

FORMULATE THE CONTROL PROBLEM OF U.S. MONETARY POLICY

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Outline:

- Monetary policy overview
- Monetary policy in 2008
- Empirical analysis
- Formulating a control problem of monetary policy

MONETARY POLICY OVERVIEW

The Fed's mandate

The Board of Governors of the Federal Reserve System and the Federal Open Market Committee shall maintain long run growth of the monetary and credit aggregates commensurate with the economy's long run potential to increase production, so as to promote effectively the goals of **maximum employment**, **stable prices**, and **moderate long-term interest rates**.

(Federal Reserve Act, Section 2A, 1977 amendment.)

Historical Monetary Policy

- **Prominent historical examples:**

1. **Gold standard**, the central bank commits to exchanging, on demand, a unit of domestic currency (for example, one dollar) for a fixed quantity of gold. 1913-1933. FDR takes United States off gold standard On June 5, 1933.

2. **Fixed exchange rate**, the monetary authority offers to buy or sell a unit of domestic currency for a fixed amount of foreign currency. 1945-1971. **Bretton Woods(1944)**, IMF and World Bank.

3. **Money supply targeting**, the central bank expands the money supply (the total amount of money—cash, coins, and balances in bank accounts—in circulation) at a pre-specified, and typically fixed, rate over time. Paul Volcker used it to end the high levels of inflation seen in the United States during the 1970s and early 1980s inflation.

<https://www.federalreserve.gov/monetarypolicy/historical-approaches-to-monetary-policy.htm>

Three Big Events in Fed History

❑ The Great Depression (1929-1938)

“Inept monetary policy” failed to adequately combat credit contraction, deflation, and depression.

❑ The Great Inflation (1965-1980)

Monetary policy failed to recognize structural changes and expectational dynamics that led to double-digit inflation.

❑ The Treasury Accord (1951)

An example highlighting the importance of central bank independence.

**This slide is from <https://www.chicagofed.org/publications/speeches/2014/04-09-14-evans-monetary-policy-goals-strategy-minsky>*

Interest rate targeting or Money targeting

- Three strategies to reach its objectives:
 1. *Set the money stock while letting the interest rate fluctuate as it will.*
 2. *Push interest rate up in times of boom and down in times of recession, while letting the money stock fluctuate as it will.*
 3. *Use both the money stock and the interest rate as instruments.*
- Today the nominal anchor in the United States is the Federal Open Market Committee's (FOMC) explicit objective of achieving inflation at the rate of 2 percent per year over the longer run.
- Although many factors can affect the level of prices at any point--including the ups and downs of the economy, global commodity prices, the value of the dollar, taxes, and so on--**the average rate of inflation over long time periods is ultimately determined by the central bank.**

Taylor's Rule

- The Taylor Rule : a guide to assessing the proper stance of monetary policy.

$$i_t = \pi_t + r_t^* + 0.5(\pi_t - \pi_t^*) + 0.5(y_t - \bar{y}_t)$$

Target Fed funds rate *Equilibrium real interest rate* *Inflation rate* *log real GDP* *log real potential GDP*

The diagram shows the Taylor Rule equation with five labels below it. Arrows point from each label to its corresponding variable in the equation: 'Target Fed funds rate' points to π_t , 'Equilibrium real interest rate' points to r_t^* , 'Inflation rate' points to the first π_t in the term $0.5(\pi_t - \pi_t^*)$, 'log real GDP' points to y_t , and 'log real potential GDP' points to \bar{y}_t .

Monetary Policy general framework

The FOMC achieved its federal funds rate target by directing the New York fed to actively manage the supply of reserves in the banking system.

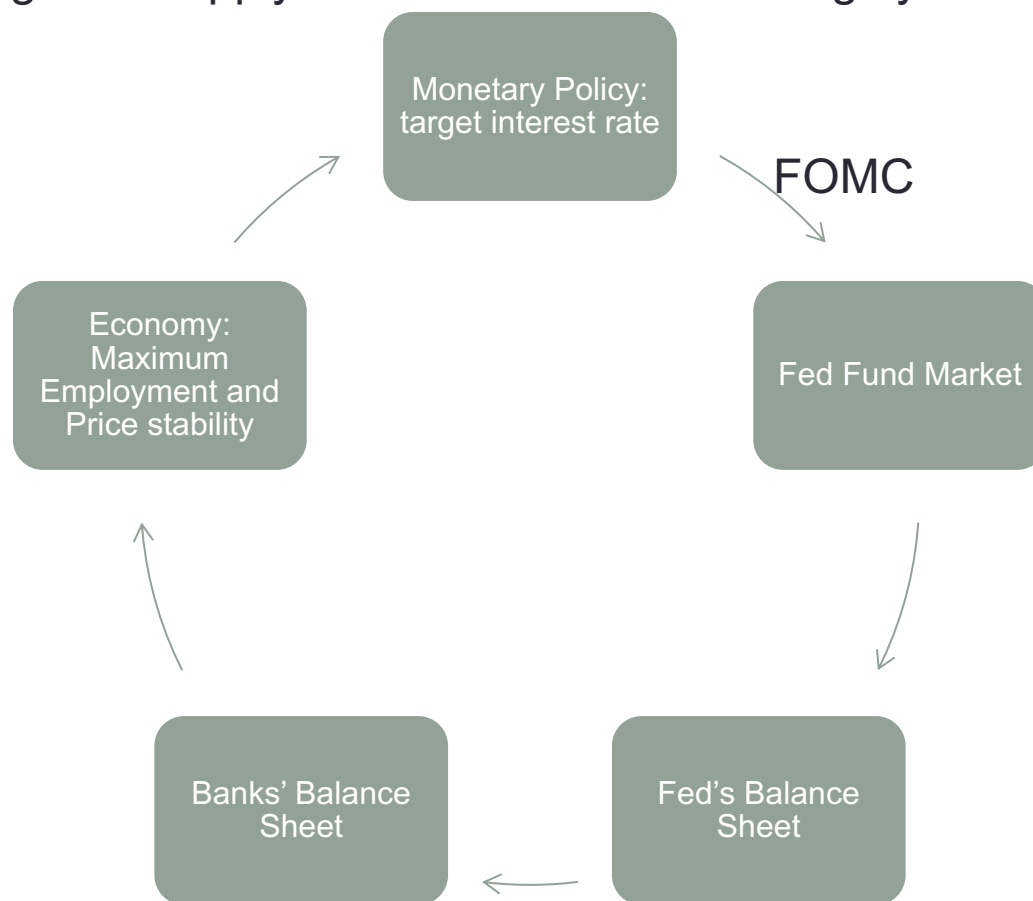


Table 3.1 Reserve ratios for calculating reserve requirements

Liability Type	Requirement	
	% of liabilities	Effective date
Net transaction accounts		
\$0 to \$16.9 million ¹	0	1/16/2020
More than \$16.9 to \$127.5 million ²	3	1/16/2020
More than \$127.5 million	10	1/16/2020
Nonpersonal time deposits	0	12/27/1990
Eurocurrency liabilities	0	12/27/1990

¹ The amount of net transaction accounts subject to a reserve requirement ratio of zero percent or the “exemption amount.”

² The amount of net transaction accounts subject to a reserve requirement ratio of 3 percent is the “low reserve tranche.”

During each reserve maintenance period an institution must satisfy its reserve requirement in the form of **vault cash** or, if vault cash is insufficient to satisfy the requirement, in the form of **a balance maintained with a Federal Reserve Bank**. The portion of the reserve requirement not satisfied by vault cash is called the reserve balance requirement.

Current Monetary Policy in U.S.

Longer-Run Goals and Monetary Policy Strategy is adopted effective on 1/24/2012 and reaffirmed thereafter every January. In the statement of 2019, it stated:

- “The Federal Open Market Committee (FOMC) is firmly committed to fulfilling its statutory mandate from the Congress of promoting maximum employment, stable prices, and moderate long-term interest rates. “
- “The inflation rate over the longer run is primarily determined by monetary policy, and hence the FOMC has the ability to specify a longer-run goal for inflation. The Committee reaffirms its judgement that inflation at the rate of 2% is most consistent over the longer run...”
- “The maximum level of employment is largely determined by nonmonetary factors that affect the structure and dynamics of the labor market. These factors may change over time and may not be directly measurable. It would not be appropriate to specify a fixed goal for employment”

Long-Run strategy for Monetary Policy

- Inflation rate

The long-run goal is fixed at 2%

- Unemployment rate

The long-run goal is time-varying.

- **Balanced approach** to reducing deviations of inflation and employment from **long-run objectives**.

These objectives are generally complementary. However, under circumstances in which the committee judges that the objectives are not complementary, it follows a balanced approach in promoting them, taking into account the magnitude of the deviations and the potentially different time horizons over which employment and inflation are projected to return to levels judges consistent with its mandate.

Current Monetary Policy faces questions:

- Can the Federal Reserve best meet its statutory objectives with its existing monetary policy strategy, or should it consider strategies that aim to reverse past misses of the inflation objective?
- Are the existing monetary policy tools adequate to achieve and maintain maximum employment and price stability, or should the toolkit be expanded? And, if so, how?
- How can the FOMC's communication of its policy framework and implementation be improved?

Cards in the Fed's hand for the next recession

- Current fed funds rate is close to the zero boundary: 1.50-1.75%.
- SOMA portfolio size is 3.79 trillion.
- Public debt is 24.886 trillion as of 12/31/2019.

**Bureau of the Fiscal Service / Debt
CONSOLIDATED BALANCE SHEET
As of December 31, 2019**

	Combined	Eliminations	Consolidated
Intra-governmental Assets			
Fund Balance	\$806,973,678,377.45		\$806,973,678,377.45
Loans and Interest Receivable	1,633,415,742,722.74	\$70,415,269,313.38	1,563,000,473,409.36
Investments and Related Interest			
Advances to Trust Funds	2,654,859,000.00		2,654,859,000.00
Due from the General Fund, Net	22,513,699,876,293.27		22,513,699,876,293.27
Other Intragovernmental Assets			
Total Intra-Governmental Assets	24,956,744,156,393.46	70,415,269,313.38	24,886,328,887,080.08

Non-governmental Assets

https://www.newyorkfed.org/markets/soma/sysopen_accholdings.html

Monetary policy in the future:

Central Bank Digital Currencies

- In a Bank for International Settlements survey of 66 central banks, more than 80 percent of central banks report being engaged in some type of central bank digital currency (CBDC) work.
- Judy Shelton (Nominee for the Fed Board):

“Under a **gold standard** you did have that stability, and I think that’s what’s missing. I like the idea of a gold standard — it could be used in a very cryptocurrency way. The point is do you **have a unified money system** so that when you talk about the international marketplace, everyone is playing on a level monetary playing field,”
- Facebook LIBRA...

MONETARY POLICY IN 2008

Monetary Policy in 2008

- First, in September 2007, the Fed began reducing its target for the Fed funds rate from an initial level of 5.25%. By late 2008, this target reached a range of 0-0.25%.
- Second, with its conventional policy arsenal exhausted and the economy remaining under severe stress, the Fed decided to provide additional stimulus through large-scale purchases of Treasuries and MBS starting from Nov. 2008.
- In 2008, the Open Market Desk at the New York Fed found it increasingly difficult to achieve the FOMC's target funds rate. In response, in October 2008, as authorized under the Financial Services Regulatory Act of 2006 and the Emergency Economic Stabilization Act of 2008, **the Federal Reserve began paying interest on reserves.**
- **IOER (interest rate on excess reserve)** was expected to establish a floor under the federal funds rate. The discount rate, which was set as a penalty rate above the funds rate target, limit upward pressure on the funds rate. With a floor and a ceiling, this operating system is called a “corridor” system.

FEDERAL FUNDS CHART



October 1, 2008, the Federal Reserve Banks pay interest on excess reserves. Nov. 2008, the Fed started QE

FOMC's target federal funds rate or range, %

2015 | 2008 | 2007 | 2006 | 2005 | 2004 | 2003 | [Historical Arc](#)

2015

Date	Increase	Decrease	Level (%)
December 17	25	0	0.25-0.50

[Back to year navigation](#)

2008

Date	Increase	Decrease	Level (%)
December 16	...	75-100	0-0.25
October 29	...	50	1.00
October 8	...	50	1.50
April 30	...	25	2.00
March 18	...	75	2.25
January 30	...	50	3.00
January 22	...	75	3.50

[Back to year navigation](#)

Why is the Effective Fed Funds Rate Below the Theoretical Floor?

- The federal funds market consists of domestic unsecured borrowings in U.S. dollars by depository institutions from other depository institutions and certain other entities, primarily **government-sponsored enterprises**.
- GSEs are not eligible to earn interest on their deposits in the Fed. While GSEs hold deposit balances at the Fed, these balances are not held to satisfy reserve requirement under Regulation D. GSEs can lend their deposit balances at the Fed to depository institutions.
- **Fannie Mae and Freddie Mac** are singled out as large players using the overnight federal funds market to warehouse the monies they receive from daily incoming mortgage payments before passing these funds on to MBS investors or servicers.

Why is the Effective Fed Funds Rate Below the Theoretical Floor?

- The GSEs ability to earn overnight interest only by lending their Fed Balances to depository institutions appears to allow participating depository institutions, including branches of foreign banks, **the opportunity to earn arbitrage profits** by simultaneously borrowing funds in the federal funds market lent from GSEs at relatively low interest rates and then holding these funds at their balance sheet as excess reserves and earning overnight interest from the Fed.
- However, two costs to this arbitrage:
 1. Deposit insurance premium to FDIC for any funds borrowed in the federal funds market.

In 2011, the FDIC expanded its deposit insurance assessment base from deposits to average consolidated total assets minus average tangible equity. For domestic banks, not foreign banks, this meant an increase in the effective cost of borrowing fed funds to arbitrage IOER since these transactions now increase their FDIC fees.

