 5.01% in the South and West
- Assume two types of investors: households and institutional investors

Model Components

- Andrés, López-Salido and Nelson (2004) and Chen, Cúrdia and Ferrero (2012)
- Investors:
 - ω_u Unrestricted - hold long and short bonds; pay transactions cost to purchase long bonds
 - ω_r Restricted - hold long bonds only
- Intermediate, capital and final goods producers
- Government collects lump-sum taxes and issues long- and short-term debt
- Central bank sets the federal funds rate in response to output gap and inflation (Orphanides 2003, Taylor 1999)

Model Equations: Euler Equations

- For the short-term bond:

$$1 = \beta_u E_t \left[\frac{MU_{t+1}^u}{MU_t^u} \frac{R_{S,t}}{\Pi_{t+1}} e^{-\gamma - z_{t+1}} \right]$$

- For the long bond:

$$1 + \zeta_t = \beta_u E_t \left[\frac{MU_{t+1}^u}{MU_t^u} \frac{R_{L,t}}{\Pi_{t+1}} \frac{P_{L,t+1}}{P_{L,t}} e^{-\gamma - z_{t+1}} \right]$$

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- Pricing equation for restricted households:

$$1 = \beta_r E_t \left[\frac{MU_{t+1}^r}{MU_t^r} \frac{R_{L,t}}{\Pi_{t+1}} \frac{P_{L,t+1}}{P_{L,t}} e^{-\gamma - z_{t+1}} \right]$$

Model Intuition: Effect of asset purchases

- The risk premium between R_L^{EH} and R_L with transactions cost is:

$$R_{L,t} - R_{L,t}^{EH} = \frac{1}{D_L} \sum_{j=0}^{\infty} \left(\frac{D_L - 1}{D_L} \right)^j E_t \zeta_{t+j}$$

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- Transactions cost function:

$$\zeta_t = \zeta \left[\frac{P_{L,t} B_{L,t}}{B_{S,t}}, \varepsilon_{\zeta,t} \right]$$

- Assume $\zeta, \zeta' > 0 \implies$ as public's holdings of long bonds fall, yields on long bonds decline
 - Change in returns on long bonds affects the consumption and savings decisions of the restricted households

Model Estimation

- Estimate model with Bayesian methods
- Construct likelihood using Kalman filter based on the RE state space representation
- Posterior:
 - Maximize posterior density function to obtain the posterior mode
 - Use normal approximation around mode to generate a sample of parameter vector draws based on MCMC

Key Parameters

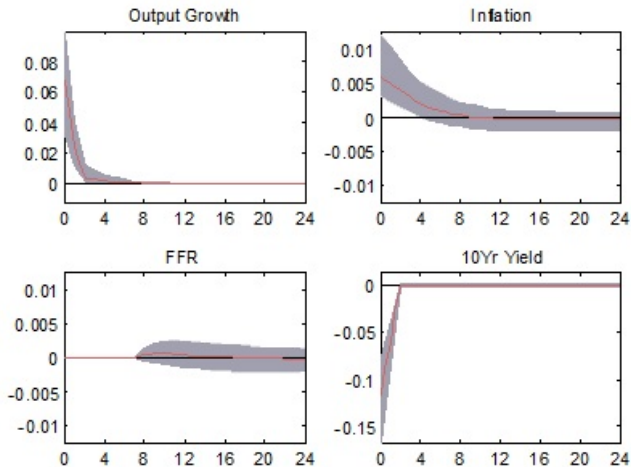
- Average duration of debt is set to match the duration of 5-year Notes
- Debt is 15% of the GDP on average over 1920s
- ZLB characterization: Short yields remained in the zero-lower bound range for approximately two years during and after the 1932 operation

Prior and Posterior Estimates of Key Parameters

	Prior		Posterior			
	Dist	Median	Mean	5%	Median	95%
$100\zeta'$	G	1.2846	0.3635	0.2479	0.3667	0.4884
ω_u	B	0.7334	0.7624	0.7098	0.7583	0.8292
ζ_p	B	0.5000	0.8017	0.7626	0.7974	0.8492
σ_u	G	1.8360	1.6409	1.3758	1.6497	1.8528
σ_r	G	1.8360	1.2687	0.5824	1.1006	1.6119
ϕ_T	G	1.4448	1.1026	0.7862	1.0804	1.4645
ϕ_π	G	1.7026	1.0457	1.0059	1.0449	1.0929
ϕ_y	G	0.3672	0.4369	0.3877	0.4312	0.4950

