Monetary Policy

Focusing on interest rates,

Influencing real growth rates,

Affecting inflation rates

Outline

1. Money, Banks and the Federal Reserve

2. Monetary Policy: Goals, Tools, Targets, Macroeconomic Effects

3. Expanded Loanable Funds Model

- Textbook Readings: Ch. 14 & Ch. 15

What is Money?

- Anything generally accepted as **payment for G&S** and **repayment of debts**
  - Examples: coins, paper bills, checks, savings deposits
  - **Not money**: wealth (stocks, houses, art), income (a flow)

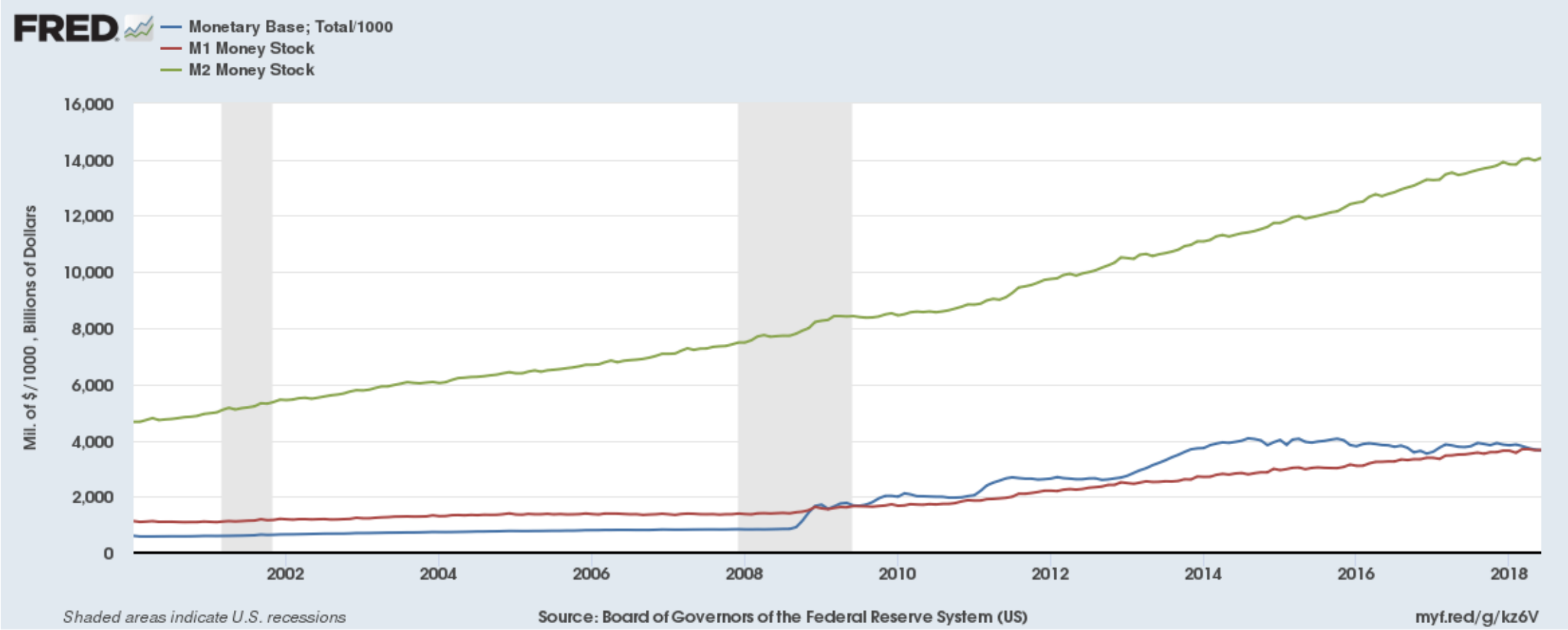
- Money plays a key role in the **functioning of an economy**:
  - Facilitates trade in G&S
  - Makes specialization possible

- Recall: People become much more productive by specializing
  - They can pursue their *comparative advantage*

Several Definitions of Money

- **Money supply**: Value of monetary assets available at specific time
  - No single correct measure of the money supply
  - Narrow measures are more directly affected by monetary policy
- **MB**: **$3.6** trillion as of June 2018
  - 46% Currency + 54% Reserves of banks at the central bank
  - *From which other forms of money are created*
- **M1**: **$3.7** trillion as of June 2018
  - 45% Currency + 55% Checking Accounts
- **M2**: **$14** trillion as of June 2018
  - 26% M1 + 65% Savings Deposits + 6% MMF + 3% Small Time Deposits

Monetary Base and Monetary Aggregates



Banks

- Banks play an important role in the economy:
  - Take **deposits** from the public
  - Provide **credit** to households and firms
  - **Create money** in the form of checking account deposits
- Bank reserves: Deposits kept as cash (usually) at the central bank
  - **Required reserves**: Mandated to keep them to meet demand for cash
  - **Excess reserves**: Any funds not lent out
  - Can be **borrowed** from other banks (**federal funds rate**) or from the central bank (discount rate)
- Thus, they play a key role in the transmission of monetary policy

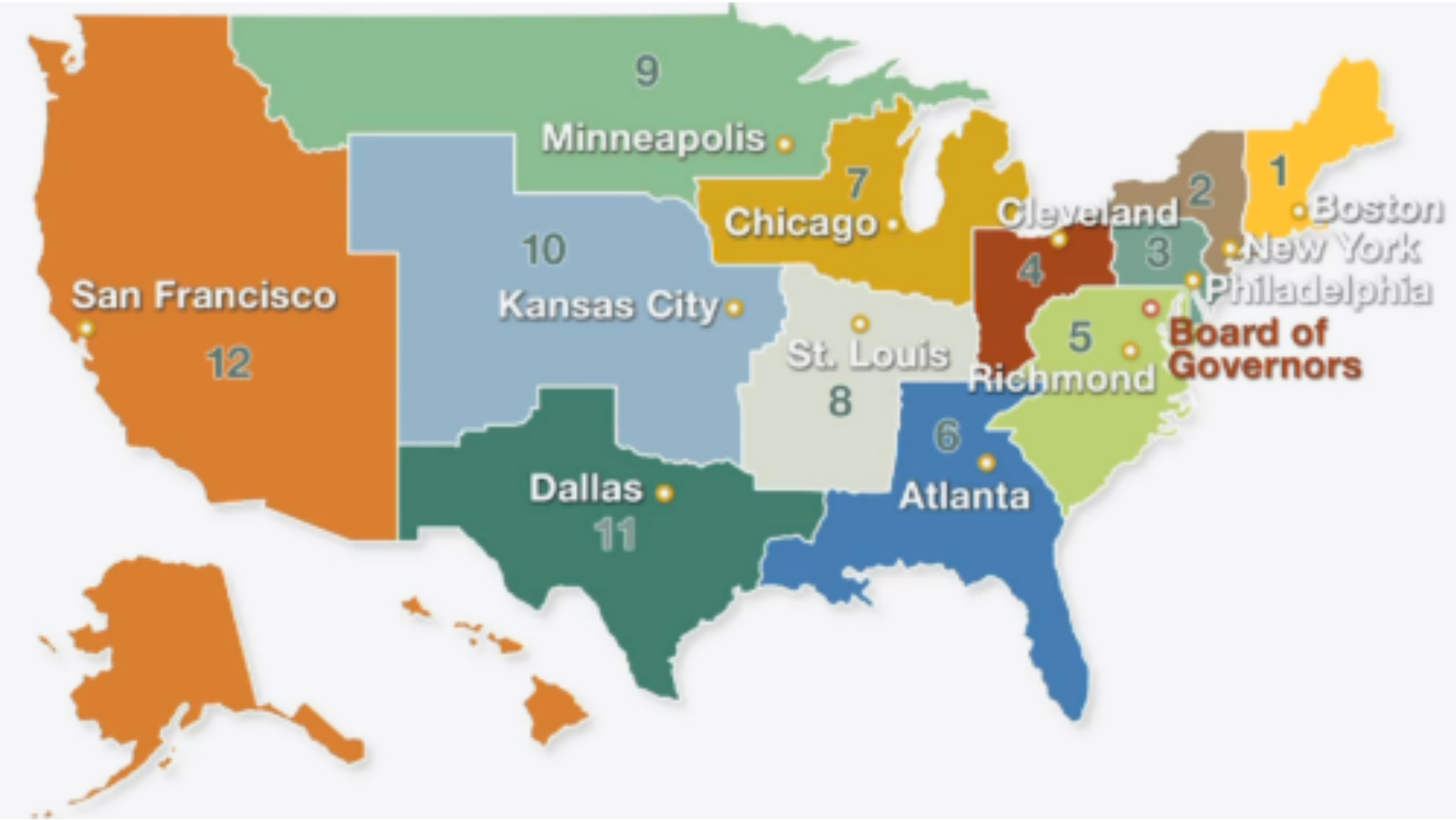
Central Banks

- Government institutions responsible for **implementing monetary policy** to pursue **macroeconomic policy goals**
  - Print currency, supervise money supply and influence interest rates
- Liquidity providers
  - 'Normal' times: Lend reserves to banks (discount loans)
  - 'Crisis' times: Lender of last resort → Prevent bank panics
- Responsibilities vary around the world
  - Along with other institutions, also *regulate & supervise* financial firms
- Generally designed to be **independent** from political interference

Federal Reserve System

- **Central bank of the U.S.** (often referred to as 'the Fed')
  - Created in response to financial panics of late 1800s & early 1900s
  - Board of Governors + 12 regional Federal Reserve Banks
  - Chair: Jerome Powell
- Federal Open Market Committee (**FOMC**) is its **monetary policymaking body**
  - 12 votes: 7 Fed governors + 5 presidents of regional banks
- FOMC meets every 6 weeks in DC to discuss monetary policy
  - It can meet sooner if situation requires it

Federal Reserve System



Central Banks Around the World

- European Central Bank (ECB) commenced operations in **1999**
  - 19 EU member states
  - President: Mario Draghi
  - Germany recovered by 2012, while GIPS struggled with high U
- Bank of Japan (BoJ)
- Bank of England (BoE)
- Emerging markets
  - China (PBoC), India (BoI), Brazil (BdB), etc.