2. The capital ratio requirement forces a bank to grow its capital at the same rate that it grows its asset. (if the risk weight for deposits in the Fed is non- zero.)

$$(A + \Delta L) = (L + \Delta L) + C$$

$$\frac{C}{A + \Delta L} < \frac{C}{A}$$

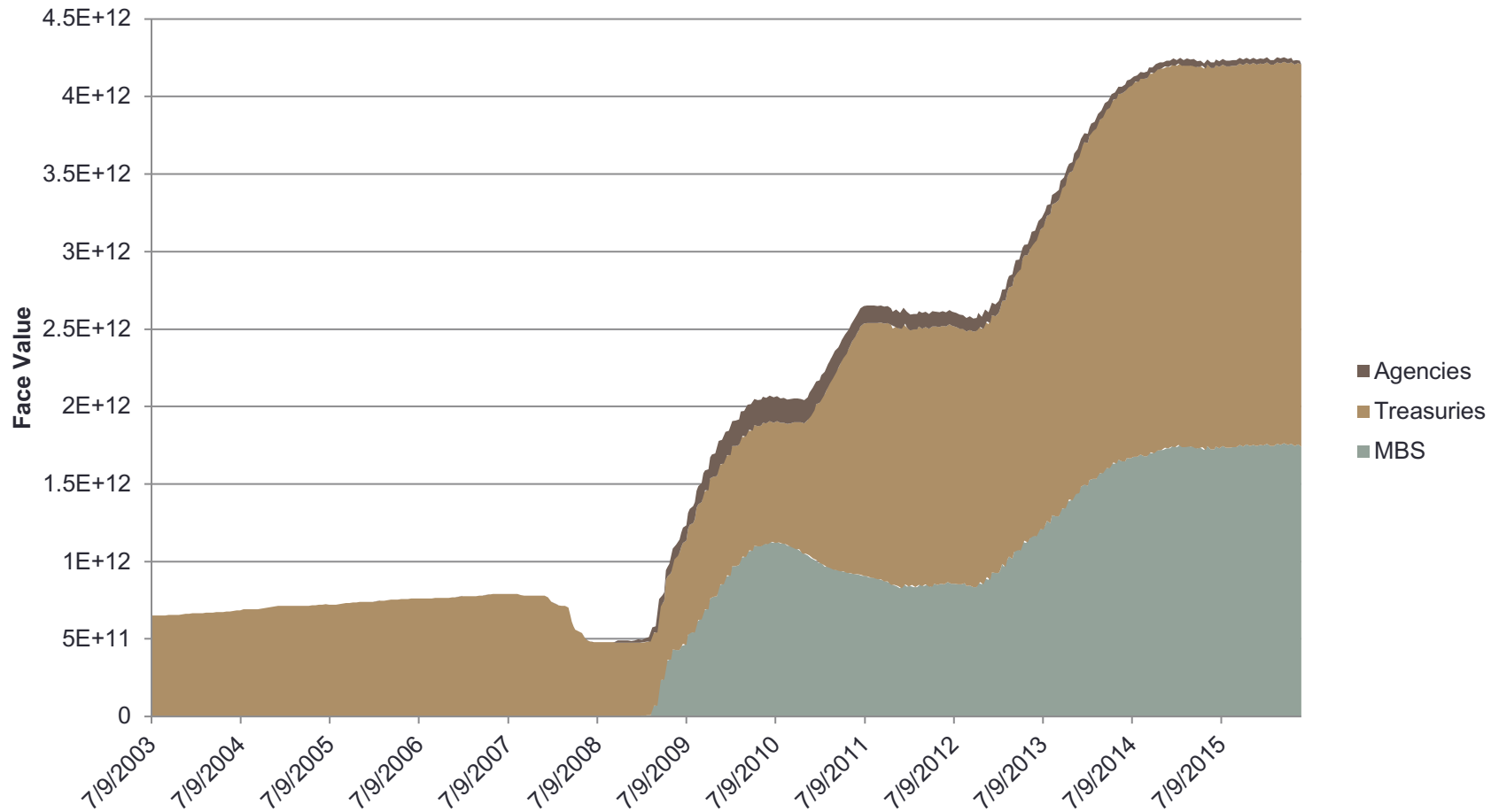
The fact

- During the Great Recession, 8.8 million jobs were lost, the federal government invested \$250 billion to stabilize banks and \$82 billion to stabilize the U.S. auto industry [see the link below]. (The Troubled Asset Relief Program (TARP), 2008-2010)

https://www.philadelphiafed.org/-/media/research-and-data/publications/economic-insights/2018/q2/eiq218-capital_requirements.pdf?la=en

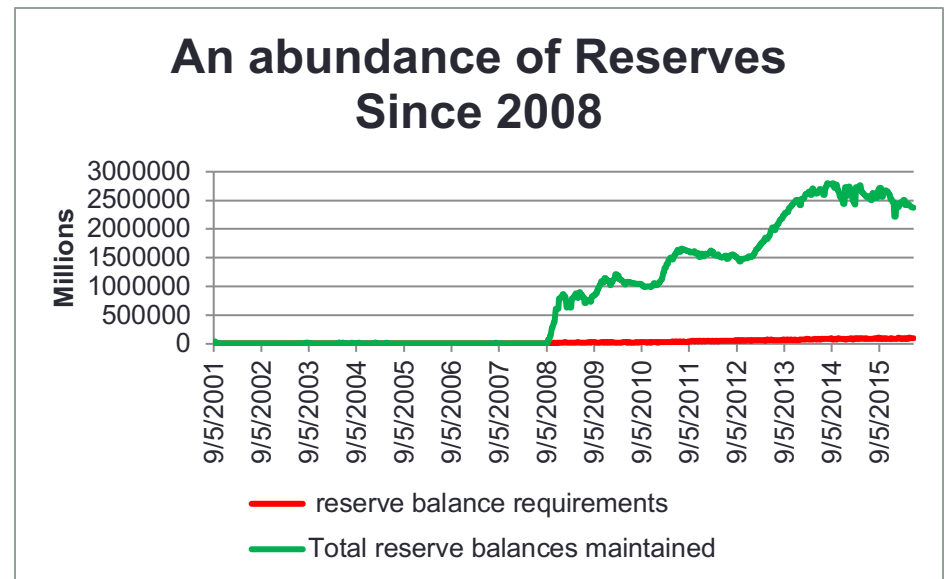
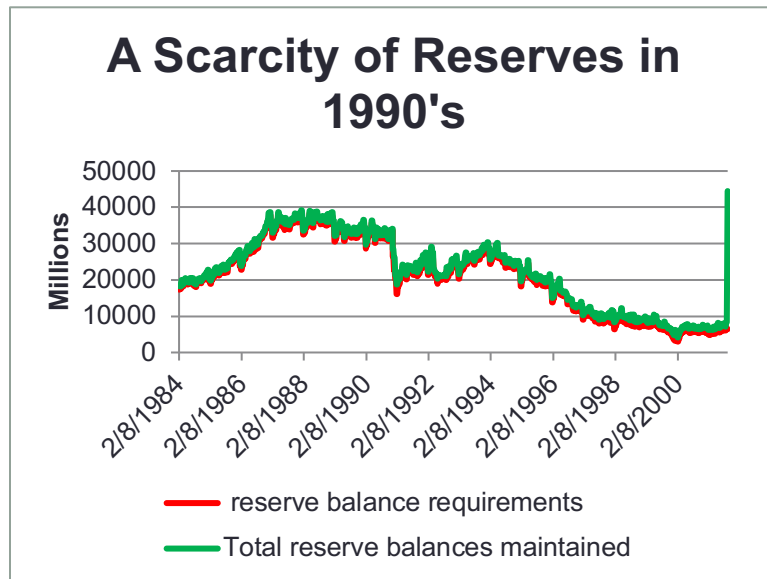
The fact: System Open Market Account

SOMA History Summary



Is it possible the Fed could lose control over the federal funds target?

- The answer is yes when the demand for reserves is small, or none as the Fed controls the supply (insensitive to changes in the supply of reserves).



The Federal Reserve reduced reserve requirements twice in the 1990s—eliminating the 3 percent requirement on non-transactions accounts in December 1990 and cutting the requirement on transaction accounts from 12 percent to 10 percent in April 1992.

The Fed's Balance Sheet: Assets

4. Consolidated Statement of Condition of All Federal Reserve Banks

Millions of dollars

Assets, liabilities, and capital	Eliminations from consolidation	Wednesday Feb 5, 2020	Change since Wednesday Jan 29, 2020	Wednesday Feb 6, 2019
Assets				
Gold certificate account		11,037	0	0
Special drawing rights certificate account		5,200	0	0
Coin		1,772	+ 5	- 39
Securities, unamortized premiums and discounts, repurchase agreements, and loans		4,097,977	+ 13,854	+ 143,007
Securities held outright (1)		3,817,516	+ 18,773	- 12,414
U.S. Treasury securities		2,427,880	+ 18,772	+ 222,167
Bills (2)		247,536	+ 15,002	+ 247,536
Notes and bonds, nominal (2)		2,025,475	+ 2,354	- 43,921
Notes and bonds, inflation-indexed (2)		129,451	+ 1,446	+ 14,682
Inflation compensation (3)		25,418	- 30	+ 3,870
Federal agency debt securities (2)		2,347	0	- 62
Mortgage-backed securities (4)		1,387,289	+ 1	- 234,520
Unamortized premiums on securities held outright (5)		123,542	+ 15	- 14,739
Unamortized discounts on securities held outright (5)		-13,333	- 27	- 75
Repurchase agreements (6)		170,250	- 4,875	+ 170,250
Loans		1	- 33	- 15
Net portfolio holdings of Maiden Lane LLC (7)		0	0	0
Items in process of collection	(0)	76	+ 22	+ 10
Bank premises		2,193	- 17	- 6
Central bank liquidity swaps (8)		48	- 3	- 18
Foreign currency denominated assets (9)		20,453	- 46	- 441
Other assets (10)		27,952	+ 1,263	- 2,156
Total assets	(0)	4,166,707	+ 15,077	+ 140,357

Source: <https://www.federalreserve.gov/releases/h41/current/>

The Fed's Balance Sheet: Liabilities

4. Consolidated Statement of Condition of All Federal Reserve Banks (continued)

Millions of dollars

Assets, liabilities, and capital	Eliminations from consolidation	Wednesday Feb 5, 2020		Change since Wednesday Jan 29, 2020	Wednesday Feb 6, 2019
Liabilities					
Federal Reserve notes, net of F.R. Bank holdings		1,746,494	+	1,897	+ 88,883
Reverse repurchase agreements (11)		239,163	+	5,759	- 9,067
Deposits	(0)	2,137,263	+	8,499	+ 60,600
Term deposits held by depository institutions		0		0	0
Other deposits held by depository institutions		1,652,873	+	40,650	- 5,990
U.S. Treasury, General Account		416,585	-	33,952	+ 62,689
Foreign official		5,183	+	2	- 61
Other (12)	(0)	62,621	+	1,798	+ 3,961
Deferred availability cash items	(0)	180	-	549	- 77
Other liabilities and accrued dividends (13)		5,105	-	508	+ 667
Total liabilities	(0)	4,128,205	+	15,097	+ 141,005
Capital accounts					
Capital paid in		31,677	-	20	- 649
Surplus		6,825		0	0
Other capital accounts		0		0	0
Total capital		38,502	-	20	- 649

Note: Components may not sum to totals because of rounding.

Commercial Banks' Aggregate Balance Sheet

Notes:

Fed funds and reverse RPs with Nonbanks included with brokers and dealers and with others, including the Federal Home Loan Banks.

Notes: nonbanks includes brokers and dealers and others, including Federal Home Loan Banks.