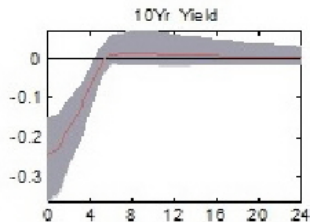
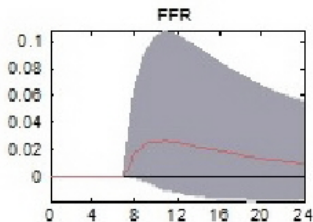
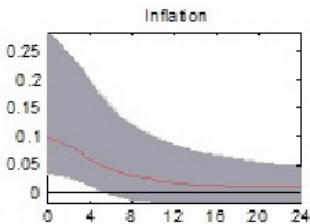
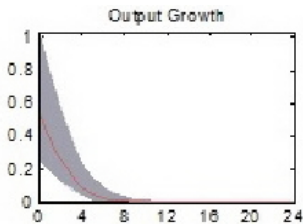
Benchmark simulation

\$1 billion increase in Fed's holdings over 1Q; divests over next quarter



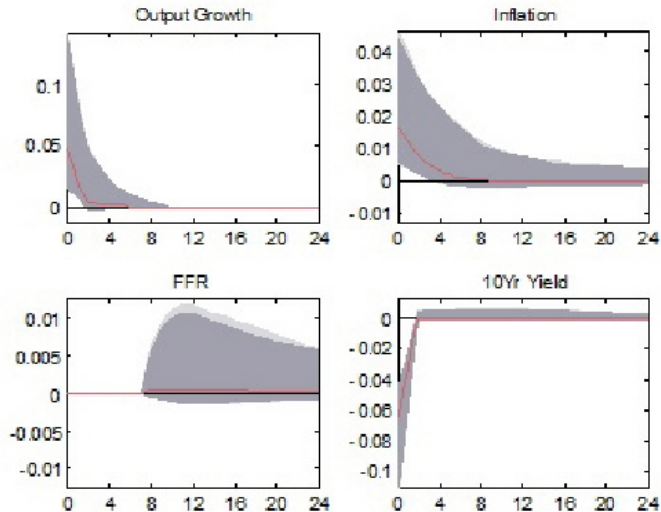
Effects of Program Structure Announcement

\$1 billion increase in Fed's holdings over 2Q; assets are held on the balance sheet for 2Q and then divested (agents understand the full path)



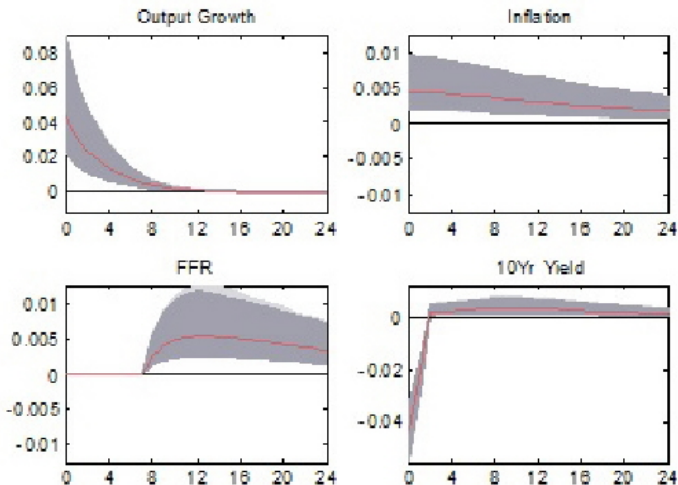
Effects of Debt Maturity

\$1 billion increase in Fed's holdings over 1Q; divests over next quarter;
Debt maturity is increased to 20Q



Effects of Debt Level

\$1 billion increase in Fed's holdings over 1Q; divests over next quarter;
Debt is increased to 20% of GDP



Conclusions and Future Work

- Empirical results suggest the 1932 OMO affected yields on Treasury Notes and Bonds
- In a segmented markets model, the purchase operation affects the risk premium on long bonds leading to a decline in long yields and a rise in output growth
- Estimates of segmentation are large (approximately 76% of investors pay transactions cost to buy long bonds)
- If the Fed in 1932 had followed the announcement strategy of QE1, the effects on the real economy would be larger
- Low degree of financial segmentation during the QE episodes suggests the Fed had to use other unconventional tools in combination with the OMO