Why Study the Federal Reserve?

- Central banks have significant influence on the entire SET of interest rates
- The Federal Reserve is the central bank of the U.S.
- How the Fed reacts to economic conditions will impact economic growth, inflation, and interest rates
- This discussion is also directly relevant for understanding the “financial system” and the Fed’s role as overseer of (almost) the entire system and what led to the financial panic in 2008.
Some History

- Dec 1913: The Federal Reserve System was established by Congress as the U.S. central bank
- Key legislative events:
  - 1935: Banking Act. Established the Federal Open Market Committee (FOMC) as the Fed’s monetary policymaking body
  - 1977: The Federal Reserve Reform Act explicitly set price stability as a national policy goal for the first time.
  - 1978: The Full Employment and Balanced Growth Act (“Humphry Hawkins) established full employment as a second goal of monetary policy and required the Fed to report to Congress on its policy twice a year.
  - 2010: Wall Street Reform and Consumer Protection Act (“Dodd Frank”) It increased transparency, expanded its regulatory responsibilities, and transferred most Fed consumer protection responsibilities to a new Consumer Financial Protection Bureau.
The Dual Mandate and Fed Policy

In 1977, Congress amended The Federal Reserve Act, stating the monetary policy objectives of the Federal Reserve as:

*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.*

In setting monetary policy, the FOMC seeks to mitigate deviations of inflation from its longer-run goal and deviations of employment from the Committee's assessments of its maximum level.
Implications for Policy
Aggregate Demand and Aggregate Supply

- Aggregate Demand in Recession
- Desired Aggregate Demand
- Potential GDP
- Inflation

Graph showing the relationship between GDP and inflation, with aggregate demand and aggregate supply curves.
Nominal and Real Fed Funds Rate

Real Interest Rate = Actual Interest Rate – Expected Inflation Rate
Nominal and Real Short Rates – Int’l

Nominal Rate (%)

Real Rate (%)

Some nominal interest rates in Europe and Japan became negative in 2014

Real rate = Nominal rate – Inflation rate
Inflation and the Federal Reserve

Four Measures of Inflation Showing Similar Trends “Over the Long Run”
International Inflation Rates

Annual Inflation Rates (%)
Brazil and Russia 1980 - 2000

Two completely different countries battling “hyperinflation” decades ago.
Japan has been encumbered with *DECLINING* price levels

a.k.a. “Deflation”
Venezuela Inflation

Looks pretty bad, doesn’t it? What about 2018?
Venezuela Hyper Inflation

You are reading this right. This is the latest data from the IMF.

The Venezuelan economy is imploding and it is because its central bank mismanaged the economy.
Inflation and the Federal Reserve

How the FOMC interprets this graph will determine how soon and how far interest rates are raised.
Fed Focus: the Impact of Low Unemployment on Inflation
The Conundrum

- Unemployment rates are very low and below NAIRU and have been for a while
- Inflation rate is ~ near target rather than rising rapidly

Is this temporary or does it reflect a change in the structural relationship between unemployment and inflation?

Will it continue?
Nominal and Real Fed Funds Rate

The calculation of real rate uses the measure of CPI inflation over 12 months as a proxy for *expected* inflation.
**Expected Inflation Theory vs. Reality**

- **Expected** inflation is and has been a major component of macroeconomic theory and policy since the late 1960s. However,
  - Measurement of expected inflation is far from trivial
  - From the Treasury “Inflation Protected Security” market we can measure a financial market’s measure of “expected” inflation. (It’s not that great!)
  - We can extrapolate from history (as I did) and it’s easy, but far from perfect
TIPS = Treasury Inflation Protected Securities

Rate (%)

Rate (%)

2% Inflation Target

Exp Inflation = 5Yr Treasury – 5Yr Tips
Federal funds are overnight borrowings by banks to maintain their reserves at the Federal Reserve.