H.8

Assets and Liabilities of Commercial Banks in the United States¹

Seasonally adjusted, billions of dollars

Account		2015 Jun	2016 Jun
ASSETS			
1	Bank credit	11,306.8	12,117.9
2	Securities in bank credit ²	3,042.6	3,210.8
3	Treasury and agency securities ³	2,144.7	2,303.7
4	Mortgage-backed securities (MBS) ⁴	1,487.6	1,608.0
5	Non-MBS ⁵	657.1	695.7
6	Other securities	897.8	907.0
7	Mortgage-backed securities ⁶	127.5	114.6
8	Non-MBS ⁷	770.3	792.4
9	Loans and leases in bank credit ⁸	8,264.2	8,907.2
10	Commercial and industrial loans	1,875.9	2,056.9
11	Real estate loans	3,739.4	3,998.1
12	Residential real estate loans	2,055.0	2,119.3
13	Revolving home equity loans	445.8	422.3
14	Closed-end residential loans ⁹	1,609.2	1,697.0
15	Commercial real estate loans	1,684.4	1,878.8
16	Construction and land development loans ¹⁰	241.2	278.3
17	Secured by farmland ¹¹	84.6	91.1
18	Secured by multifamily properties ¹²	248.1	291.8
19	Secured by nonfarm nonresidential properties ¹³	1,110.5	1,217.6
20	Consumer loans	1,216.8	1,319.5
21	Credit cards and other revolving plans	630.3	684.6
22	Other consumer loans	586.5	634.9
23	Automobile loans ¹⁴	368.0	400.4
24	All other consumer loans ¹⁵	218.5	234.5
25	Other loans and leases	1,432.1	1,532.7
26	Fed funds and reverse RPs with nonbanks ¹⁶	344.0	341.3
27	All other loans and leases ¹⁷	1,088.1	1,191.4
28	Loans to nondepository financial institutions ¹⁸	357.4	411.4
29	Other loans not elsewhere classified ¹⁹	730.7	779.9
30	LESS: Allowance for loan and lease losses	106.3	108.5

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Assets and Liabilities of Commercial Banks in the United States¹

Seasonally adjusted, billions of dollars (continued)

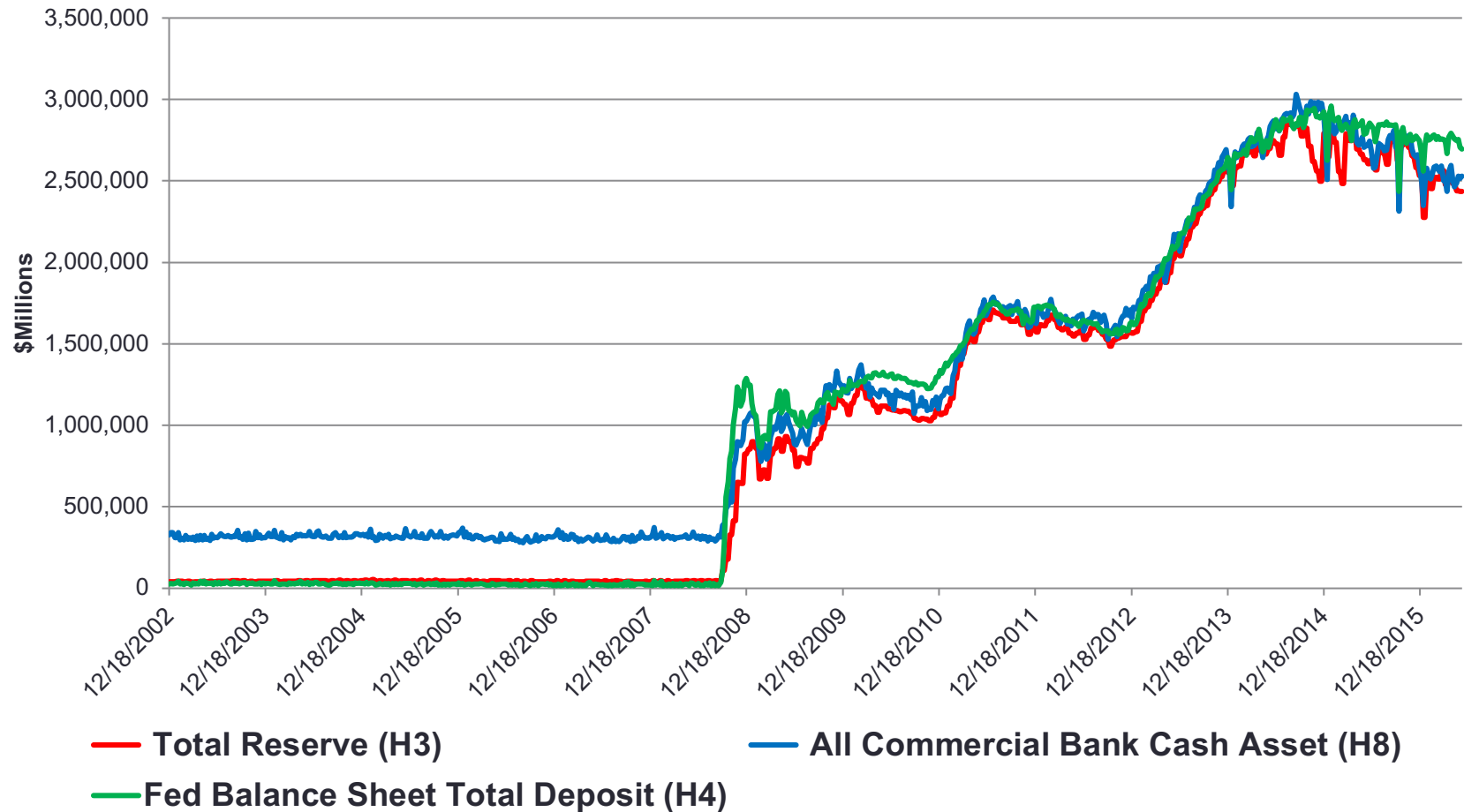
	Account	2015 Jun	2016 Jun
ASSETS (CONTINUED)			
31	Interbank loans	72.3	62.2
32	Fed funds and reverse RPs with banks ¹⁶	60.5	49.5
33	Loans to commercial banks ²⁰	11.8	12.7
34	Cash assets ²¹	2,672.9	2,495.7
35	Trading assets ²²	204.4	236.2
36	Other assets ²³	1,155.5	1,141.1
37	TOTAL ASSETS	15,305.7	15,944.6
LIABILITIES			
38	Deposits	10,754.1	11,253.1
39	Large time deposits	1,700.4	1,658.8
40	Other deposits	9,053.6	9,594.2
41	Borrowings	1,835.6	1,963.8
42	Borrowings from banks in the U.S.	106.9	124.4
43	Borrowings from others	1,728.7	1,839.5
44	Trading liabilities ²⁴	214.8	243.2
45	Net due to related foreign offices	438.6	369.8
46	Other liabilities ²⁵	434.3	406.2
47	TOTAL LIABILITIES	13,677.3	14,236.2
48	RESIDUAL (ASSETS LESS LIABILITIES)²⁶	1,628.3	1,708.4
MEMORANDA			
49	Net unrealized gains (losses) on available-for-sale securities ²⁷	10.0	26.1
50	U.S. Treasury and agency securities, MBS ²⁸	7.0	18.5
51	Loans with original amounts of \$1,000,000 or less	540.6	549.3
52	Loans secured by nonfarm nonresidential properties ²⁹	264.9	261.0
53	Commercial and industrial loans to U.S. addressees ³⁰	275.7	288.3

Notes:

1. **Cash assets** include vault cash, cash items in process of collection, balances due from depository institutions, and balances due from Federal Reserve Banks.

The link between Fed and Commercial Banks

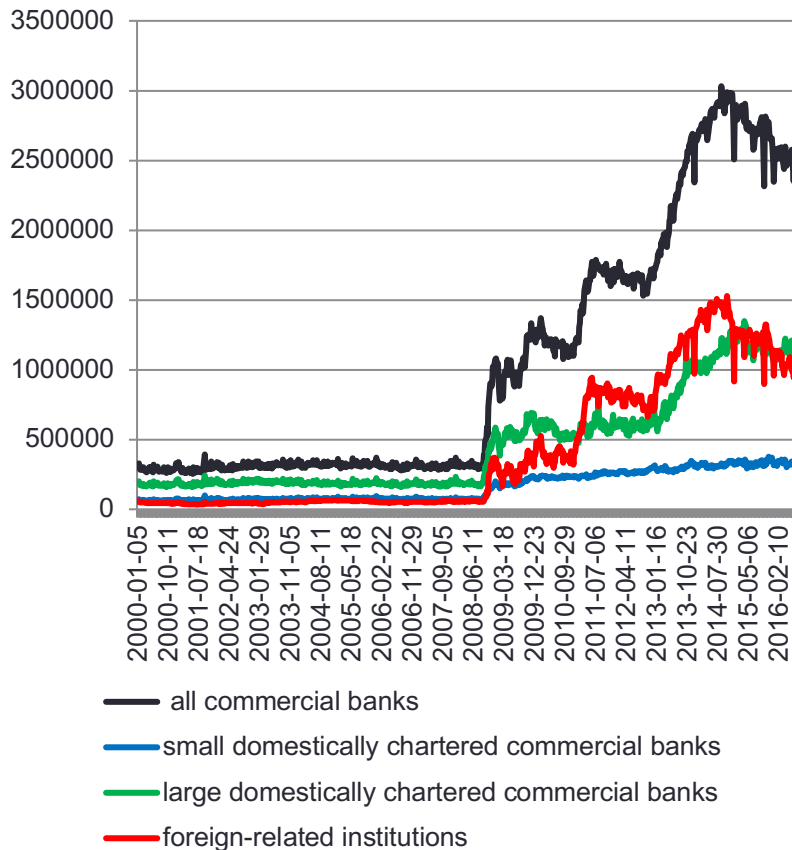
The link between Commercial Banks and the Fed



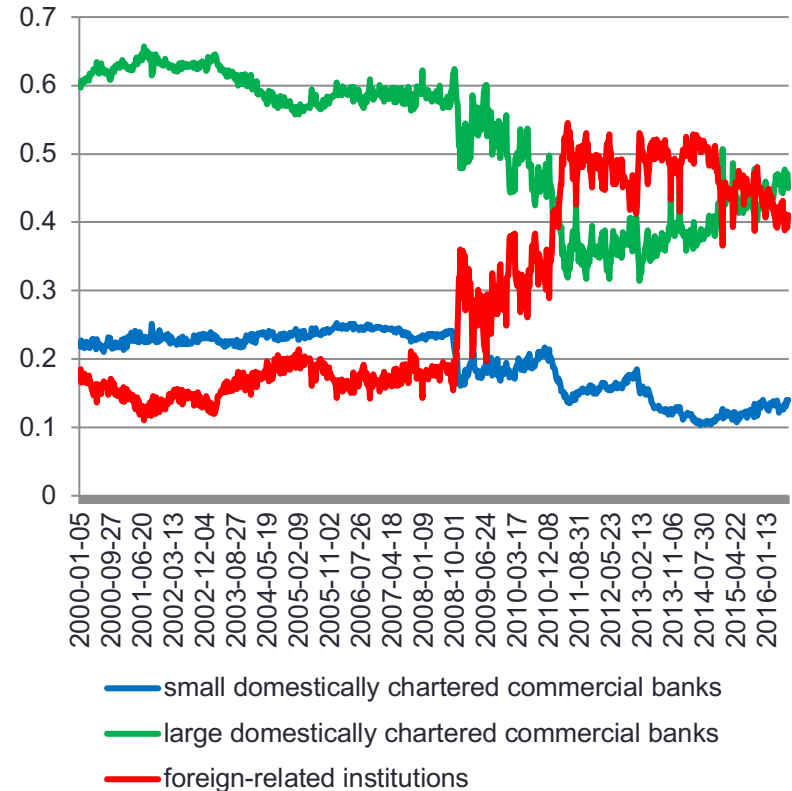
Data source: Federal Reserve data release H3, H4, H8 as of June 2016

40% to 50% of QE money went to foreign-related institutions

Banks' Cash Assets



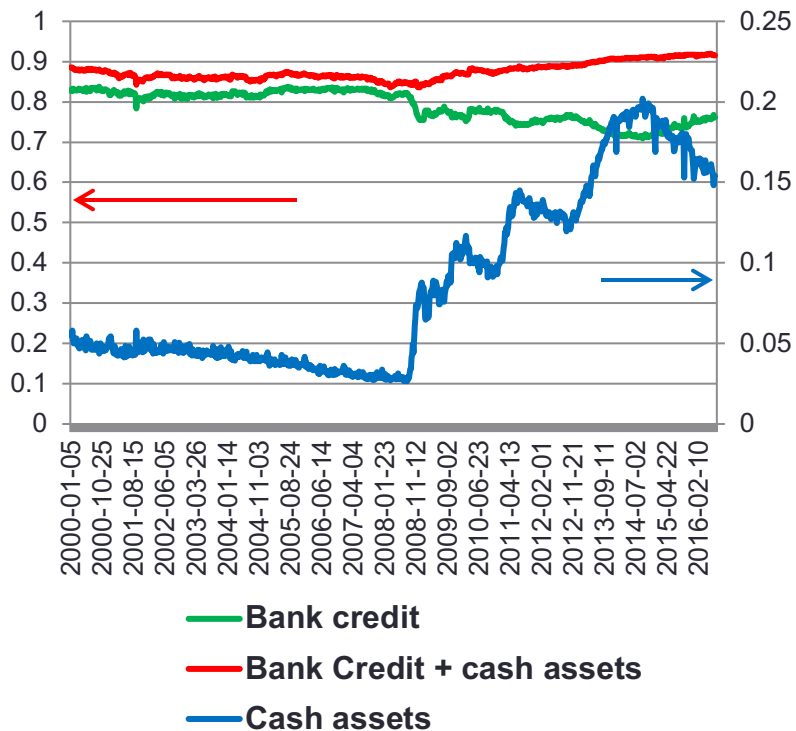
Banks' Cash Assets (Percentage)



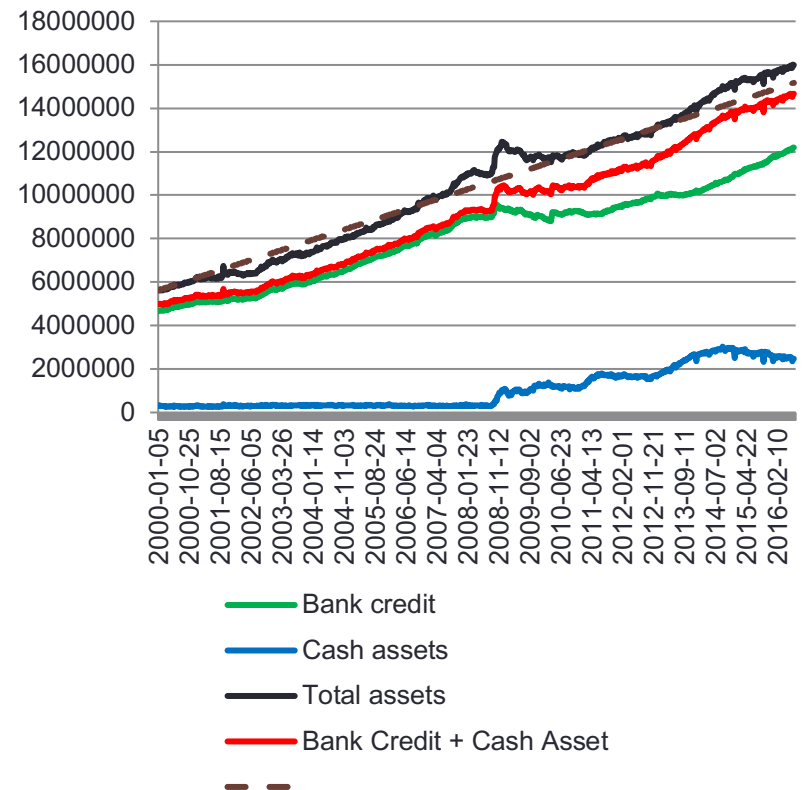
Large domestically chartered commercial banks are defined as the top 25 domestically chartered commercial banks, ranked by domestic assets. Small domestically chartered commercial banks are defined as all domestically chartered commercial banks not included in the top 25.