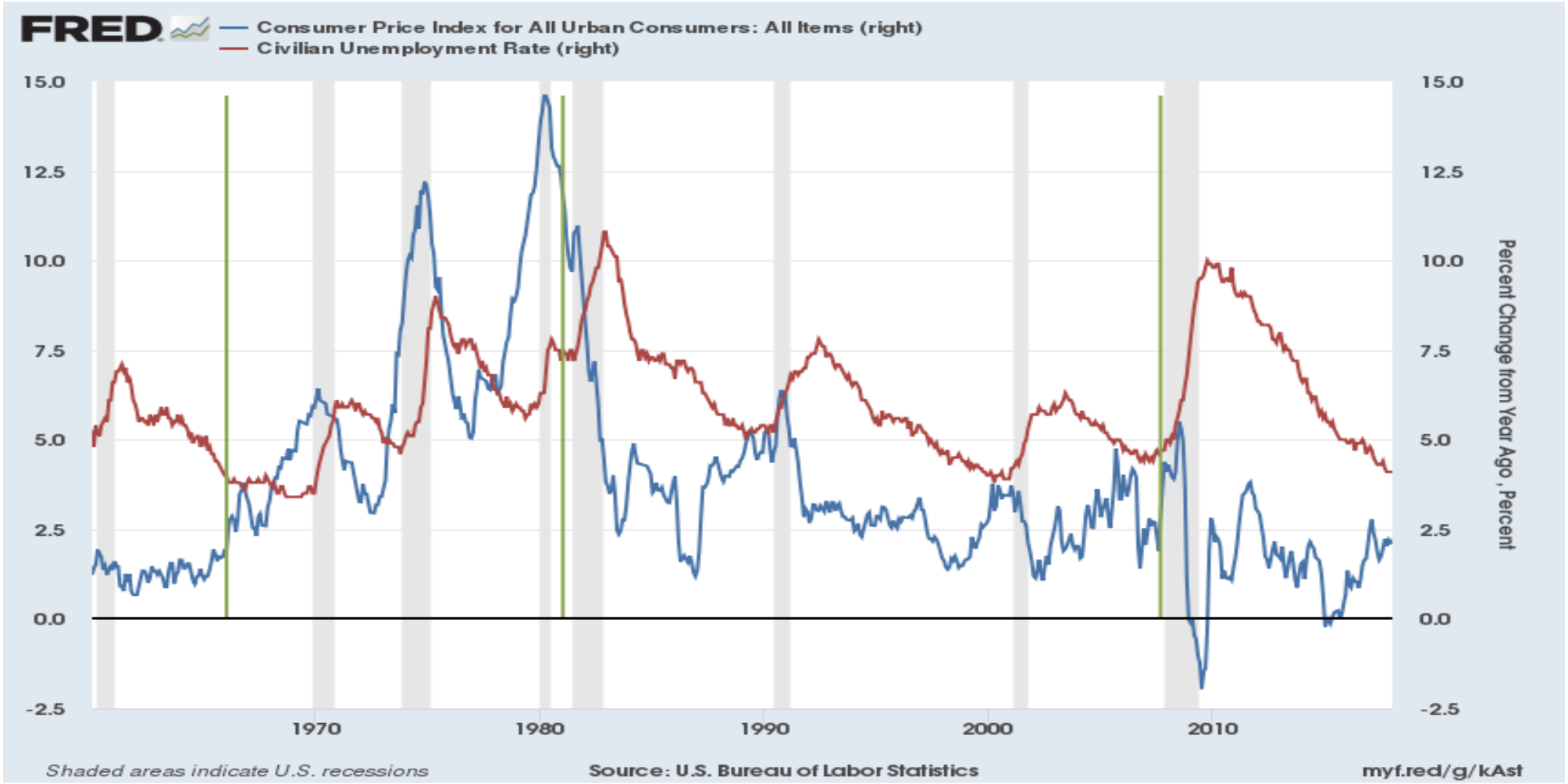
Monetary Policy Goals

- MP goals intended to promote a well-functioning economy:
  - Price stability
  - High employment / Low unemployment
  - Stability of financial markets and institutions
  - Strong real GDP growth
  - Foreign-exchange market stability

Monetary Policy Goals

- All central banks have a mandate to promote:
  - Stable and **low**—but not too low—general price **inflation**
  - Price stability
- Some central banks also have a mandate to promote:
  - Stable and **low**—but not too low—**unemployment**
  - Reduce cyclical unemployment
- Fed has both goals: a '**dual mandate**' central bank
- ECB has only the inflation goal: a '**single mandate**' central bank

U.S. Experience with the Dual Mandate



What Is Monetary Policy?

- Central banks control **powerful policy tools** to:
  - Loosen or tighten **financial conditions** in the economy

- Monetary policy is **how** the central bank uses these tools to pursue its legal mandate

Monetary Policy Tools

- **Conventional** MP tools
  - Implemented during '**normal**' times
  - Smooth the business cycle ➞ Manage expansions and recessions
- **Unconventional** MP tools
  - Implemented during the Global Financial Crisis

Conventional Monetary Policy Tools

- **Open market operations**
  - Fed buys and sells U.S. Treasury securities in the market
  - Primary policy tool *before* the Great Recession
- Discount lending
  - Sets discount rate and the terms of lending
  - Encourage/discourage banks to borrow reserves from the Fed
- Reserve requirements
  - Alters demand by banks for reserves
  - Rarely used as an MP tool

How the Fed Conducts Monetary Policy?

- Fed seeks to promote **stable & low** (but not too low) **inflation & unemployment**
- MP tools **don't** allow the Fed to achieve MP goals **directly**
  - Why?
- Instead, Fed typically uses variables that it can influence directly and that, in turn, affect the desired variables
  - Control the **money supply** (and let nominal interest rate to adjust)
  - Set an **interest rate** (and let the money supply to adjust)

Connecting Money and Prices: The Quantity Equation

- Irving Fisher formalized the connection between money and prices
- Fisher's **Quantity Equation**:

$$M \times V = P \times Y$$

Money supply — Velocity of money — Price level — Real output

- **Velocity of money**: Average number of times each dollar in the money supply is used to purchase G&S included in GDP

$$V = \frac{P \, x \, Y}{M}$$

Quantity Theory of Money: Beautiful In Its Simplicity

$$M \times V = P \times Y$$

- Express the equation in dynamic terms:

$$\%\Delta M + \%\Delta V = \%\Delta P + \%\Delta Y$$

- Fisher asserted that **velocity was constant** → $\%\Delta V = 0$

Growth Rate for Money Supply = Inflation Rate + Real Growth Rate

  - What if $\%\Delta M > \%\Delta Y$?

Hyperinflation

Banknotes used to light the stove
(Berlin: 9 August 1923)

http://www.vision.net.au/~pwood/aug04.htm

Hyperinflations

The Hanke-Krus World Hyperinflation Table (abbreviated) (2013, Amended 01/2019)

Rank	Location	Start Date	End Date	Month with Highest Inflation Rate	Highest Monthly Inflation Rate	Time Required for Prices to Double	Currency	Type of Price Index
1.	Hungary	Aug. 1945	Jul. 1946	Jul. 1946	4.19×10^{16}%	15.0 hours	Pengö	Consumer
2.	Zimbabwe	Mar. 2007	Mid-Nov. 2008	Mid-Nov. 2008	7.96×10^{10}%	24.7 hours	Dollar	Implied Exchange Rate
3.	Yugoslavia	Apr. 1992	Jan. 1994	Jan. 1994	313000000%	1.41 days	Dinar	Consumer
4.	Republika Srpska	Apr. 1992	Jan. 1994	Jan. 1994	297000000%	1.41 days	Dinar	Consumer
5.	Germany	Aug. 1922	Dec. 1923	Oct. 1923	29500%	3.70 days	Papiermark	Wholesale
15.	France	May 1795	Nov. 1796	Mid-Aug 1796	304%	15.1 days	Mandat	Exchange rate
14.	Venezuela	Nov. 2016	Ongoing	Jan. 2019	315%	14.8 days	Bolivar	Exchange Rate
29.	Zimbabwe	Sep. 2017	Oct. 2017	Oct. 2017	185%	20.1 days	Dollars	Implied Exchange Rate
53.	Yugoslavia	Sep. 1989	Dec. 1989	Dec. 1989	59.70%	45.1 days	Dinar	Consumer

Source: Hanke, Steve H., and Erik Bostrom. "Zimbabwe Hyperinlfates, Again: The 58th Episode of Hyperinlfation in History." Studies in Applied Economics, No.90(2017). The Johns Hopkins Institute for Applied Economics, Global Health, and the Study of Business Enterprise, 19 Oct. 2018. Web. https://sites.krieger.jhu.edu/iae/files/2018/07/Zimbabwe-Hyperinflates-Again-Hanke-Bostrom-.pdf

Quantity Theory: A Plan For Central Banks?