- Banks keep reserves at Federal Reserve Banks to meet their reserve requirements and to clear financial transactions.
- Transactions in the federal funds market enable depository institutions with reserve balances in excess of reserve requirements to lend reserves to institutions with reserve deficiencies.
- These loans are usually made for one day only, that is, "overnight". The interest rate at which these deals are done is called the federal funds rate.

This the rate that all financial markets are paying attention to because it signals the Feds “Plan”
The Federal Reserve targets the Fed funds rate by the buying and selling of Treasury bills and bonds in the secondary (a.k.a., “open market”)

![Graph showing the supply and demand for Fed funds balances]

- Supply of FF by Banks
- Upper Target
- Lower Target
- Demand for FF
There are occasions when the market is so disrupted that the effective Fed funds rate is not close to the target.
More Recently

Last change in the Fed Funds target was just before Xmas

Upper Target

Lower target
Each bank’s “loan pricing committee” - acting independently and on its own - magically reprices its bank’s Prime rate when the Fed announces a change in its target Fed Funds rate.
Interest rates that receive media attention are

- Prime rate
- Federal funds rate
- London Inter-Bank Offered Rate (LIBOR)
- Treasury bill rate
- Ten-year Treasury bond rate
- AAA, AA, A, BBB rates
- 30 Yr FRM (fixed rate mortgage), 15 Yr FRM
- Adjustable Rate Mortgages: Floating rate, hybrid, option ARM

If economic agents are transacting at these rates then they matter. Hence, they all matter.
Treasury Yield Curve

Defined as the locus of points for the same issuer over different maturities. In this case, this is considered (as long as the US Gov’t doesn’t default) “a riskless security.”

<table>
<thead>
<tr>
<th>Maturity</th>
<th>Nominal interest rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3M</td>
<td>3</td>
</tr>
<tr>
<td>10Yr</td>
<td>10Yr Treasury Bond Rate</td>
</tr>
<tr>
<td>3M  Treasury Bill Rate</td>
<td>3M Treasury Bill Rate</td>
</tr>
</tbody>
</table>
Other rates are priced off the Treasury curve at matched maturities.
Treasury Rates and Commercial Paper

Nominal interest rate (%)

Credit Spread (%)

[Graph showing trends in nominal interest rates and credit spreads for 3M AA CP and 3M Treasury, with shaded areas indicating specific periods.]
10 Yr Treasury and 30 Yr Mortgage Rates

Nominal interest rate (%)

FRM-Treasury Spread (%)
Long Term Rates vs. Short Term Rates

Rate (%)

10 Yr Rate – 3M Rate (%)
79-82 Movie
Real Fed Funds Rates at Economic Peaks

Current **real** Fed Funds rate is much below average at this stage of economic performance.
What the Fed is doing with regards to interest rates and inflation has a significant impact on the level of interest rates at any point in time.
The “Natural” Real Rate of Interest

- Easy to describe

Definition: the *real* short term risk free interest rate that occurs when GDP is equal to Potential GDP

- Measurement is highly sensitive to modeling assumptions, involving non-directly observable parameters
Estimation of Real Natural Rate is based on very complex theoretical models with “posited” or “calibrated” parameters.
What do Recent Measures Look Like?

Real Interest Rate (%)

Actual Real Rate at Various Economic Peaks
What About R* in Other Countries?

Real Interest Rate (%)

$R^* = \text{natural real rate of interest.}$
The Central Banks of the advanced economies have been targeting and successfully managing inflation rates to remain at relatively low levels.

- Meanwhile the central bankers believe this is a successful macroeconomic policy and have every intention of continuing it.
- They have consistently announced these intentions to the public.
- They’ve been so successful that economic agents – individuals, households, businesses, and governments – EXPECT them to continue to succeed.
Simultaneously, as currently measured the “real” (inflation adjusted) interest rate has dropped 2.5-3.0 percentage points.