Banks' Assets: One Side of QE Money

All Commercial Banks' Assets Components (Percentage of total asset)

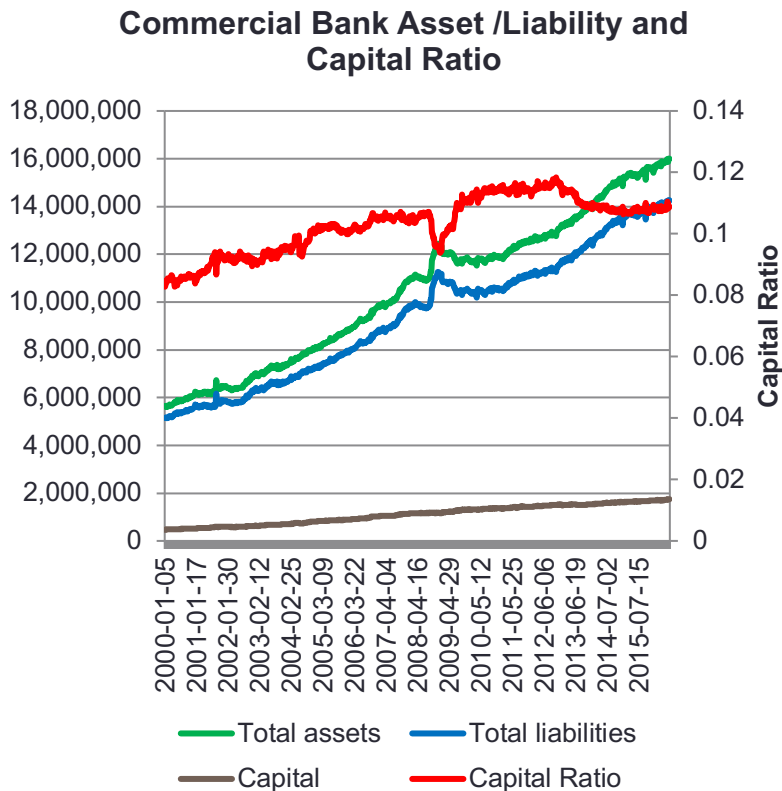


All Commercial Banks' Assets Components

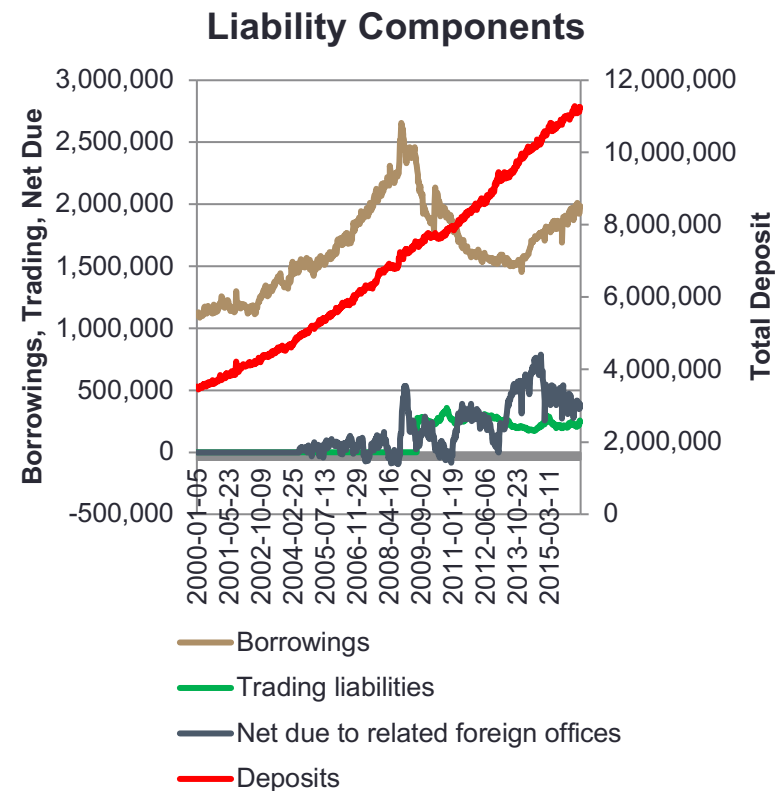


Banks' Liabilities: The Other Side of QE Money

Total Assets and Total Liabilities

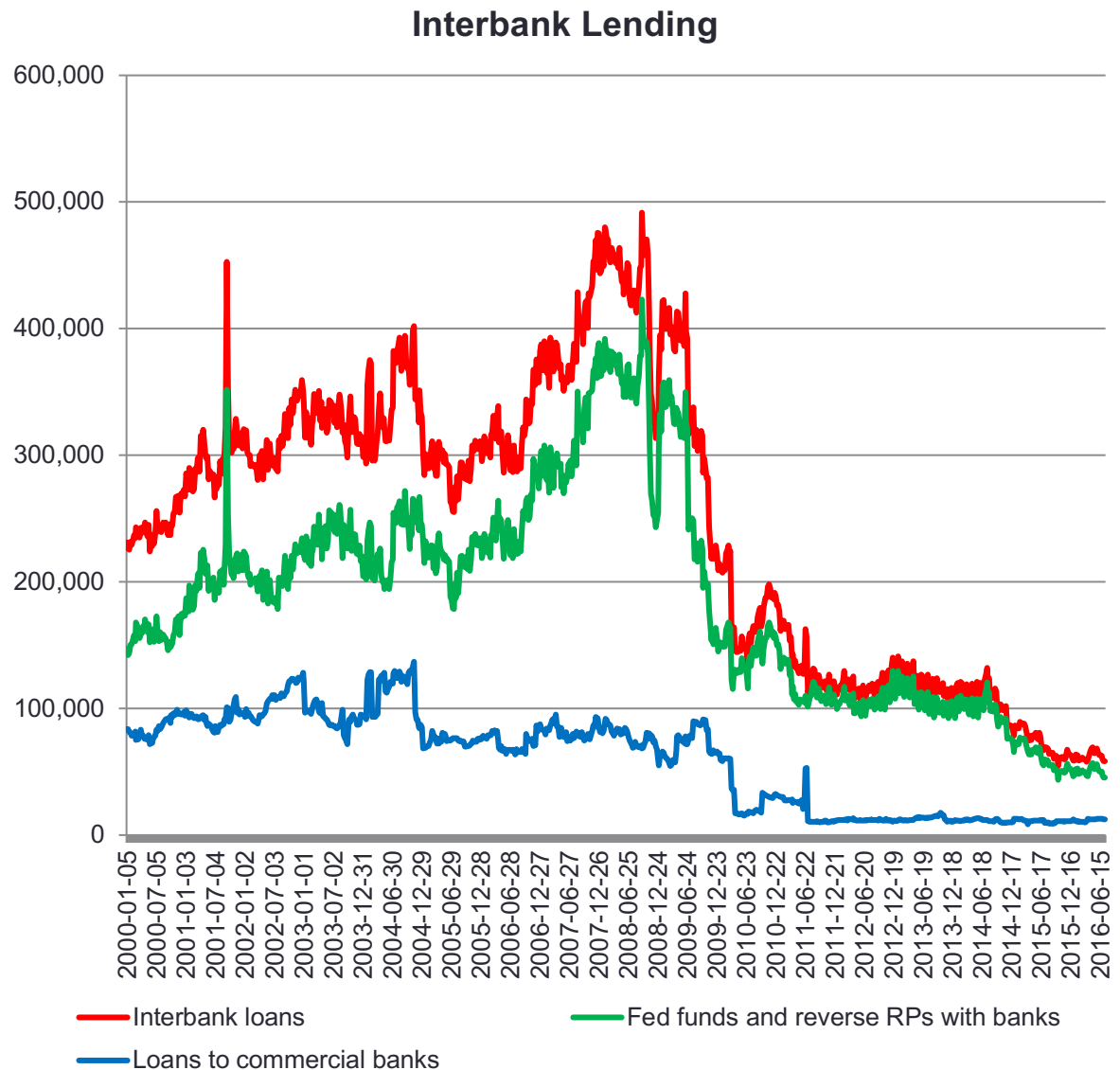


Liability Distribution



QE money's Impact on interbank lending

Interbank lending
volume has decreased
significantly after QE.



Where did the QE money go?

Most of QE money did not go into the economy. It is parked in commercial banks' cash assets account, even after considering the effect of monetary policy lags.

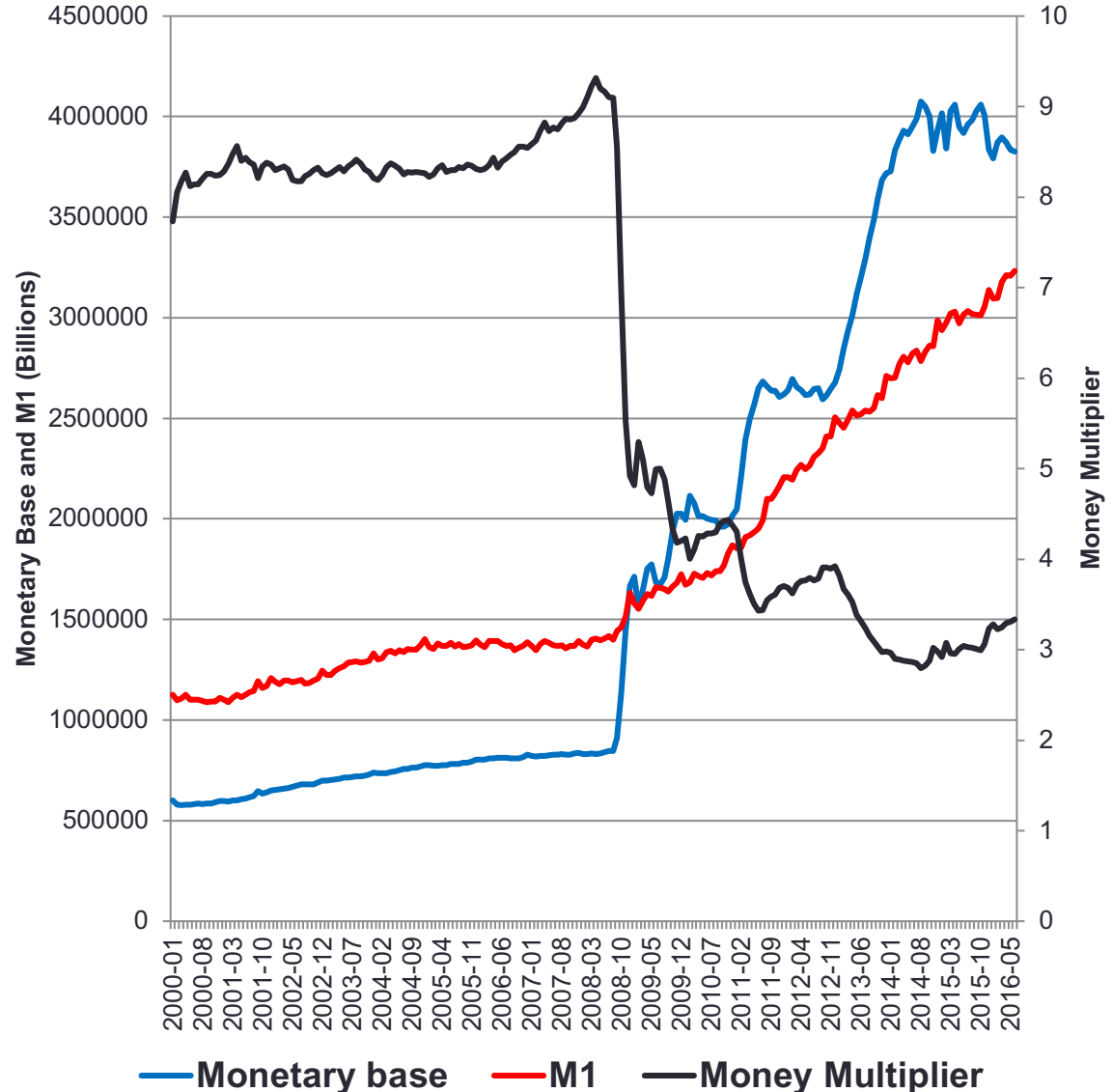
Notes:

Monetary Base: reserves + currency in circulation

M1: Currency in circulation, traveler's checks, demand deposits, other checkable deposits