- Suppose Fed agrees that **3% real growth** + **2% inflation** is IDEAL
- If quantity theory works, what should the central bank do?
- Set **$\%\Delta M$ at 5%**, and *hope* that it splits into:
  - 3% real growth and 2% inflation
- Monetarist model: Milton Friedman's rule

Quantity Equation Also Works If $\%\Delta V$ Is Constant

$$\%\Delta M + \%\Delta V = \%\Delta P + \%\Delta Y$$

- Suppose velocity speeds up each year by 1%?

$$\%\Delta M + 1\% = 2\% + 2\%$$

- You target 3% growth in the money supply!

Quantity Theory: Four Big Problems

1. Different definitions of money, which one do we target?
   - Cash? Cash plus bank deposits? What about credit cards?

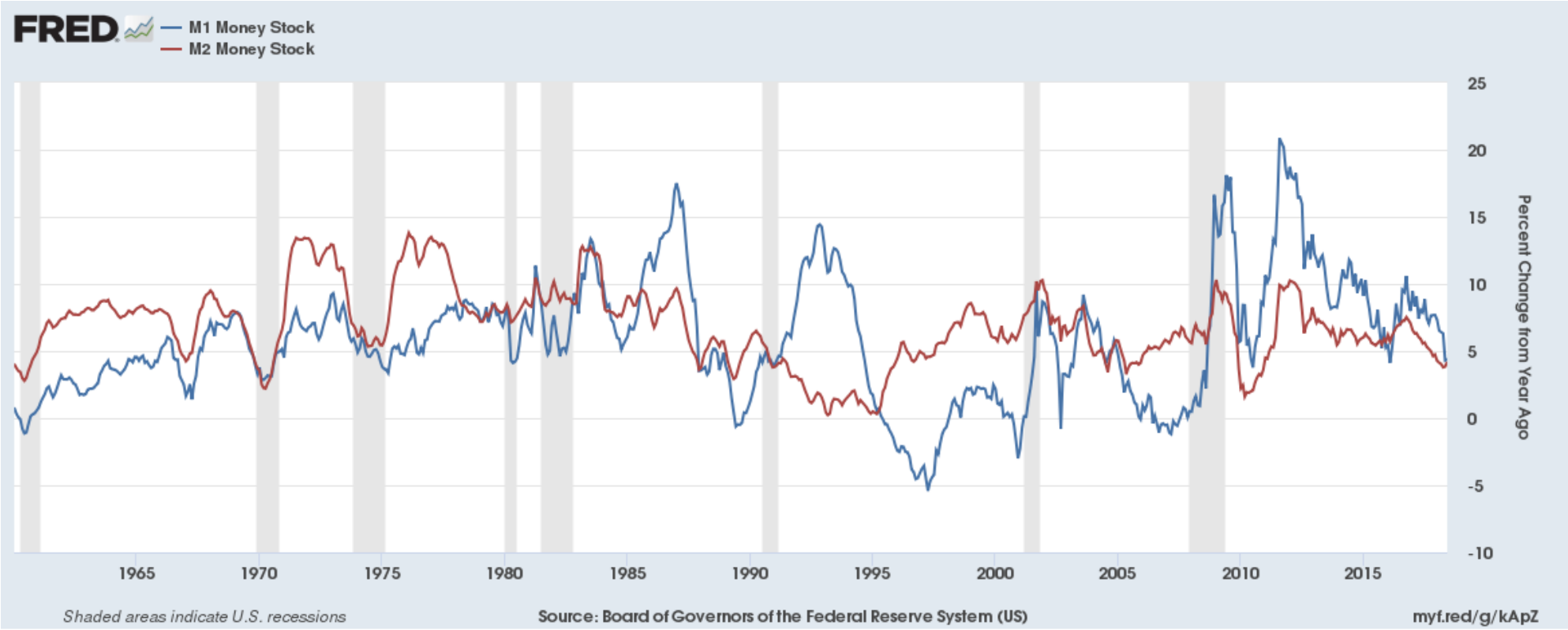
2. Fed does not have complete control of the money supply
   - It buys and sells securities, which influences the money supply but does not guarantee a change in it

3. Velocity of money is very volatile, not constant

4. Changes in the velocity of money are not constant either!

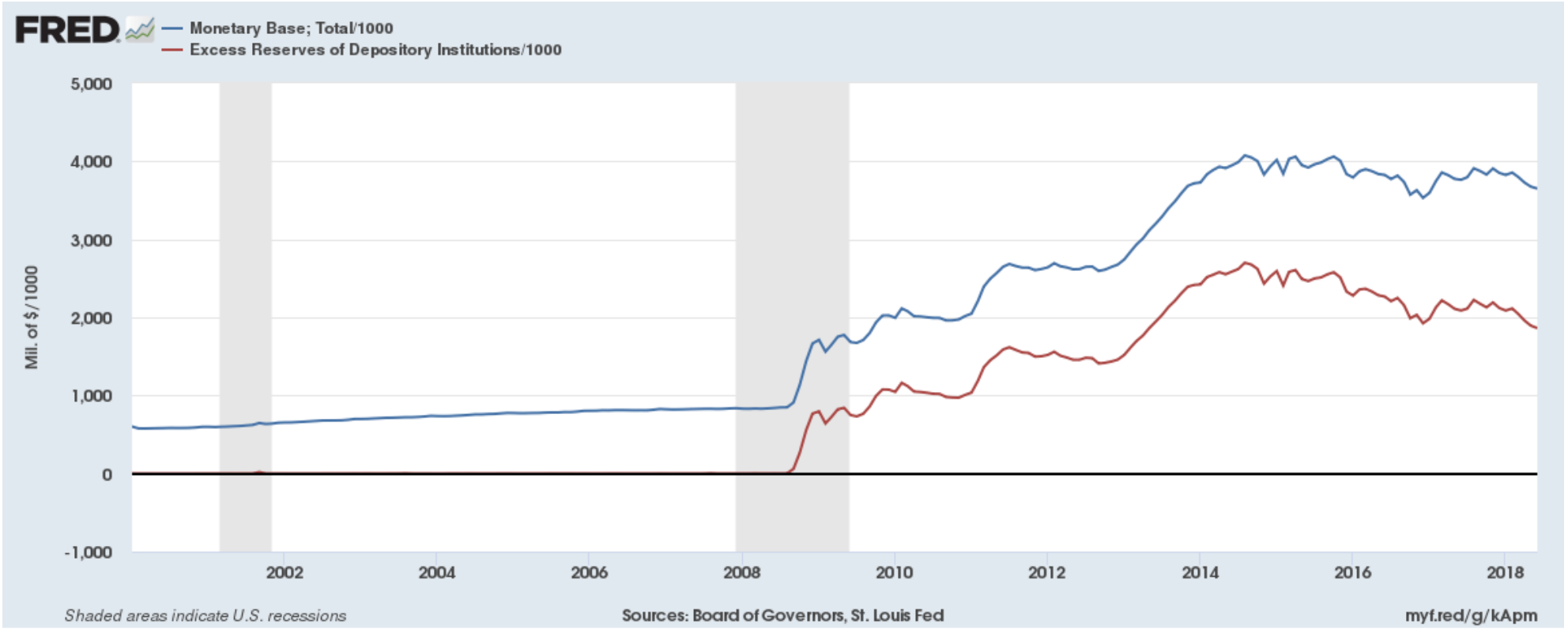
1. Different definitions of money

- Monetary aggregates **send different signals**
  - Debate as to which measure (narrower or broader) of the money supply conveys more useful information