It means:

❖ Interest rates will not be pushed up as much as once thought.
❖ If the Fed doesn’t violate the zero nominal interest rate policy constraint (referred to as the “Zero Lower Bound”) then ...

In the next recession, the Fed, by being constrained by the zero lower bound may under-stimulate the economy.

OR

In order to stimulate the economy it may require *negative* interest rates
Basic Money Mechanics
What is Money?

Money is a financial asset that serves three functions:

- The unit of account: Money is how values in the economy are measured and indicates the price of all goods and services in the economy.
- A store of value: Money is a means of preserving purchasing power. Other assets can also serve as a store of value but not as the medium of exchange. Money is the most *liquid* of all assets.
- The medium of exchange: Money is the accepted method for payment for goods and services and repayments of debts.
What isn’t Money?

Money is not the same as:

- **Wealth**: the total collection of property and financial assets, net of liabilities, that serves as a store of value

- **Income**: a *flow* of earnings per unit of time (money is a *stock*)
The Money Pyramid

M2

M1

The Monetary Base

Note: 
M2 = M1 + other stuff
Monetary Aggregates: M1 & M2

- In the real world there are many forms of money besides “cash.” So they must be defined.
- The two most discussed in the “monetary” literature are M1 and M2.

The M1 is a very liquid measure of the money supply, as it contains primarily cash, checking and NOW accounts that can quickly be converted to currency.

M2 is M1 + Savings Accounts, small CDs, and retail money market accounts
How Large are M1 and M2?

Trillions of $
How Large are M1 and M2 vs. GDP

Velocity = GDP/M

[Graph showing M1 and M2 Velocity over time]
Imagine you’re a monetarist economist and it’s 1990. M2 and GDP are highly correlated. So, one might interpret that as causal and predictive.
Why Do Economists Care?

Problem: whatever relationship there was, it broke down beginning in 1990. Many have connected this with financial innovation.
Notes on The Federal Reserve System
The Federal Reserve System

The U.S. “central bank” was created by an Act of Congress on December 23, 1913.

Responsibilities:

❖ Functions as the government’s bank.
❖ Regulates and supervises banks
❖ Acts as lender of last resort.
❖ Implements monetary policy.

For those with Netflix accounts, check out the documentary:
❖ “Money for Nothing”
The Federal Reserve System
Federal Reserve - Independence

▪ “Independence”
  ❖ Appointment of Governors by President
  ❖ Appointment of Bank Presidents by FRB Boards approved by Fed Board of Governors
  ❖ Reserve Bank Directors elected by bank members and BOG
  ❖ Financed from its own resources
    ➢ Surplus from interest paid on bonds held in vault returned to U.S. Treasury

▪ “Oversight” by Congressional Committees
Fed Independence and Recent Tweets

- Federal Reserve Board appointees are subject to confirmation by the Fed.
  - The Senate does not always approve these appointments
  - Nobel Laureate Peter Diamond (Prof., MIT) withdrew his nomination to serve in June 2011, citing intractable Republican opposition for 14 months
- A Fed Governor can be removed for “cause.”
- The law does not address whether a Chairperson can be “reassigned” to a non-Chair position
- Independence is a very important component of the setting of monetary policy.
Federal Open Market Committee (FOMC)

- Created by an Act of Congress on March 1, 1936.
- The primary monetary policy decision-making body in the US government
- Consists of 12 voting members:
  - 7 members of the Board of Governors.
  - President of the New York Fed.
  - 4 other regional Federal Reserve Presidents that serve on an annually rotating basis.
- 7 non-voting members:
  - The other regional Federal Reserve Presidents off rotation.