M2: M1+ savings deposits + small time deposits + retail money funds

Money Multiplier used here : $\frac{M2}{\text{Monetary Base}}$



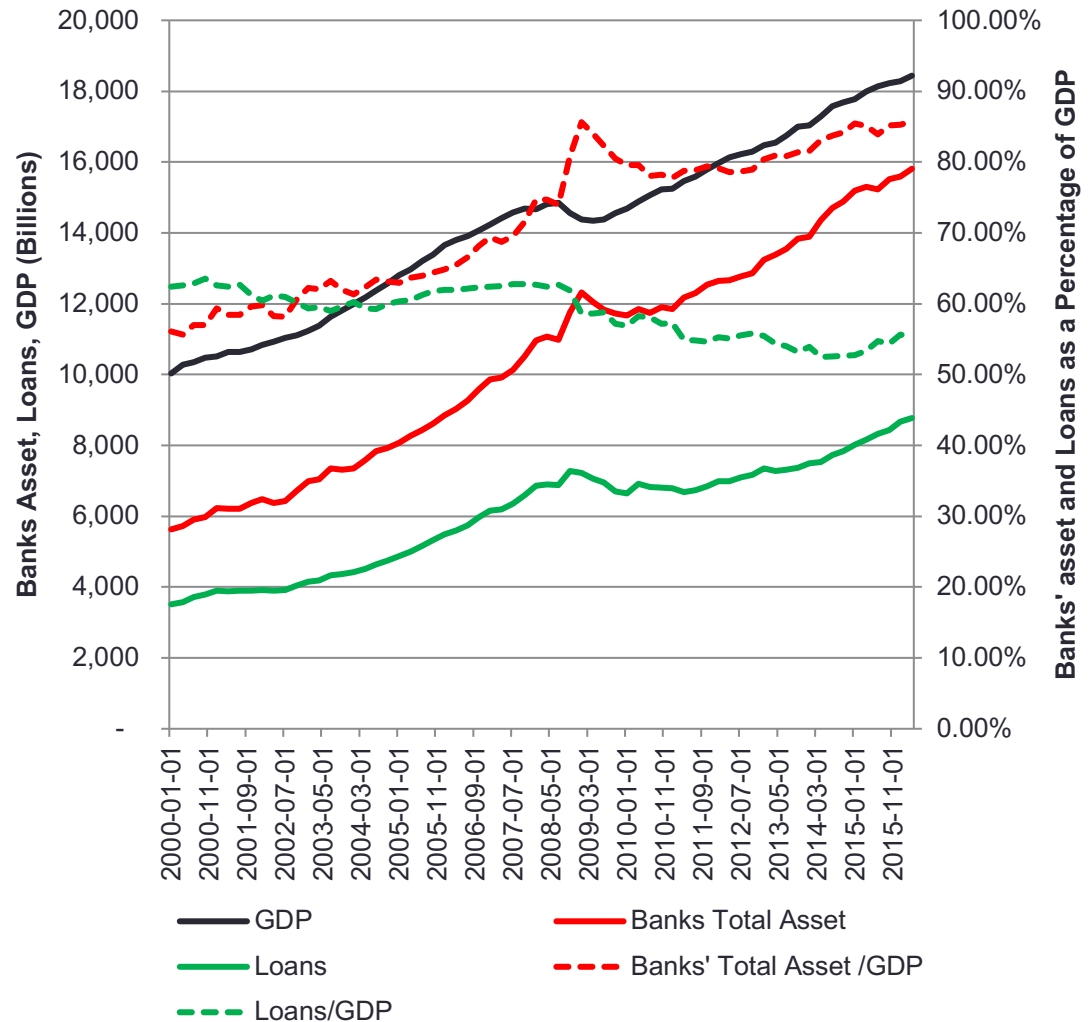
Data Source: www.federalreserve.org

Bank assets grew too big to fail, or too big to save?

Total US Commercial banks' asset reached 85.74% of GDP as of 4/1/2016. Even though it is much lower than Euro Area 350%, Japan 180%, UK, 520%, a high ratio of bank assets to GDP could put the financial system in risk.

At the same time, the number of banks decreased from 9000 to 7000. Top 25 domestic chartered banks count 57% of total banks' asset.

- Banks' Asset and loans as a percentage of GDP



Why were banks not lending the QE Money?

- Most QE money is stuck with primary dealers with which the Fed trades.
- The demand for loans is low.
- The Fed is paying 50bps on excess reserve as of Aug.4 2016. Banks collect this 50bps on excess reserve for nothing - no risk at all.

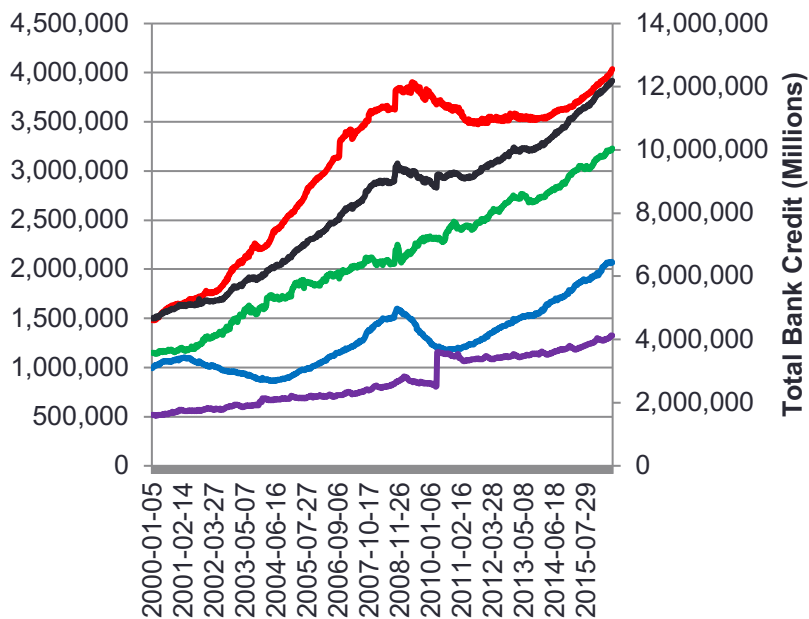
Interest Rates on Reserve Balances for August 4, 2016 Last Updated: August 4, 2016 at 4:30 p.m., Eastern Time	Rates (percent)	Effective Date
Rate on Required Reserves (IORR rate)	0.50	12/17/2015
Rate on Excess Reserves (IOER rate)	0.50	12/17/2015

Source: www.federalreserve.org

- Business loans are usually 5 years term and they are risky for banks to lend in such a low interest rate environment because the loans may expose the banks to **interest rate risk** in a rising rate environment.
- Even if banks give that business a floating interest rate loan, the borrower is in a riskier situation than they were when you lent them at very low interest rates. They might not be able to pay back when interest rates go up, exposing the banks to **credit risk**.

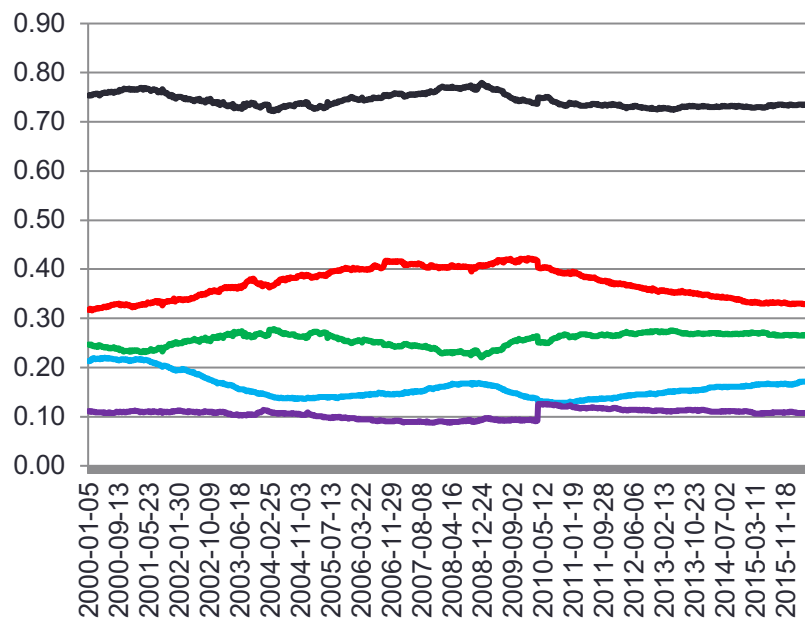
Banks' Lending

Bank Earning Assets Distribution before and after Crisis



- Securities
- Commercial and industrial loans
- Real estate loans
- Consumer loans
- Bank credit Total

Bank Earning Assets Distribution before and after Crisis (Percentage)

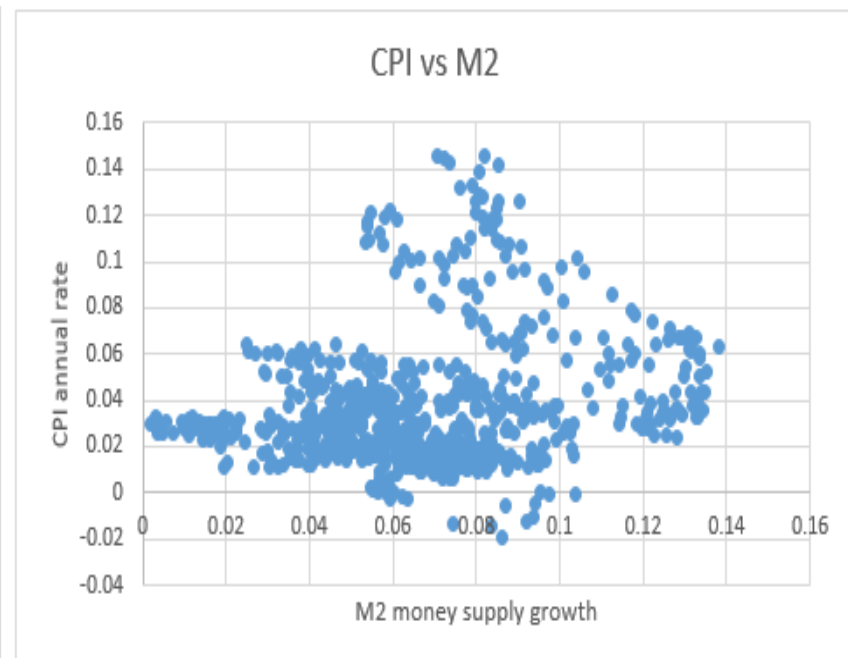
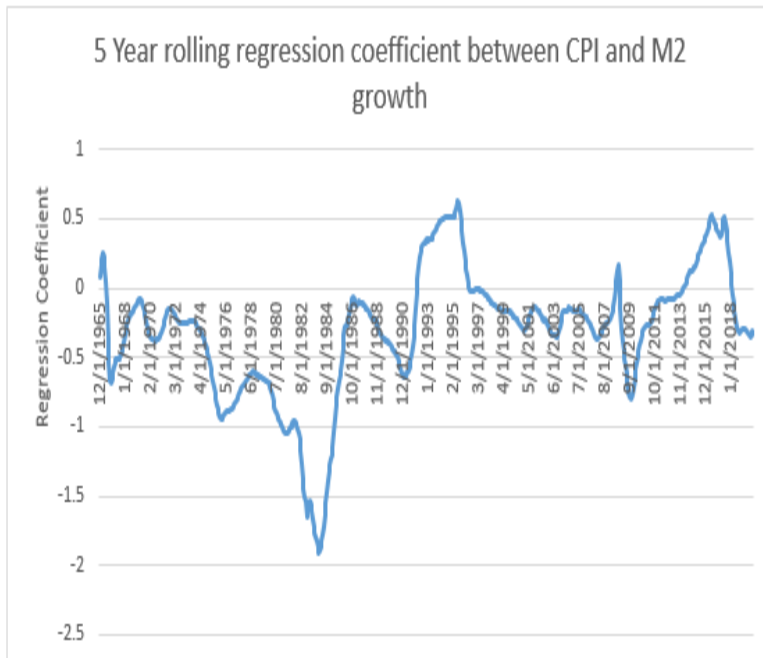


- Securities
- Loans and leases in bank credit
- Commercial and industrial loans
- Real estate loans
- Consumer loans

EMPIRICAL ANALYSIS

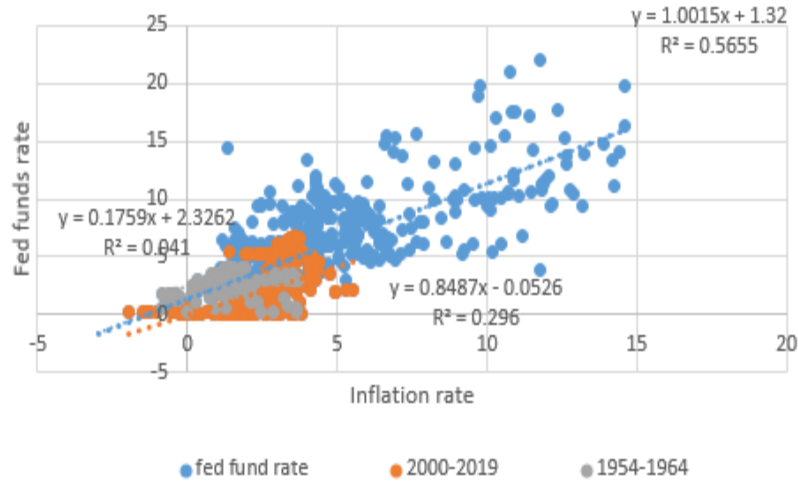
Can we use money stock to control inflation ?

- Empirically, there is no strong correlation between money stock and inflation.