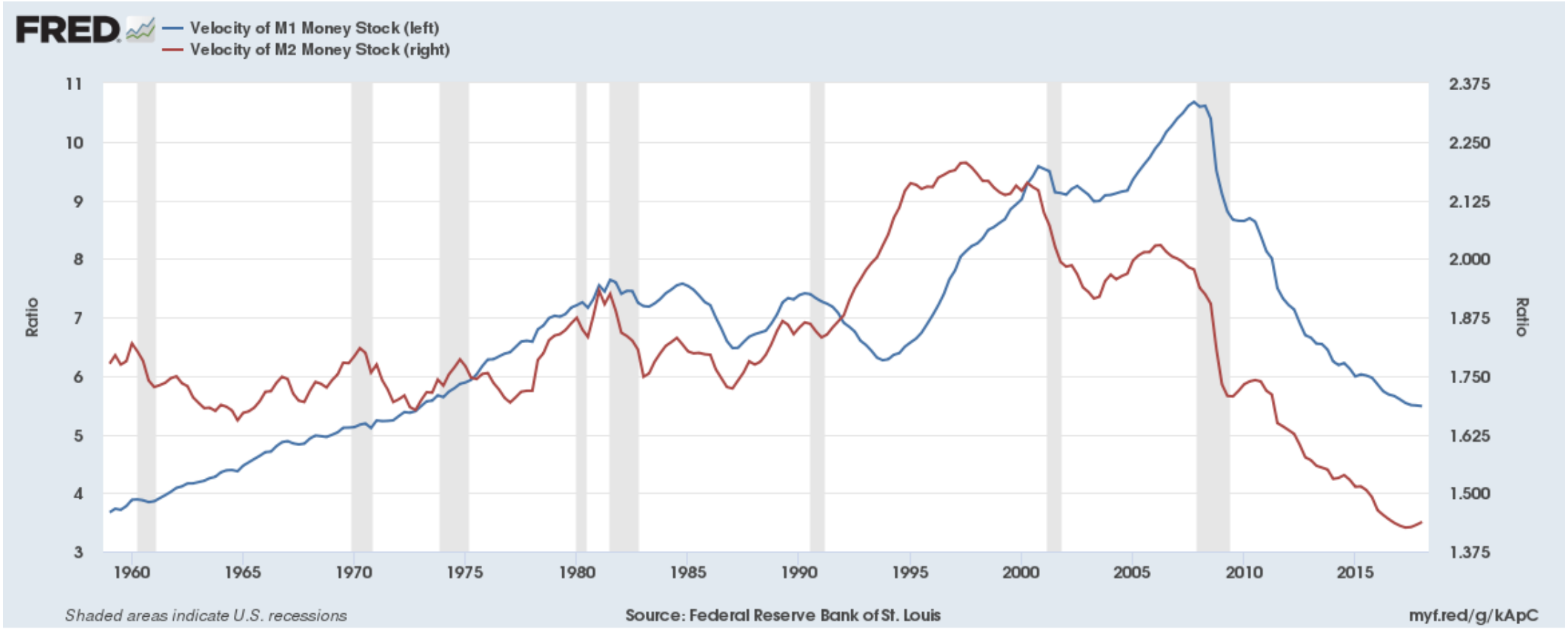


2. Fed doesn't have complete control of money supply

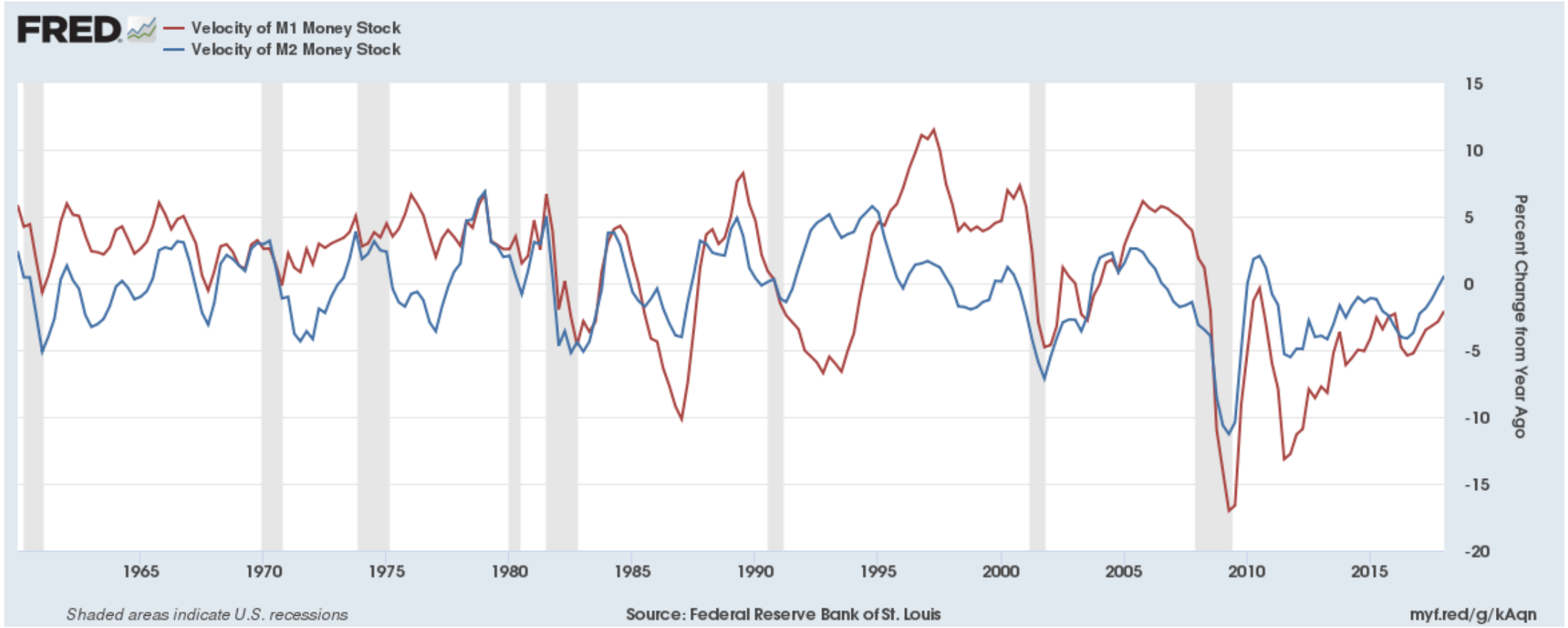
- When Fed buys securities, it gives reserves to banks
- Banks **don't have to** lend them out



3. Velocity of money is not constant



4. Changes in the velocity of money are volatile



Controlling the Money Supply?

- **In the past**, central banks conducted MP by increasing or decreasing the **money supply**

- Another problem: This model looks at banks as unimportant
  - Fed can put as much or as little money into the system as it wants and banks lend out however much the Fed puts in

- All these problems make **money targeting nearly impossible**
  - Now policymakers rely less on the money supply to steer the economy

If the Fed Doesn't Control the Money Supply, Then?

- Monetary policy has one major power → **Influencing interest rates**

- Fed **targets** a short-term **nominal** interest rate
  - **Federal funds rate** (FFR): Cost of short-term borrowing between banks
  - Not directly relevant for households and firms

- But by adjusting FFR, Fed influences **other** important interest rates:
  - Auto loan rate
  - Fixed mortgage rate
  - Corporate borrowing rate

What Is the Effect of Targeting the FFR?

- Fed targets a value for FFR, a short-term nominal interest rate

- Fed shifts its rate target to influence:
  - Other **interest rates**
  - Other **financial markets**
  - The **value of the dollar** versus other currencies

- The changing state of financial markets, in turn, is expected to shift the performance of the **real** economy

How Does the Fed Implement Its Decision for the FFR?

- **Open market operations**
  - Fed buys and sells U.S. Treasury securities in the market

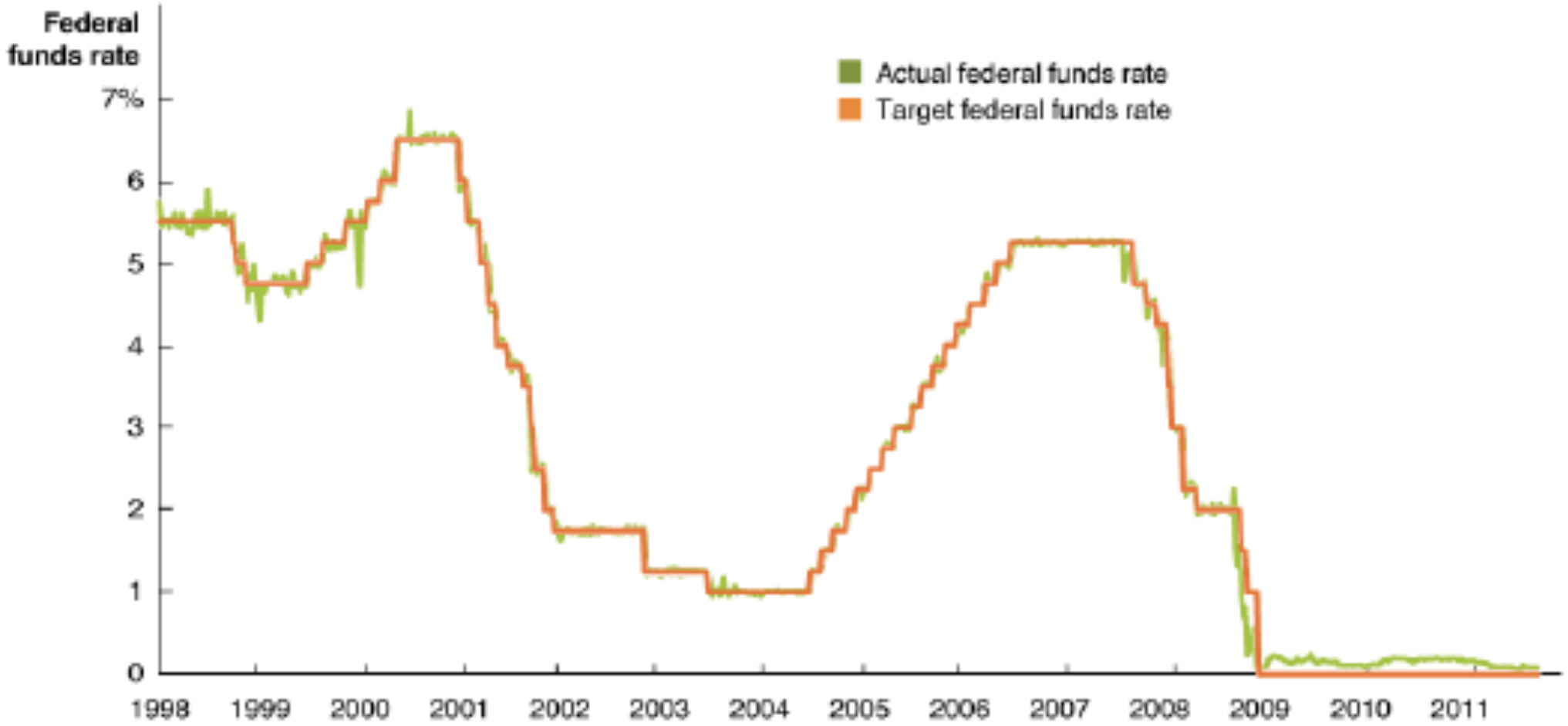
- Fed directs its *trading desk* in New York to buy and sell T-bills
  - When the Fed buys T-bills, the price goes up
  - When the price goes up, the **yield** goes down