No One on this Powerful Committee is Subject to Direct Oversight by Voters
Federal Open Market Committee (FOMC) “Transparency”

- Chairman of the Board of Governors presides as the FOMC chairman

Meeting Records:

- Minutes released 3 weeks after the meeting.
- Meeting transcripts released after 5 years.
The Federal Reserve earns interest on the bonds held in its vaults and returns “excess revenues” to the US Treasury.
Federal Reserve’s Budget and Remittances to the US Treasury

- Every year the Fed earns more interest on the bonds it holds in its vault than it needs to operate.
- Extra interest is returned to the US Treasury as a “remittance.”
- Included in the Fed’s expenses is “interest on reserves paid to banks” totaling $108 B since late 2008.
FOMC – Open Market Operations

- Primary method for changing money supply
- FRB-NY buys and/or sells U.S. gov’t securities in open market from “the desk” in NYC.

**Open Market Purchase:** When the Fed buys U.S. government securities in the open market, it will:
- Increase banks’ deposits and reserves.
- Banks will now increase their lending.
- Households and firms deposit their borrowings in their checking accounts, which are part of the money supply.

**Open Market Sale:** When the Fed sells U.S. government securities in the open market, it will:
- Decrease banks’ deposits and reserves.
- Banks will now decrease their lending.
- Households and firms checking accounts will decline, which are part of the money supply.
Control over the Money Supply

Fed Sells Treasury Securities to the “Market”

Monetary Base Decreases

Banks Reduce Lending

Money Supply Decreases
Control over the Money Supply

Fed Buys Treasury Securities from “Market” → Monetary Base Increases

If Yes: Money Supply Increases

If No: Banks Hold “Excess Reserves” and Money Supply stays relatively Unchanged
September 2008: The Money Supply
“Game” Changed
and has Remained Changed
Control over the Money Supply

Fed Buys Treasury Securities from "Market"

Monetary Base Increases

Banks Lend (or not)

If Yes

If No

Banks Hold "Excess Reserves" and Money Supply stays relatively Unchanged

Money Supply Increases

Banks Hold "Excess Reserves" and Money Supply stays relatively Unchanged

Money Supply stays relatively Unchanged
This is what the Fed’s holding of assets looked like to manage the country’s money supply prior to Mar ‘08
Fed’s Use of its Balance Sheet changed dramatically after Lehman failure.

Chart showing the Fed’s Balance Sheet post the meltdowns, with key events such as Bear Stearns and Lehman Brothers failures, and the implementation of QE1, QE2, and QE3 programs. The chart highlights the additions and maturing of assets, with a significant rise in MBS from 2008 onwards, peaking at $1.6T in 2014. The chart also indicates the addition of assets halted in 2017 and assets maturing in 2018.
Conclusions

Lehman Failure and Financial Collapse has had material consequences on the core operations of the Federal Reserve:

- In order to stimulate economic growth the Fed has pumped trillions of dollars into the banking system and these funds are largely still sitting in the vaults of the Federal Reserve System.

- Because the economy was performing so poorly until recently, banks did not lend these funds and they became an historically – off the charts – level of excess reserves in the system TO THIS DAY!

- This changed the behavioral relationship between the variable the Federal Reserve has close control over (the Monetary Base) and the one it has less control over (the Money Supply)
What was the Purpose of this “Unconventional” Monetary Actions?

To answer this question, let’s review what happened:

- A financial panic in the fall of 2008, triggered by the Fed allowing Lehman Bros to go bankrupt, led to the Great Recession.
- In the Spring of 2009 the Obama Administration passed an $800 Billion stimulus bill of direct federal expenditures, tax cuts, and transfers to state governments.
- The Great Recession ended in June 2009.
- Democrats lost control of Congress in November 2010.
- Fiscal policy became restrictive.
- The Federal Reserve initiated “unconventional” monetary policies with the “Quantitative Easing” program.
Key Concept from Keynes: Aggregate Demand

GROSS DOMESTIC PRODUCT: Total Spending by Households, Businesses, & Government + Net Exports

- Government
- Goods & Services
- Purchases
- Businesses
- Households

Employment
What Makes Macroeconomics ...Macroeconomics?