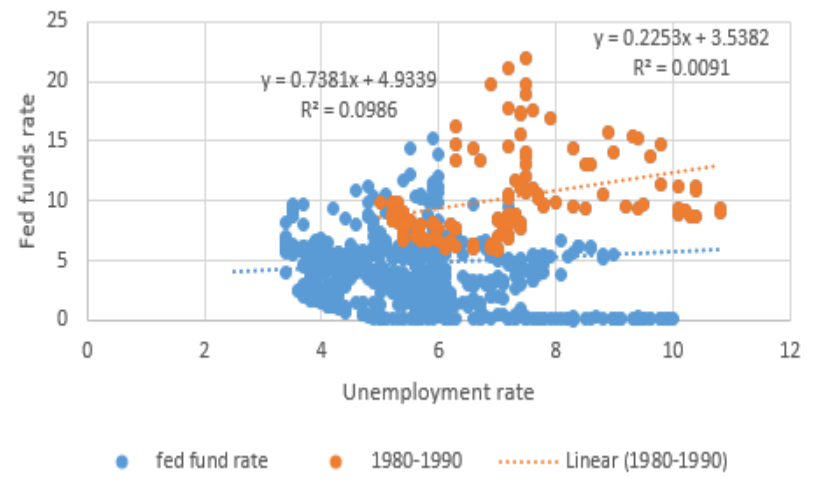


- **Over some periods**, measures of the money supply have exhibited fairly close relationships with important economic variables such as nominal gross domestic product (GDP) and the price level. Based partly on these relationships, some economists—Milton Friedman being the most famous example—have argued that **the money supply provides important information about the near-term course for the economy and determines the level of prices and inflation in the long run**. Central banks, including the Federal Reserve, have at times used measures of the money supply as an important guide in the conduct of monetary policy.
- **Over recent decades**, however, **the relationships** between various measures of the money supply and variables such as GDP growth and inflation in the United States **have been quite unstable**. As a result, the importance of the money supply as a guide for the conduct of monetary policy in the United States has diminished over time. The Federal Open Market Committee, the monetary policymaking body of the Federal Reserve System, still regularly reviews money supply data in conducting monetary policy, but money supply figures are just part of a wide array of financial and economic data that policymakers review.

Historical Inflation rate vs Fed funds rate

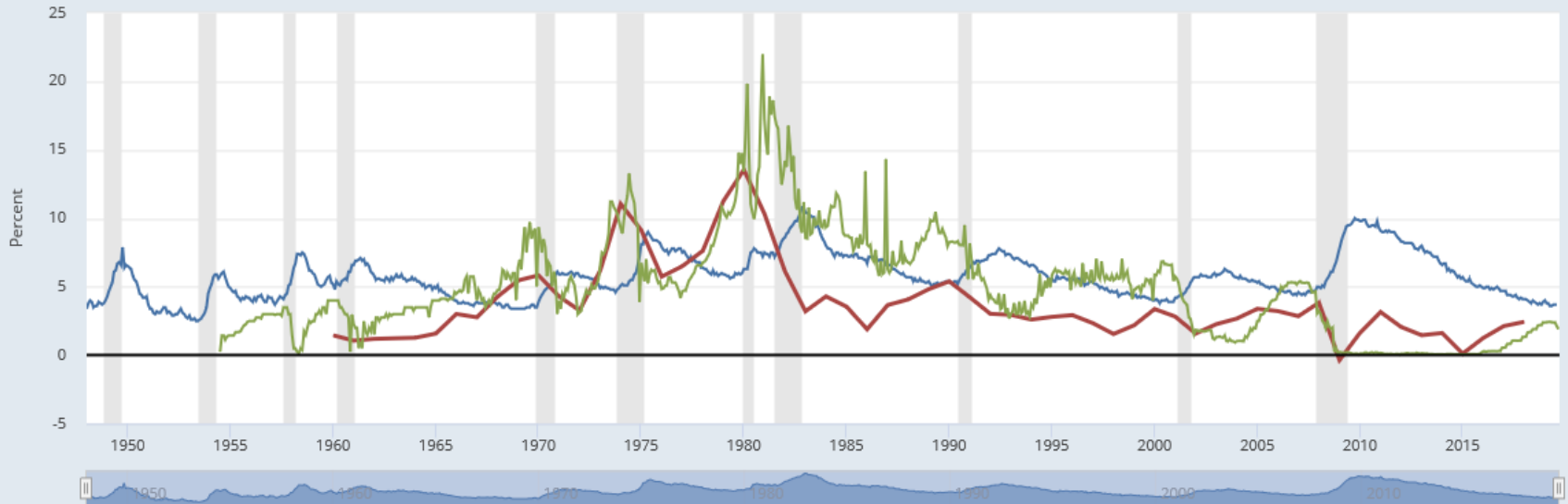


Historical unemployment rate vs Fed funds rate



FRED

- Civilian Unemployment Rate
- Inflation, consumer prices for the United States
- Effective Federal Funds Rate

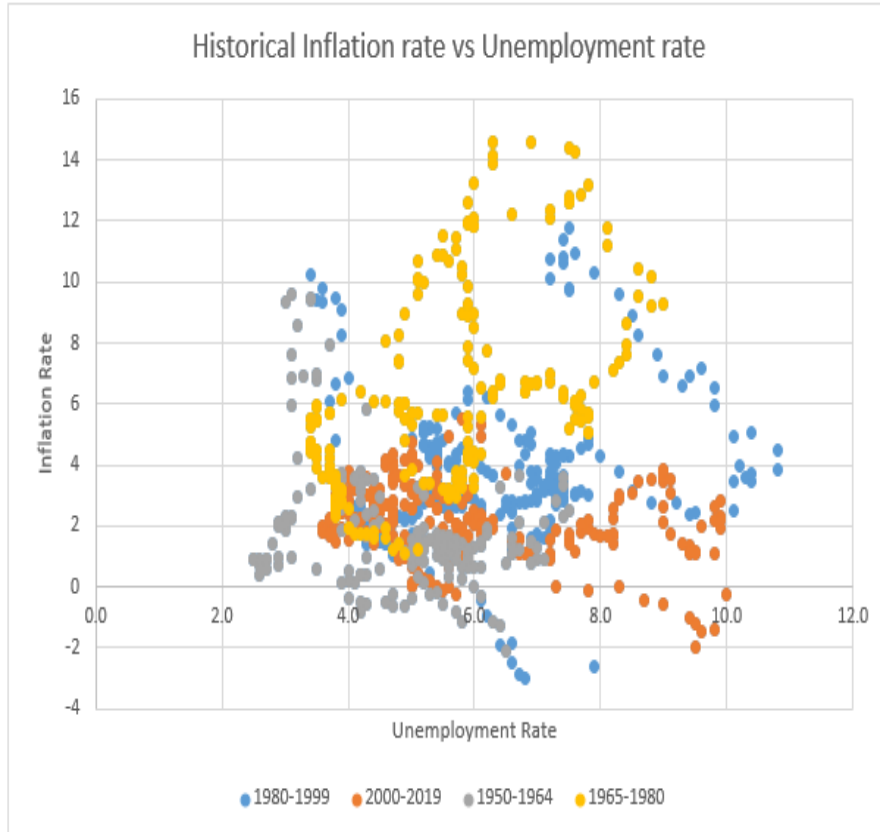


Shaded areas indicate U.S. recessions

Sources: BLS, Board of Governors, World Bank

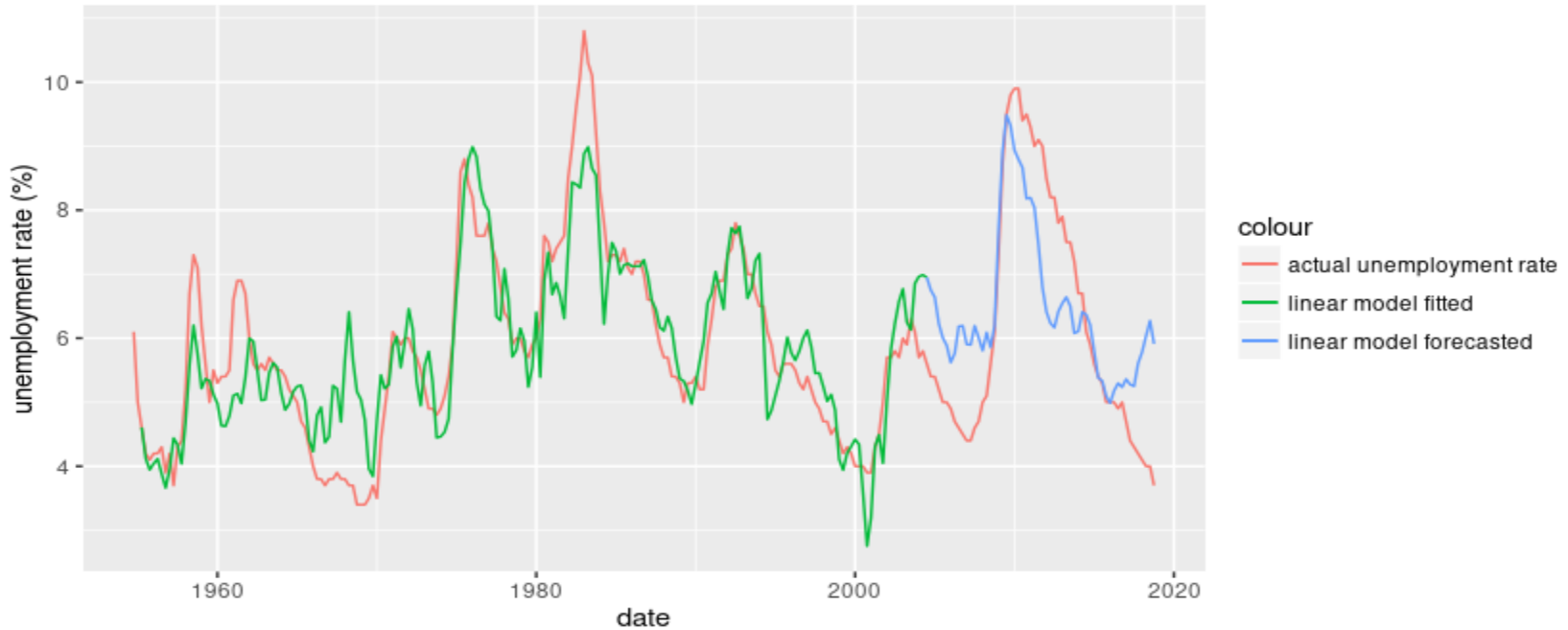
fred.stlouisfed.org

Historical inflation rate and unemployment rate



Note: (1) monthly data (2) Inflation rate is calculated from CPI by Haimei Shao (3) CPI is from Fred data series "CPI AUCSL"

Unemployment rate model



Coefficients:

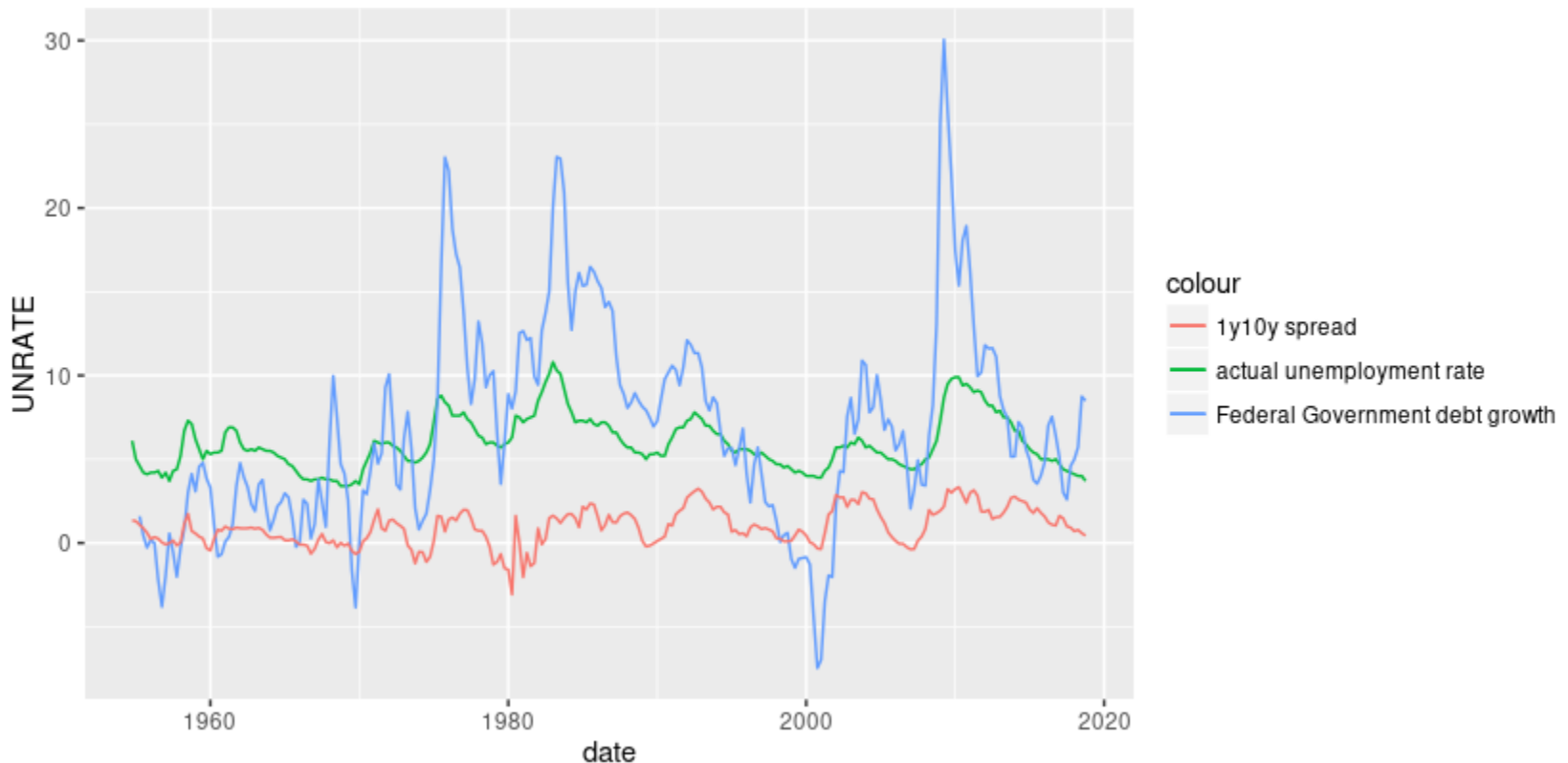
	Estimate	Std. Error	t value	Pr(> t)	
(Intercept)	4.19710	0.26512	15.831	< 2e-16	***
d1_Corporate_ma	-0.02165	0.02037	-1.063	0.2892	
d1_Federalgovernment_ma	0.15898	0.01110	14.320	< 2e-16	***
d1_Homemortgage_ma	0.00177	0.02038	0.087	0.9309	
d1_Consumercredit_ma	-0.03743	0.01454	-2.574	0.0108	*
d1_financialsector_ma	0.02575	0.01123	2.292	0.0230	*
d1_foreign_ma	0.06850	0.01015	6.746	1.78e-10	***
T1T10Spd	0.30183	0.07167	4.211	3.92e-05	***

 Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.7547 on 190 degrees of freedom
 Multiple R-squared: 0.7432, Adjusted R-squared: 0.7337
 F-statistic: 78.54 on 7 and 190 DF, p-value: < 2.2e-16

What data tells factors that relate to the unemployment rate

- Federal government debt growth is positively correlated to the unemployment rate.
- The spread between 1Y treasury and 10Y treasury is also positively correlated to the unemployment rate.
- However, we observed that the government debt is negatively correlated to the private sector growth rates.