- Thus, **by buying and selling T-bills** the Fed **controls** the level of **short-term interest rates**

Federal Funds Rate Targeting

- Each 6 weeks, FOMC agrees upon a target for the FFR
- However, Fed **does not directly set** the FFR
  - FFR is determined by the interaction of **demand and supply** for bank reserves in the federal funds market
- Fed buys and sells T-bills through open market operations
- History reveals that, **via open market operations**, Fed does very well at **meeting its target** for the FFR

How Well Does Fed Meet Its Target For The FFR?



Key Interest Rates Alter Real Economy Decisions

- Consumer durables
  - Auto financing interest rate can influence **auto buying decisions**
- Most homes are 'financed' via a mortgage
  - The mortgage rate, therefore, can influence **home buying decisions**
- Factory, office and equipment spending is oftentimes financed
  - The corporate borrowing rate influences **investment decisions**
- Changing real economy circumstances can change pace of π and **U**!

Back to the Fed's Monetary Policy Mandate

- Fed uses powerful tools to **loosen or tighten financial conditions** to promote stable & low (but not too low) π and **U**

- What is '**tighten** financial conditions'?
  - Tighter also called 'less accommodative'
  - Contractionary monetary policy

- What is '**loosen** financial conditions'?
  - Looser also called 'more accommodative'
  - Expansionary monetary policy

Tightening Financial Conditions

- **Interest rates** generally & temporarily **rise** (or rise more quickly)
  - It is more expensive for firms and HH to borrow
  - Incentives to save increase
- **Real asset prices** generally & temporarily **fall** (or rise more slowly)
  - Stock market prices, house prices
- Value of the **home currency rises**
  - Exports are more expensive and imports are cheaper ➞ NX will fall

Loosening Financial Conditions

- **Interest rates** generally & temporarily **fall** (or fall more slowly)
  - It is cheaper for firms and HH to borrow
  - Incentives to save decrease
- **Real asset prices** generally & temporarily **rise** (or fall more slowly)
  - Stock market prices, house prices
- Value of the **home currency falls**
  - Exports are cheaper and imports are more expensive ➞ NX will rise

Monetary Policy Can Change the Pace of π and U

- By **raising** interest rates, the Fed
  - Slows the economy
  - **Increases unemployment**
  - May succeed in pushing **inflation lower**

- By **lowering** interest rates, the Fed
  - Speeds economic growth up
  - **Lowers unemployment**
  - May oversee a **rise** for the **inflation rate**

From Financial Conditions to the Fed's Mandate

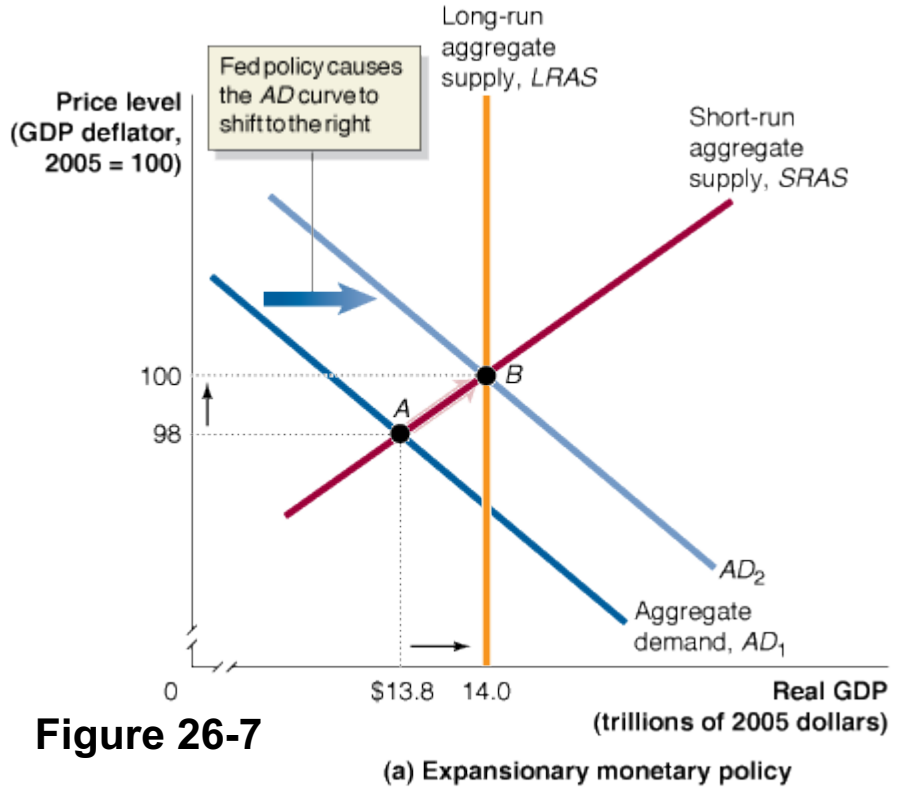
- **Tighter** financial conditions promote:
  - Lower π and
  - Higher U

$$FFR \uparrow \rightarrow \boldsymbol{r} \uparrow \rightarrow I \downarrow, C \downarrow, NX \downarrow \rightarrow \overleftarrow{AD} \rightarrow GDP \downarrow, U \uparrow, \pi \downarrow$$

- **Looser** financial conditions promote:
  - Higher π and
  - Lower U

$$FFR \downarrow \rightarrow \boldsymbol{r} \downarrow \rightarrow I \uparrow, C \uparrow, NX \uparrow \rightarrow \overrightarrow{AD} \rightarrow GDP \uparrow, U \downarrow, \pi \uparrow$$