Full Employment Economy

- Government
- Businesses
- Households

2009Q2

Full Employment GDP (2009Q2) ~ $15.5 Trillion

Recession Economy

- Government
- Businesses
- Households

Actual GDP = $14.4 Trillion

GDP “Gap” ~ $1 Trillion in 2009$
In 2008, Congress passed the Bush’s Economic Stimulus Act that gave one-time tax rebates of $78 billion.

In 2009, Congress passed the Obama’s American Recovery and Reinvestment Act, involving a $787 billion fiscal stimulus package with tax cuts and government spending increases.

Both legislations aimed at raising aggregate demand.
Spring 2009 Obama Fiscal Stimulus

State and Local Government

$44 B

Federal Government

$215 B

State and Local Government

$215 B

Businesses

$44 B

Direct Purchases

$88 B

Tax cuts

$21 B

Transfers and tax cuts

$363 B

Households

Goods & Services Purchases

How the $787 B hit the economy
Aggressive Fiscal Policy

Deficits as % of GDP

Passage of $787 B Stimulus
Δ in Jobs (000)

3.6 Jobs were lost in 12 months Dec ’07 – Dec ’08
Job Gains and Losses in 2007 - 2010

Δ in Jobs (000)

Passage of $800 B Stimulus
The “Zero Lower Bound” constrains monetary stimulus, which is further limited by declining inflation.

The real rate rose, because the inflation rate declined while the nominal rate was prevented from going below zero.
In order to maintain the Fed funds rate above zero while flooding the market with cash via open market operations, the Fed decided to pay interest to banks on their reserves.

It worked, but came at a significant cost to the taxpayers.
Stabilization Policy in the AD/AS Framework

In “Normal” (pre-2008) Times:

- Fiscal and Monetary policies work together
- Fiscal stimulus & Monetary are used to stimulate the economy
- Both work to INCREASE AGGREGATE DEMAND
- When GDP<< Potential for increasing the inflation rate is not a major concern. In fact the inflation rate declining may be a concern.
This Recovery Compared with Others

The weak recovery was because of the COMBINATION of weakening fiscal stimulus AND the zero bound on interest rates.

The Fed turned to Quantitative Easing policies but these have only weak effects on stimulating aggregate demand and economic growth.
Government Purchases of Goods and Services since the 2009 Fiscal Stimulus

Trillions of $2009

Federal Purchases

State and Local Gov't Purchases

GDP = C + I + G + NX

Total Government Purchases are Constraining Economic Growth 2010-2013

State and Local Government Purchases are Constraining Economic Growth 2010-2013

Federal Purchases Peak
Just when the economy needed additional fiscal stimulus it didn’t get it.
The Zero Bound and Monetary Policy

- From Dec 2008 – Sep 2015 the Fed Funds rate has been “essentially” zero
- Additional open market operations will NOT reduce the Fed Funds rate further.
- Other longer term interest rates have not been at zero

Transmission mechanism of stimulating the economy through lower Fed Funds rate has not been possible since December 2008.

So, How Can the Fed meet its DUAL MANDATE?
Fed’s Use of its Balance Sheet changed dramatically after Lehman failure.
The Zero Bound and Monetary Policy

**Quantitative Easing:** Designed to address the DUAL MANDATE given the inability to lower the Fed Funds Rate.

**Hypothesis:** buying long term bonds and mortgage backed securities will lower longer term rates and the rate on 30 year fixed rate mortgages

If you want to know “why are interest rates so low?” this is why
Purpose of Quantitative Easing

QE Purpose:
Pushing Down Long Term Rates!

Rates and Spreads (%)

QE1
QE2
QE3
How Well Did QE Work?

Hypothesis: $3.0 trillion of additional purchases may have lowered mortgage rates 1 percentage pt from ~5% to ~4%!