Why is the Federal government debt negatively correlated to private sector debts?

- The government lean against the wind when the economy is stressed (in deficit).
- Crowding-out effect: the growth in government debt pushes the cost of private sector debt higher.

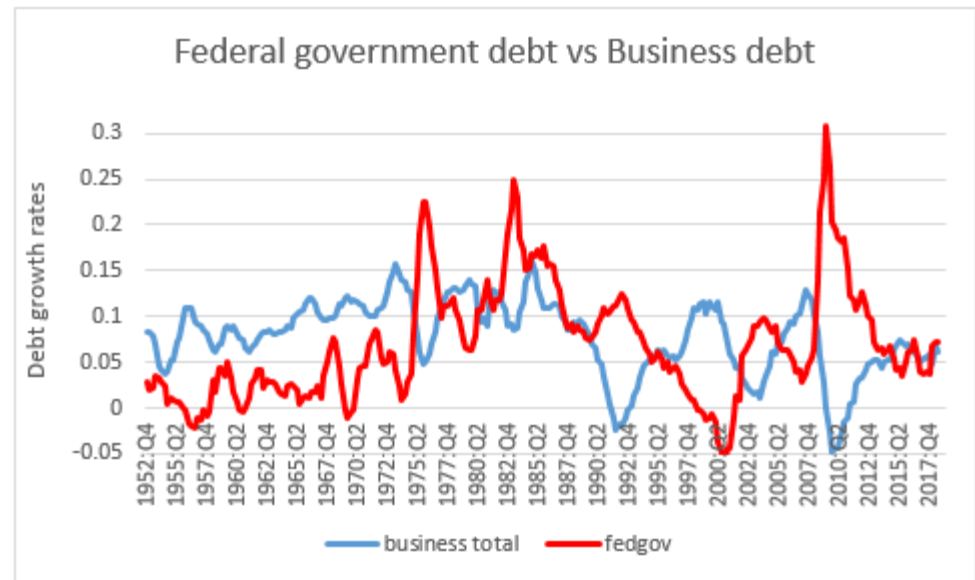
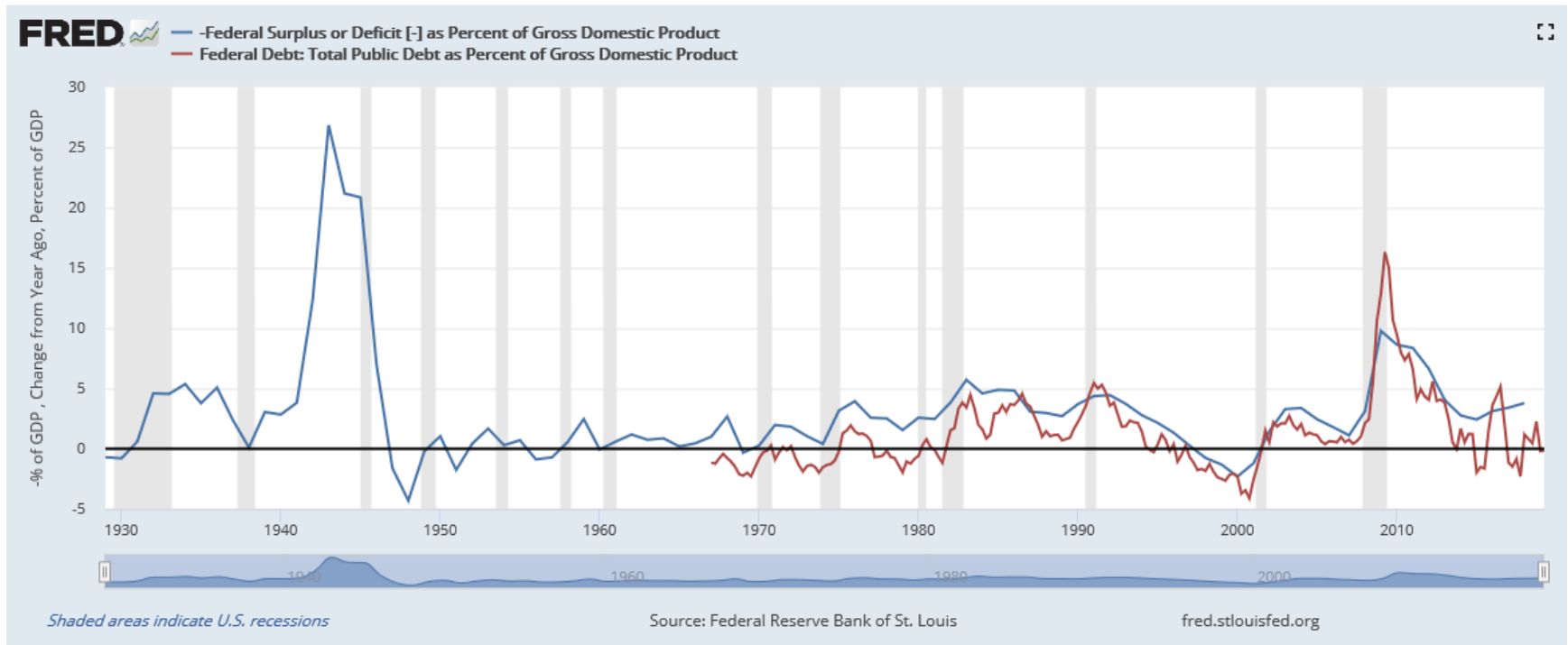


Table: Correlation coefficients of debt growth rates and unemployment rates

	unemployment	total	total households	mortgage	consumer	business total	corporate	fedgov	stategov	fin	foreign
unemployment rate	1.00	0.11	-0.35	-0.30	-0.36	-0.36	-0.33	0.79	-0.04	-0.30	0.27
total	0.11	1.00	0.71	0.68	0.47	0.64	0.56	0.34	0.54	0.61	0.13
total households	-0.35	0.71	1.00	0.96	0.68	0.54	0.42	-0.21	0.50	0.71	-0.02
mortgage	-0.30	0.68	0.96	1.00	0.49	0.45	0.33	-0.18	0.53	0.65	-0.03
consumer	-0.36	0.47	0.68	0.49	1.00	0.56	0.53	-0.25	0.18	0.59	-0.09
business total	-0.36	0.64	0.54	0.45	0.56	1.00	0.94	-0.27	0.15	0.72	-0.02
corporate	-0.33	0.56	0.42	0.33	0.53	0.94	1.00	-0.24	0.09	0.71	-0.07
fedgov	0.79	0.34	-0.21	-0.18	-0.25	-0.27	-0.24	1.00	0.08	-0.28	0.14
stategov	-0.04	0.54	0.50	0.53	0.18	0.15	0.09	0.08	1.00	0.29	0.08
fin	-0.30	0.61	0.71	0.65	0.59	0.72	0.71	-0.28	0.29	1.00	-0.07
foreign	0.27	0.13	-0.02	-0.03	-0.09	-0.02	-0.07	0.14	0.08	-0.07	1.00

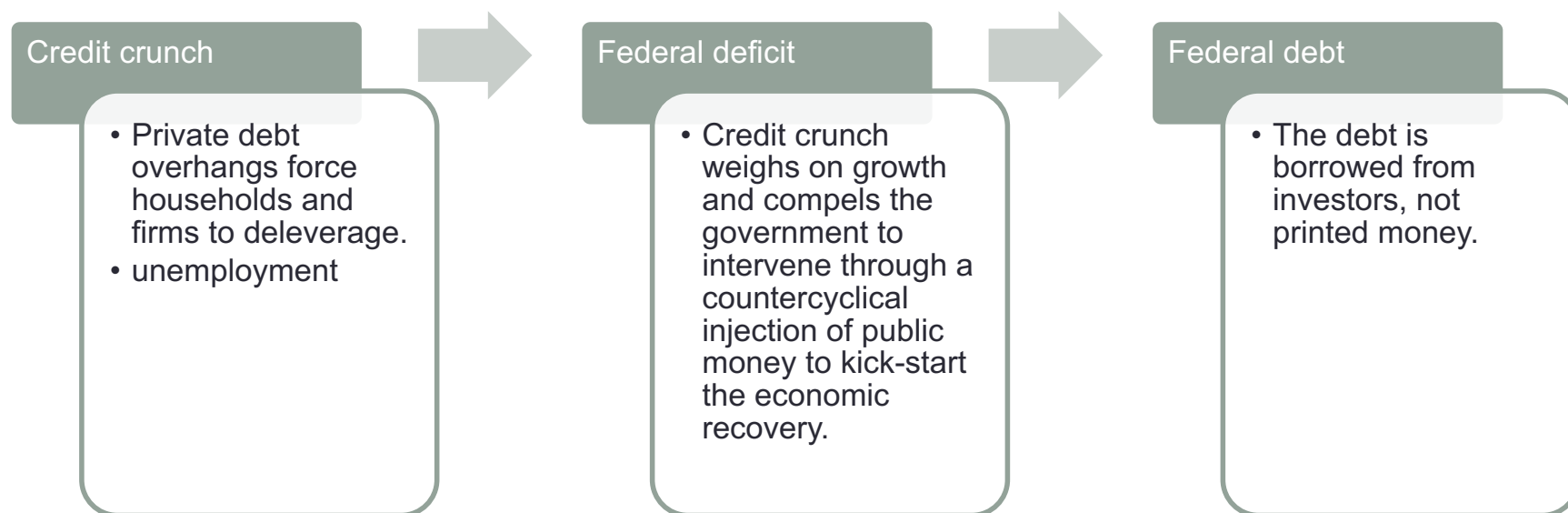
Federal Debt vs Federal deficit



Note: the sign of deficit is flipped for a better demonstration. (positive sign means deficit)

- Budget deficits are the principal contributor to debt held by the public.
- Interest payments made on public held debt instruments contribute directly to federal deficits.
- Federal deficit and debt outcomes are interdependent.

Preliminary story

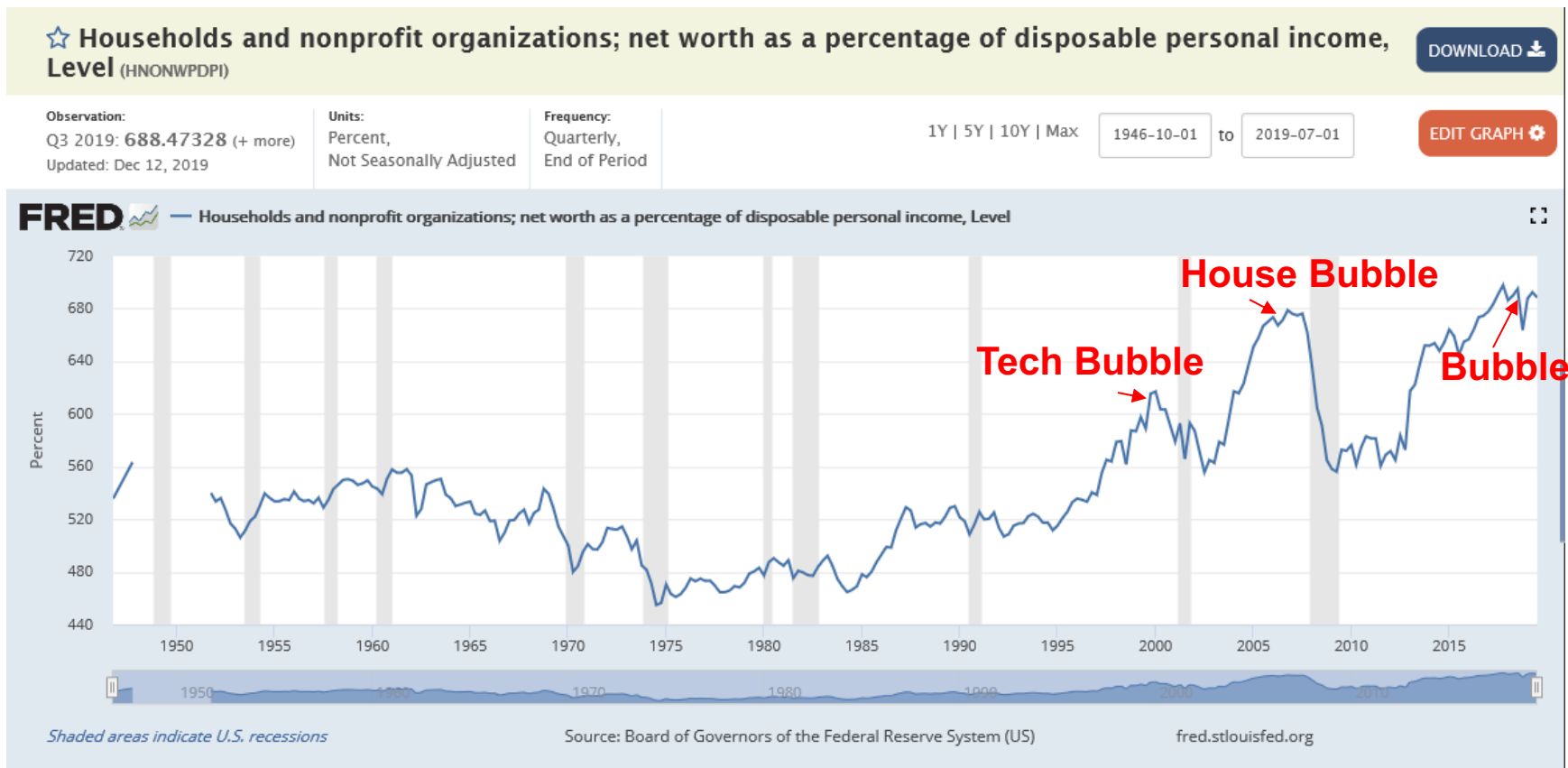


- But this is not the only possible explanation. Private debt, public debt and growth are mutually endogenous. Thus, one could build alternative explanations starting from other ends of the knot: crowding-out effects from excess public borrowing triggers a slowdown in private borrowing.
- This finding invites a question: **is issuing new debt on behalf of all taxpayers a optimal solution from a welfare perspective?**