Effects of MP on Real GDP and the Price Level



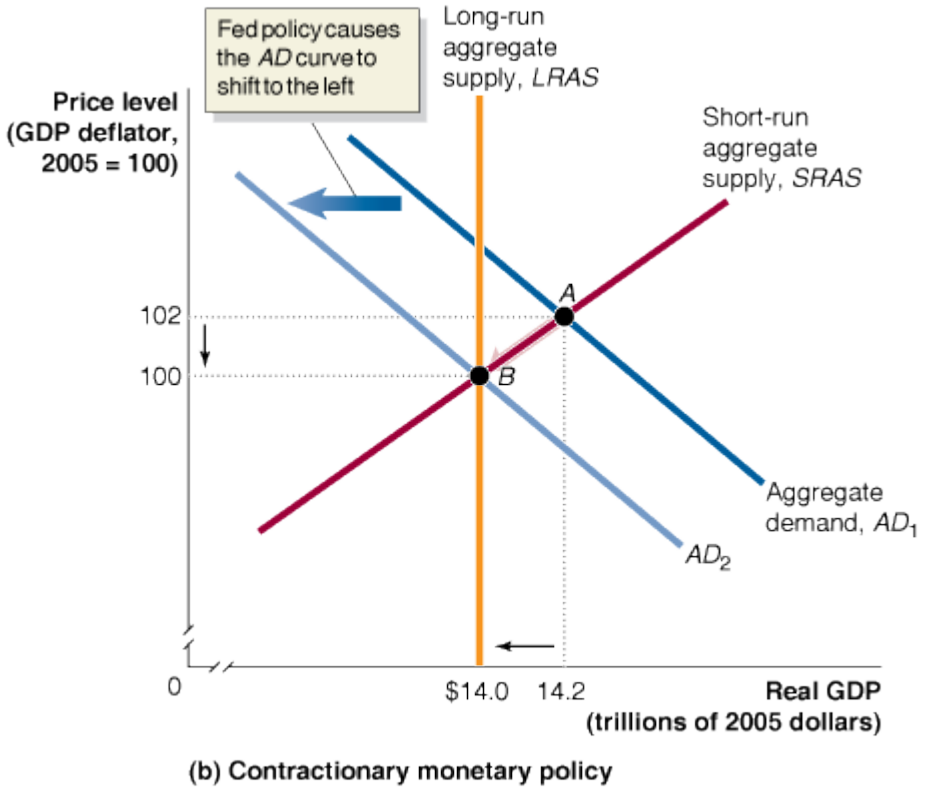
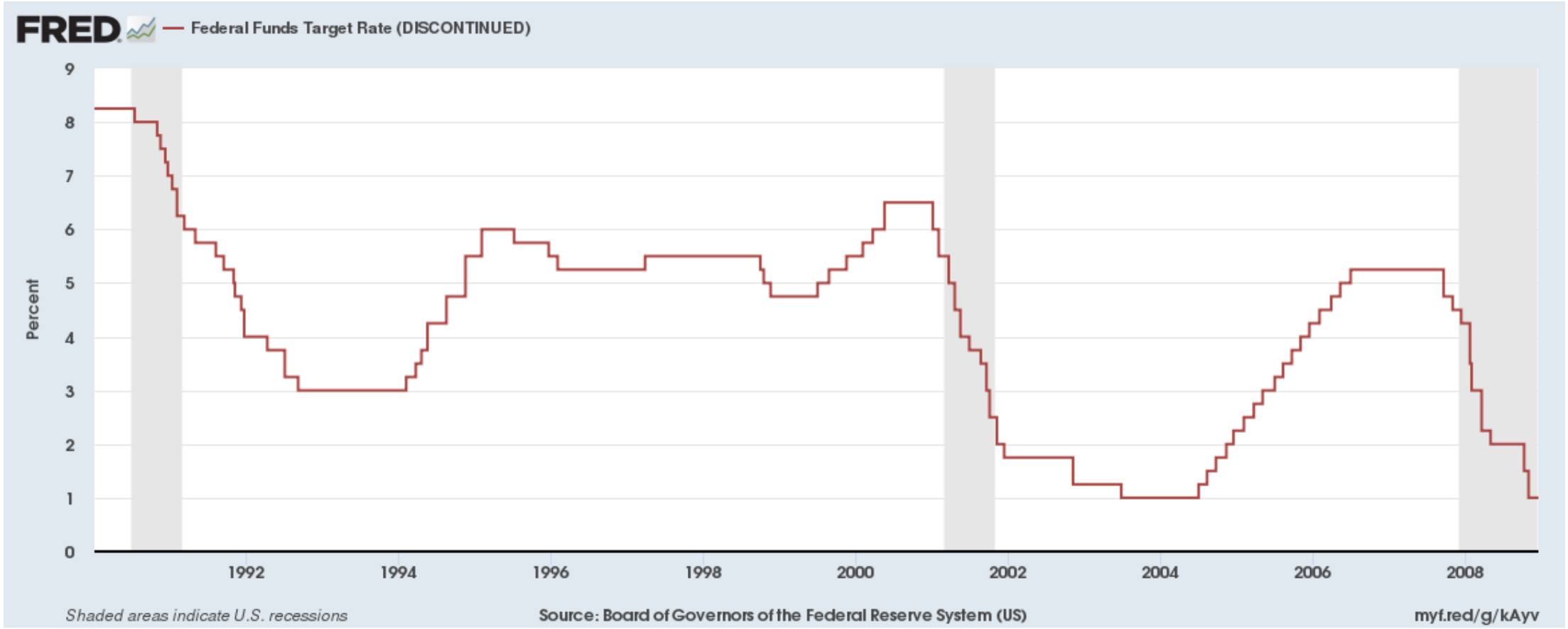


Figure 26-7

Monetary Policy in Normal Times

"The Fed's job is to take away the punch bowl just as the party gets going," William McChesney



So Can Monetary Policy Be Set in Autopilot?

- Note that Fed's tools tend to push π and U in **opposite directions**
  - $U \uparrow$ & $\pi \downarrow$, or
  - $U \downarrow$ & $\pi \uparrow$
- Fed has no tool to push π up without pushing U down
- Thus, **at times**, the Fed encounters **conflicts among** its **policy goals**

A (Not-So-Long-Ago) Discussion Within the Fed

- Situation before 2016 highlighted a problem:
  - π was too low and U seemed 'healthy'
- What should policymakers do?
- Should they keep policy loose in order to push π up?
  - Risk?
  - Pushing U too low
- Should they tighten policy to keep U from falling even lower?
  - Risk?
  - Keeping π too low

An Omnipotent Fed?

- Three slippages between **Fed** policy **action** and **π / U reaction**

1. Fed may not be able to move the **interest rates** that matter in the fashion it wants

2. Fed may move the relevant interest rates, but not produce the **real economy effect** it expects

3. Interest rates and the real economy may perform as expected, and **inflation** may refuse to cooperate

Some Key Points So Far

- Fed influences the money supply but it doesn't control it
- Fed conducts open market operations in order to set a FFR target
- Shifting the FFR target influences other interest rates
- Changes in interest rates can change the pace of economic growth
- Changes in the real growth rate can change the pace of π and U

Expanded Loanable Funds Model

Part II: A Tale of 3 Interest Rates

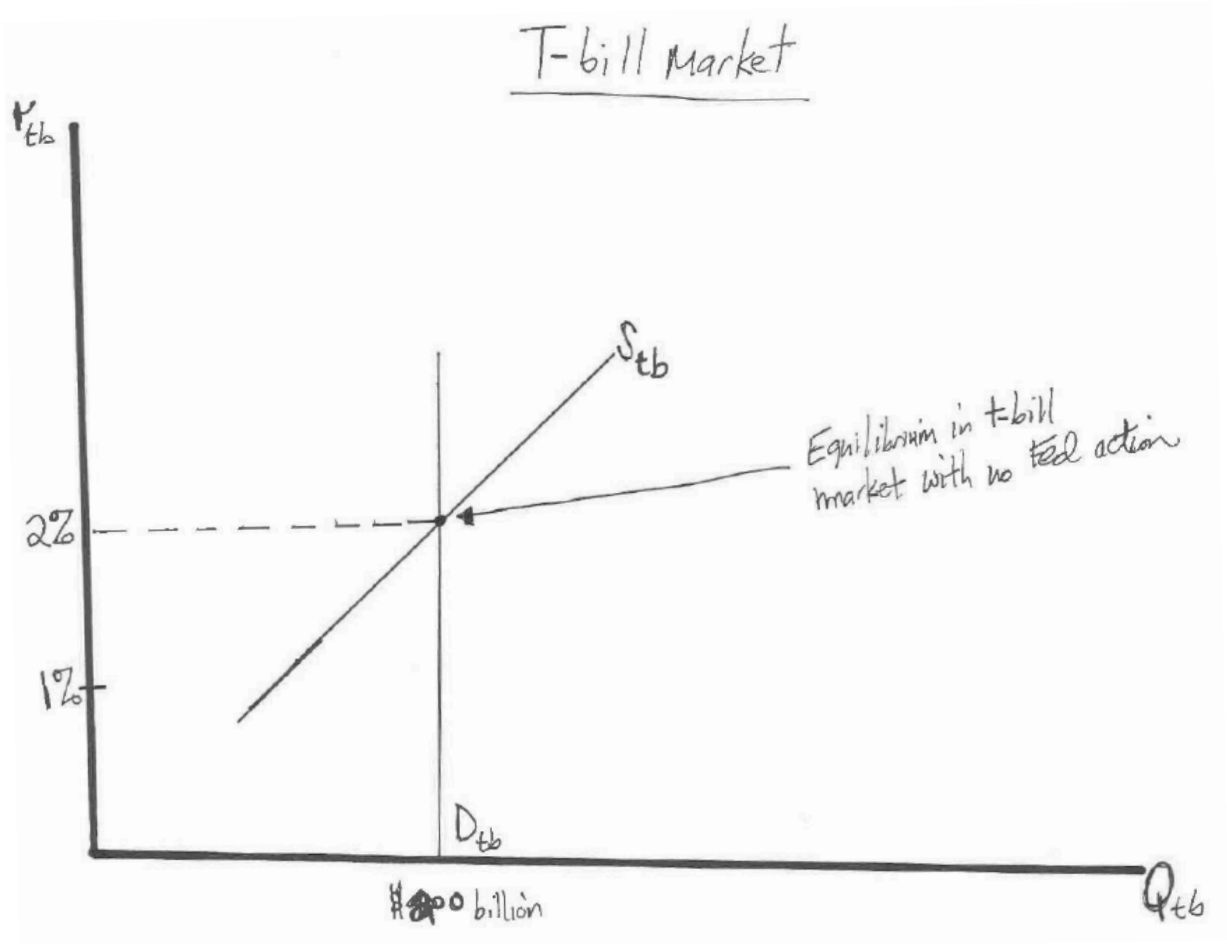
Expanded Loanable Funds Model

- Expanded loanable funds model so far:
  - r_c – **real long-term** borrowing rate for corporations
  - r_g – **real long-term** borrowing rate for the government
- Fed monetary policy is tied to a third interest rate:
  - r_f – **real short-term** interest rate ➞ Real fed funds rate