Real question: what would the mortgage rate be without QE?
Yield Curve Movie
Long Term Rates vs. Short Term Rates Rates

Rate (%)

10 Yr Rate – 3M Rate (%)
Negative Yield Curves as Forecasts of Recessions

Does the market know something about the future?
Takeaways

1. Fiscal and monetary policies have enormous influence on the performance of the economy

2. To the extent the “natural rate of real interest” has declined, there are important consequences on policy:
   ❖ The power of monetary policy to stimulate the economy when it becomes necessary will be constrained UNLESS the Federal Reserve opts to push interest rates below zero, as other central banks have done.
   ❖ When monetary stimulus is constrained, the economic recovery will be more dependent on appropriate fiscal policies. In turn, this implies even larger budget deficits

3. Politics matter. Lack of agreement on these principles will constrain implementation of the right policies and impact economic outcomes.
Monetary Policy Does Not Occur in a Vacuum

Monetary Policy Can’t Be Evaluated on a Stand-Alone Basis.

The position of the economy AND what the federal government was doing has to be considered.
Aggregate Demand and Aggregate Supply

Aggregate Demand

Liberals believe in this

Conservatives believe in this

Region of Debate

GDP

Potential GDP

π Inflation Rate

Aggregate Supply

Liberals believe in this
### Prior to the Great Recession

Fiscal and Monetary policies work together to simulate Aggregate Demand (with one minor exception)

<table>
<thead>
<tr>
<th>Recession</th>
<th>Peak</th>
<th>Trough</th>
<th>Δ Def/GDP</th>
<th>Δ Real FF</th>
</tr>
</thead>
<tbody>
<tr>
<td>57Q3</td>
<td>57Q3</td>
<td>58Q2</td>
<td>2.8</td>
<td>-2.1</td>
</tr>
<tr>
<td>60Q2</td>
<td>60Q2</td>
<td>61Q1</td>
<td>1.1</td>
<td>-1.4</td>
</tr>
<tr>
<td>69Q4</td>
<td>69Q4</td>
<td>70Q4</td>
<td>2.9</td>
<td>-3.2</td>
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<tr>
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<td>73Q4</td>
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<td>01Q1</td>
<td>01Q4</td>
<td>1.6</td>
<td>-2.4</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td><strong>Average</strong></td>
<td><strong>Average</strong></td>
<td><strong>1.9</strong></td>
<td><strong>-2.7</strong></td>
</tr>
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</table>
The Great Recession Changed the Macroeconomic Response

<table>
<thead>
<tr>
<th>Recession</th>
<th>Average</th>
<th>2009 Stimulus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak</td>
<td>Trough</td>
<td>Def/GDP</td>
</tr>
<tr>
<td>07Q4</td>
<td>09Q2</td>
<td>7.2</td>
</tr>
</tbody>
</table>

Fiscal stimulus – as large as it was wasn’t sufficient to stimulate faster economic growth and Fed’s ability was constrained by the zero boundary on nominal interest rates.
Conclusions about the Great Recession

The economy needed additional fiscal stimulus in 2010-2012 and didn’t get it.

Quantitative Easing Policies Worked a Little. There was nothing else the Fed could do because of their adoption of the zero bound on nominal interest rates.

Politics and ideology trumped implementation of good macroeconomic policy and imposed significant economic costs on the economy, individuals, and families.
The context of evaluating Trump macroeconomic policies has three major components:

- Understanding macroeconomics and when policies can stimulate or restrict economic growth
- Knowing where the economy is and where it is going when the policies are adopted
- And how those policies “fit” with these descriptions
An Example of Macroeconomic Policy Success

And with much lower inflation rate volatility since targeting started.
An Example of Ongoing Macroeconomic Policy Challenges

Unemployment Rate (%)

Average Unemployment Rate:
1947 – 1990 = 5.6%
1991 – 2018 = 5.7%
Does the Public Understand This?

“Interest on reserves paid to banks” totaling $108 B since late 2008.

Chart showing the trend of payments from 2008 to 2018, with a significant increase in 2009 and subsequent years, indicating taxpayer-financed payments to banks.