What economics theory tells the causes of unemployment

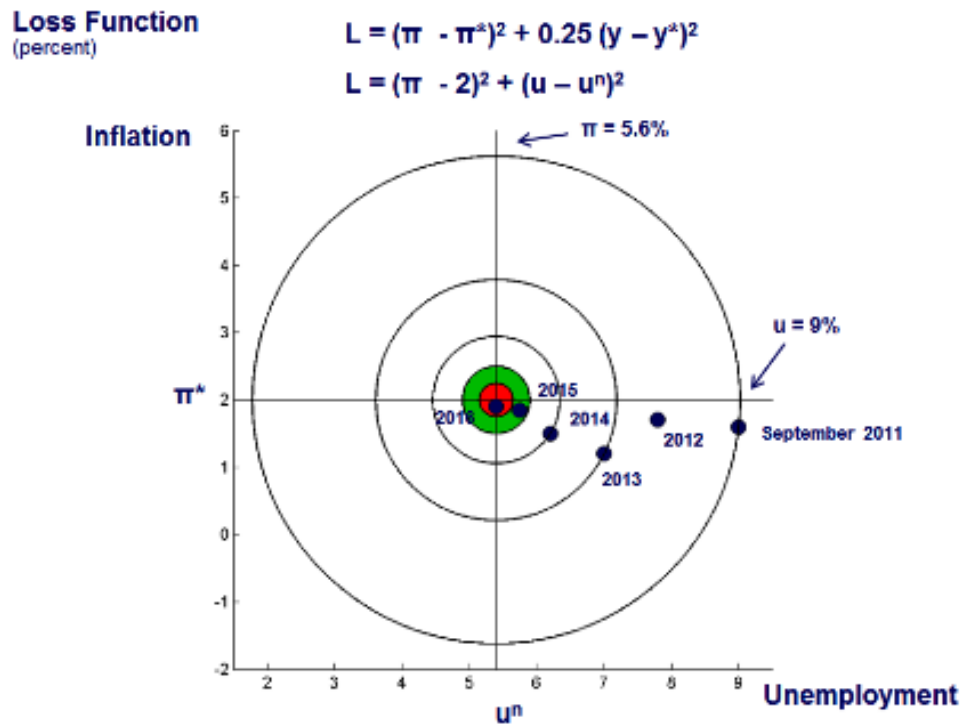
- The labor force is the driving factor behind the U.S. economy. Economists, academics and policy makers long have argued about the causes of and remedies for unemployment. While it is unlikely a consensus ever will be reached, most agree that there are three main categories of unemployment.
- **Frictional unemployment:** unrelated to the economy
- **Structural unemployment:** mismatch in the demographic or industrial composition of a local economy (the supply and demand of labors with necessary skill sets).
- **Cyclical unemployment:** change in the employment rate due to the change in the economic cycle.

Are we going to have another crash?



FORMULATE THE CONTROL PROBLEM

Bull's-Eye Accountability for Fed's Dual Mandate

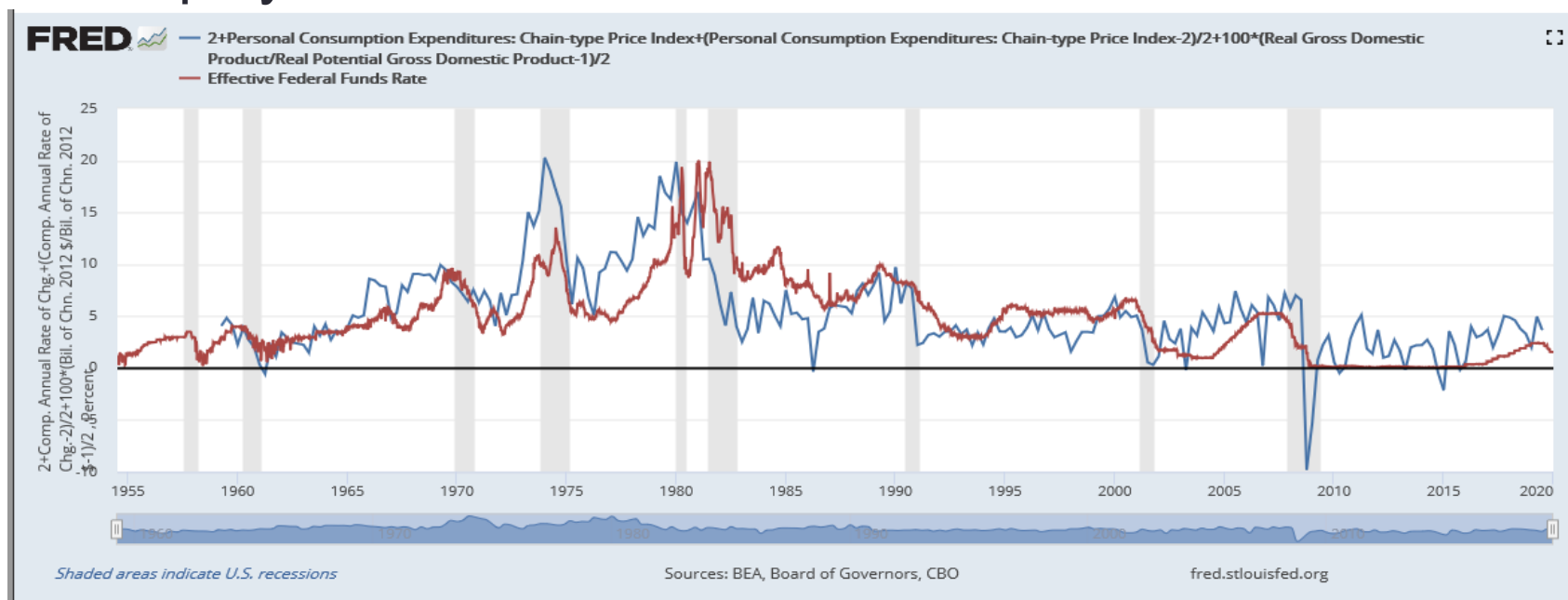


*2014 – 2016 values are FOMC participants' Summary of Economic Projections midpoints, March 19, 2014.

*This graph is from <https://www.chicagofed.org/publications/speeches/2014/04-09-14-evans-monetary-policy-goals-strategy-minsky>

Rules Versus Discretion

- Current monetary policy involves human judges. Even with best intentions, policymakers are human. In history, President Nixon allegedly told Fed Chair Burns, “We'll take inflation if necessary, but we can't take unemployment.”

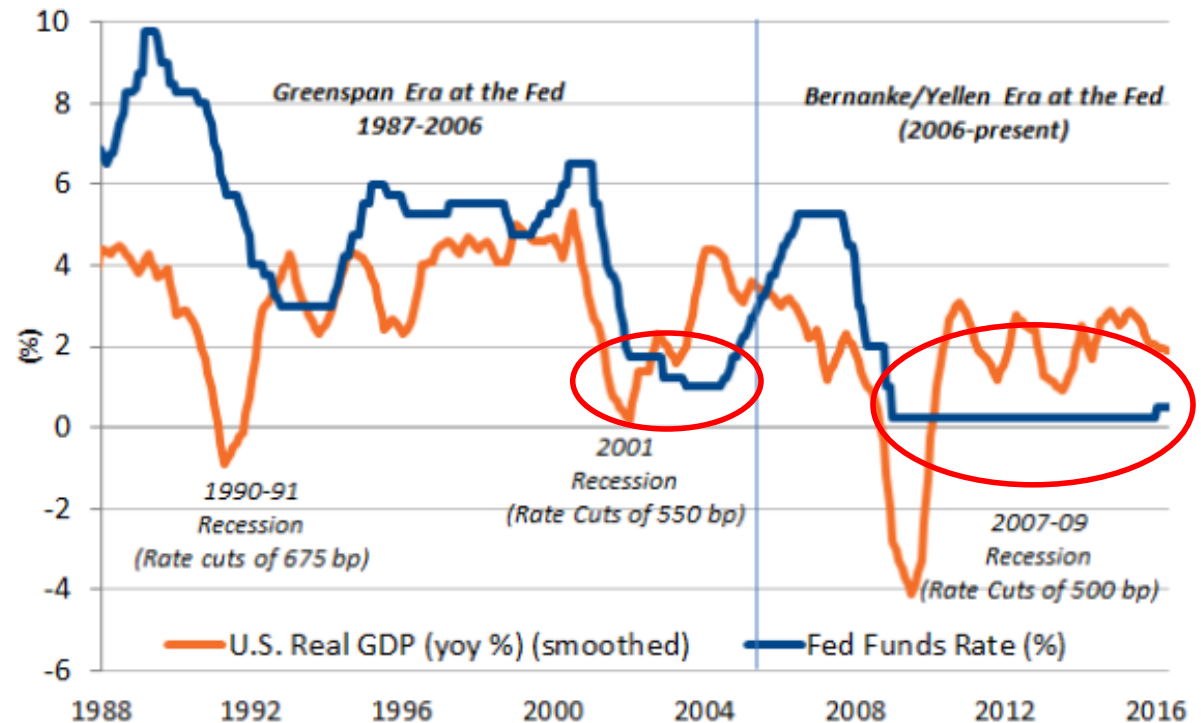


Notes: Red Line is effective federal funds rate, and the blue line is the original Taylor's Rule

The Taylor Rule: a description of monetary policy or a prescription?

1. John Taylor argues that the FOMC kept interest rates much lower than prescribed by the Taylor rule during **2003-2005**, and that this deviation was a major source of the housing bubble.

2. He asserts that the Fed's Monetary policy since the financial crisis has not been sufficiently rule-like, and that policy has been too easy. If the FOMC had been following the Taylor rule, it would have ended its policy of near-zero interest rates several years ago.



Source: Bloomberg

- John B. Taylor

“You do not prevent bailouts by giving the government more power to intervene in a discretionary manner. You prevent bailouts by requiring adequate capital based on **simple**, enforceable rules and by making it possible for failing firms to go through bankruptcy without causing disruption to the financial system and the economy”

Challenges

- Uncertainty: The economic system contains innumerable variables.
- Controllability: The economic system may not be sensitive to the monetary policy at certain conditions. Or in the other words, the economic system may not be controllable.
- Timing and magnitude: it is not an easy job to diagnose the economic situation, so is the timing and magnitude in carrying out the monetary policy.
- Practicality: A monetary policy strategy has to be practical.

Benchmark Strategies

- Do nothing, let the market to work it out by itself.
- Directly give support to unemployed families, such as waiving or postponing mortgage payments, or zero-interest loans for a limited time period.
- The new framework should be able to explain the failures of monetary policy in history.

Reference

- “Statement on Longer-Run Goals and Monetary Policy Strategy” adopted effective 1/24/2012; as amended effective 1/29/2019.
https://www.federalreserve.gov/monetarypolicy/files/FOMC_LongerRunGoals.pdf
- Eduard J. Bomhoff, “Money targeting and interest-rate targeting in an uncertain world”, Cato Journal, 2012. <https://www.cato.org/sites/cato.org/files/serials/files/cato-journal/1992/5/cj12n1-15.pdf>
- Duong Ngotran, “Interest on Reserves and Monetary Policy of Targeting Both Interest Rate and Money Supply”, 2017.
- Lael Brainard, “The Digitalization of Payments and Currency: Some Issues for Consideration”, 2/5/2020.

“The economic system contains innumerable variables...Only in imagination can all of these variables remain constant and be kept in equilibrium by the balanced forces of human desires, as manifested through supply and demand...”

---- Irving Fisher (1933)

“The Debt-deflation theory of great depressions”

Crisis Indicators

- Asset valuation pressures
- Household and business debt
- Funding risk
- Financial sector leverage
- Credit-to-GDP
- **Nonetheless, Judgment must play an important role in this process**

New proposal for monetary policy

- The CCyB framework, which was finalized in September 2016, requires the Federal Reserve Board to vote at least once per year on the level of the CCyB. In the United States, the CCyB has so far not yet been activated. The condition set out in September 2016 for raising the CCyB above its minimum value of zero is that financial system vulnerabilities are meaningfully above normal.
- While policymakers in the United States have maintained the CCyB at zero since 2016, other countries have adjusted their countercyclical buffers in response to vulnerabilities within their financial sectors. Currently, 13 countries have announced a CCyB above zero, ranging from 0.25 percent in Luxembourg to 2.5 percent in Hong Kong, Norway, and Sweden.
- Lael Brainard (7/11/2019): I am mindful that low spreads on corporate credit, together with risky corporate debt at historic highs, suggest financial imbalances are growing. We should be addressing these financial imbalances by activation of the **counter cyclical capital buffer**.