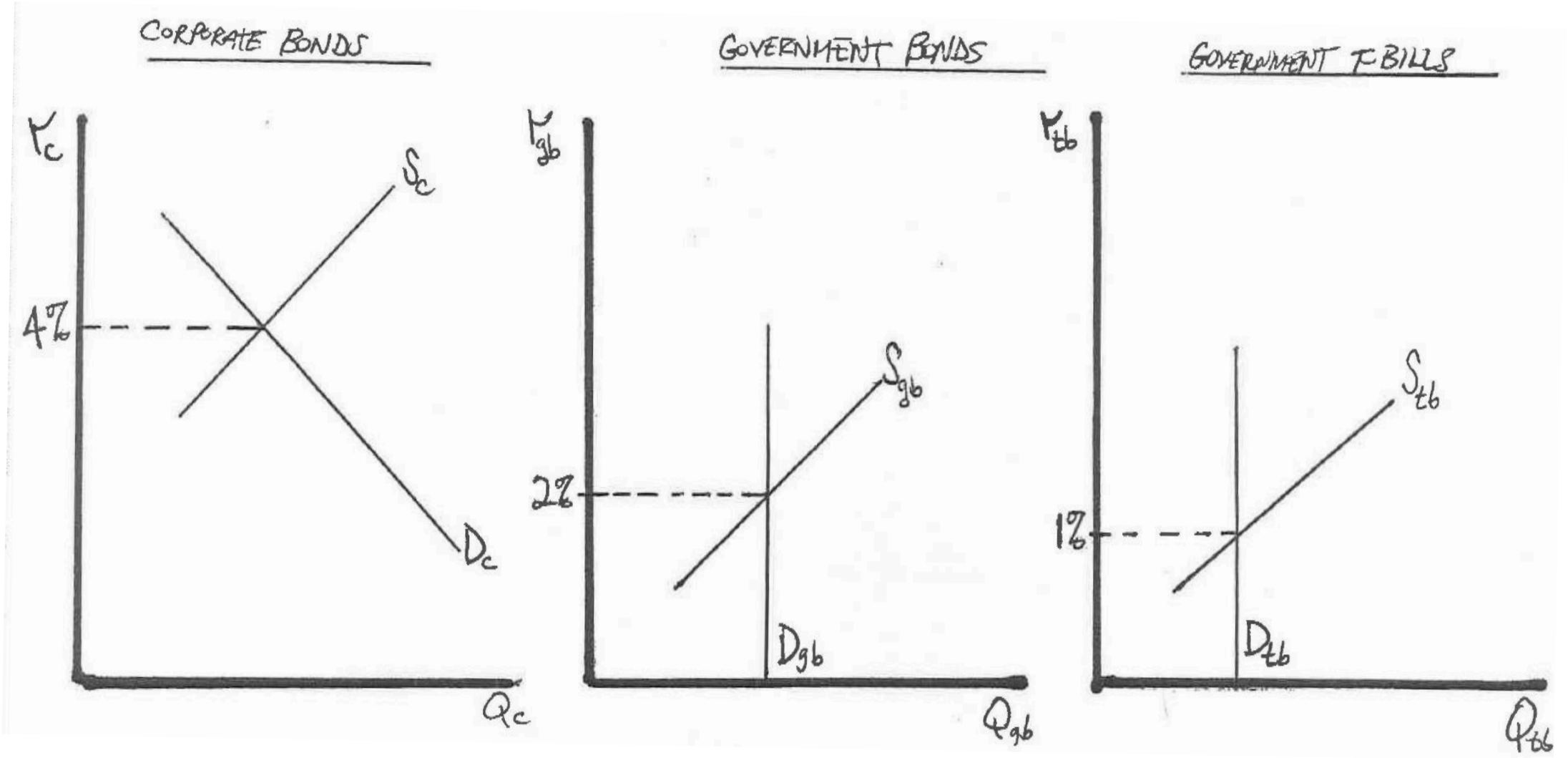
- In the model, the Fed **targets** the **real FFR**: r_f (or r_{tb})
- Real FFR (r_f) influences the real long-term government rate (r_g)
- Fed policy rate (r_f) and government long rate (r_g) influence the borrowing rate for corporations (r_c)

Example: Equilibrium in the T-bill Market (No Fed Action)

- π = 2%
- Government borrows \$200 bn on T-bill market (D_{tb} = \$200)
- HH willing to supply \$200 bn in loanable funds (S_{tb} = \$200)
- HH receive 4% in interest
  - Why?



The Expanded Loanable Funds Model



The Expanded Loanable Funds Model

- Four Actors:
  - Households
  - Corporations
  - Government
  - Federal Reserve

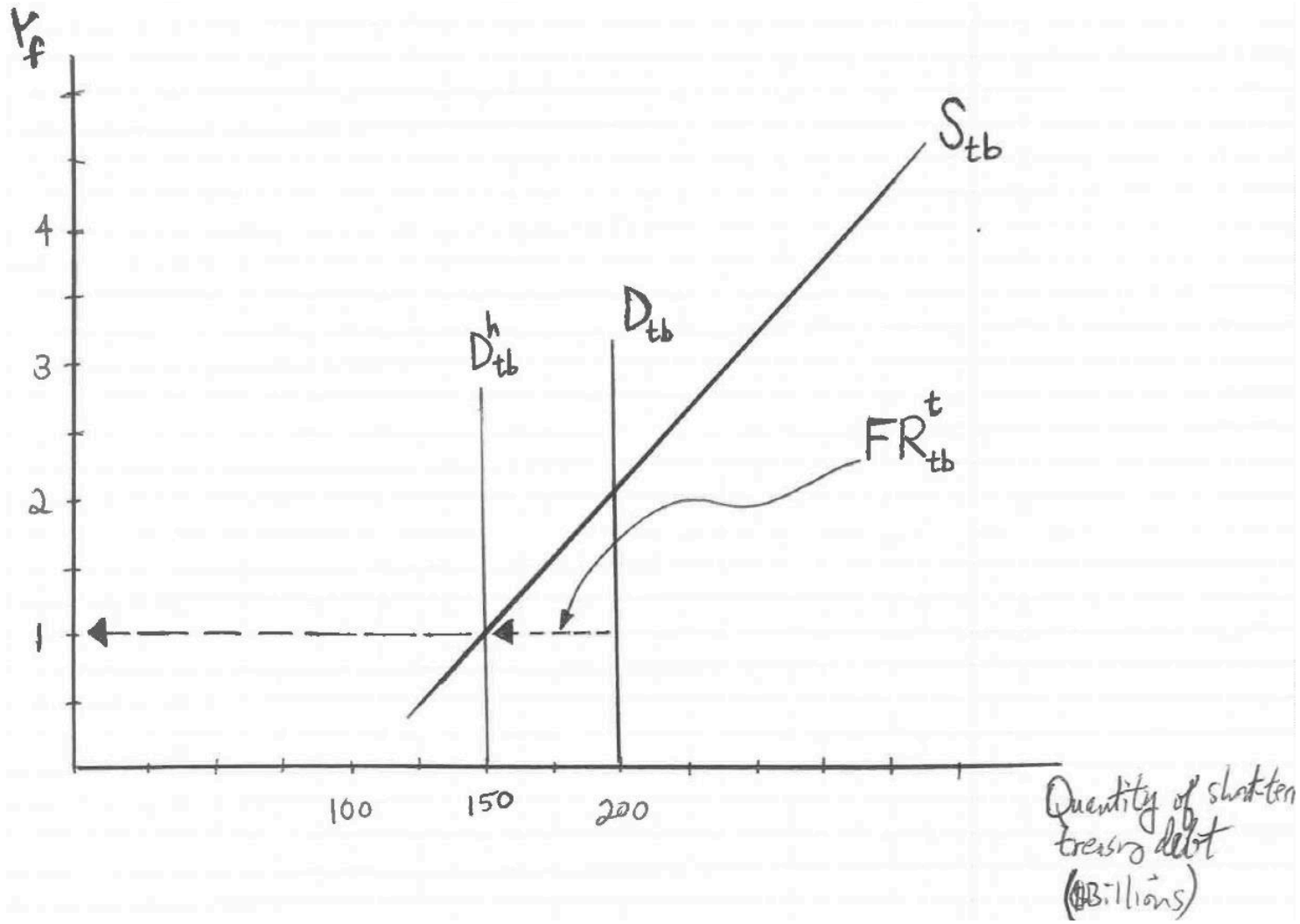
- Three Interest Rates:
  - $r_c \equiv$ real long-term corporate bond rate
  - $r_g \equiv$ real long-term government bond rate
  - $r_f \equiv$ real short-term fed funds rate

ELFM: The Actions of Key Actors

- Fed sales or purchases of T-bills shift **net** government **demand** for **HH funds** in the T-bill market:
  - FR^{t}_{tb} ≡ Fed T-bill transactions **add/subtract** to net government demand for HH funds
  - FR^{p}_{tb} ≡ Fed **purchases** T-bills, reducing net government demand for HH funds
  - FR^{s}_{tb} ≡ Fed **sells** T-bills, adding to net government demand for HH funds

$$FR^{t}_{tb} \equiv FR^{p}_{tb} \text{ or } FR^{s}_{tb}$$

Example: Fed Buys T-bills



ELFM: The Actions of Key Actors

- Government demand for funds: Total vs Private
  - D_{tb} ≡ government demand for loanable funds
  - D^h_{tb} ≡ government demand for **HH funds**

- FR^t_{tb} ≡ Fed's **net** provision of funds

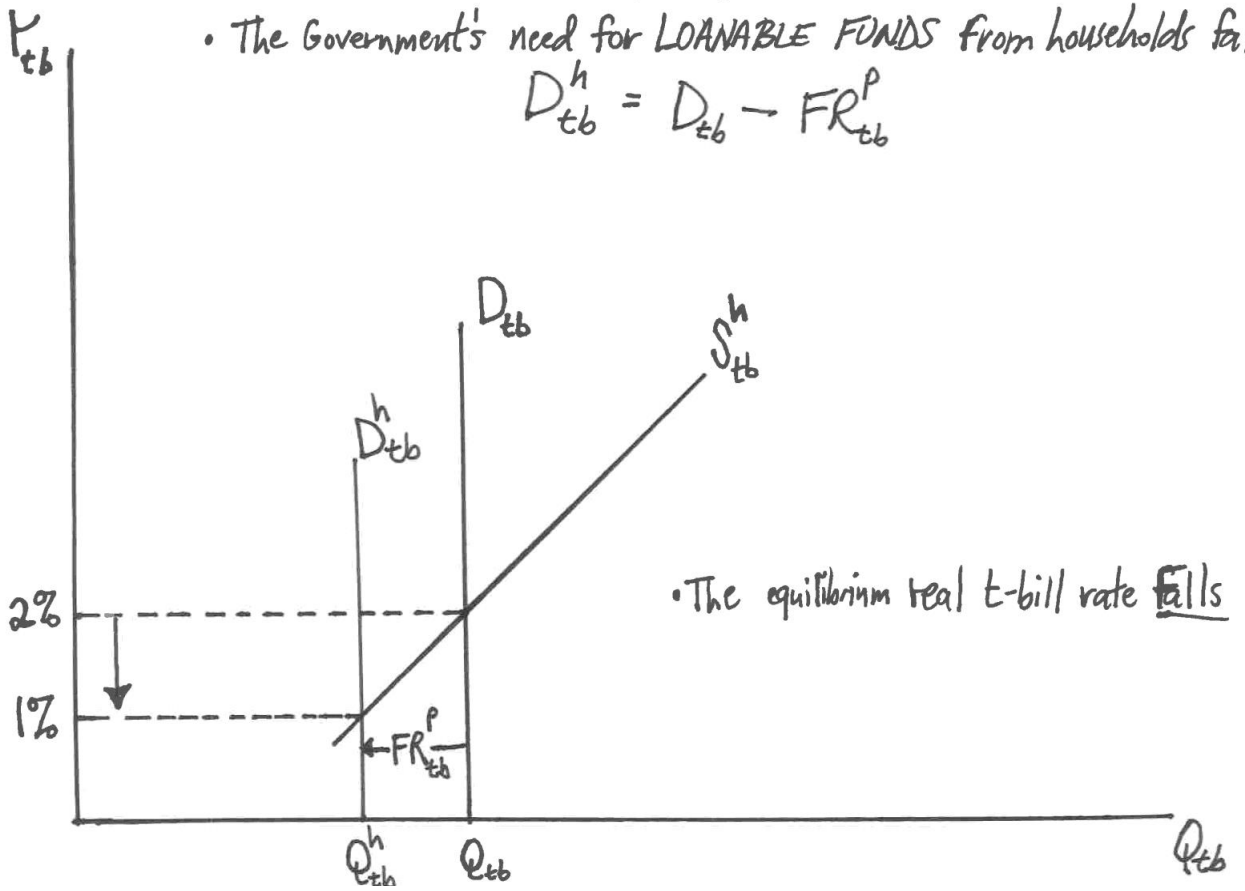
- $D_{tb} = D^h_{tb} + FR^t_{tb}$

- $D^h_{tb} = D_{tb} - FR^t_{tb}$ government private demand for funds (**net of Fed transactions**)

Example: Expansionary Monetary Policy

- Suppose the F.R.B. wants to lower their target interest rate
- The F.R.B. buys t-bills (FR^p_{tb})
- The Government's need for LOANABLE FUNDS from households falls

$$D^h_{tb} = D_{tb} - FR^p_{tb}$$

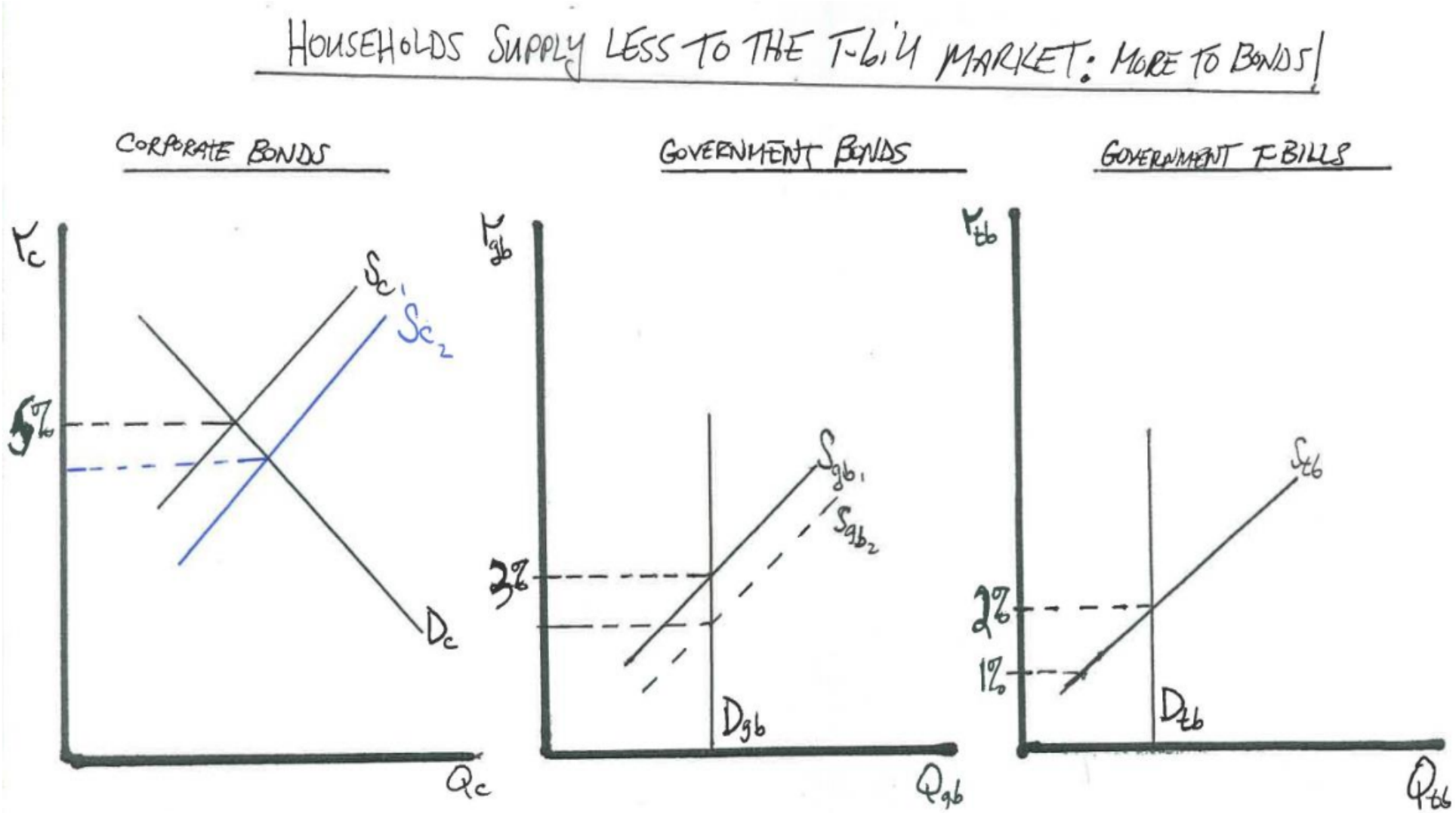


- The equilibrium real t-bill rate falls

Example: Expansionary Monetary Policy

- We move **along** the HH supply curve for **T-bills**
  - Equilibrium T-bill real interest rate, r_{tb}, falls
- This **shifts** the HH supply curve for **T-bonds**
  - Equilibrium T-bond real interest rate, r_g, falls
- Lower **risk-free** rates **shift** the HH supply curve for **risky** bonds
  - Equilibrium corporate (risky) real interest rate, r_c, declines

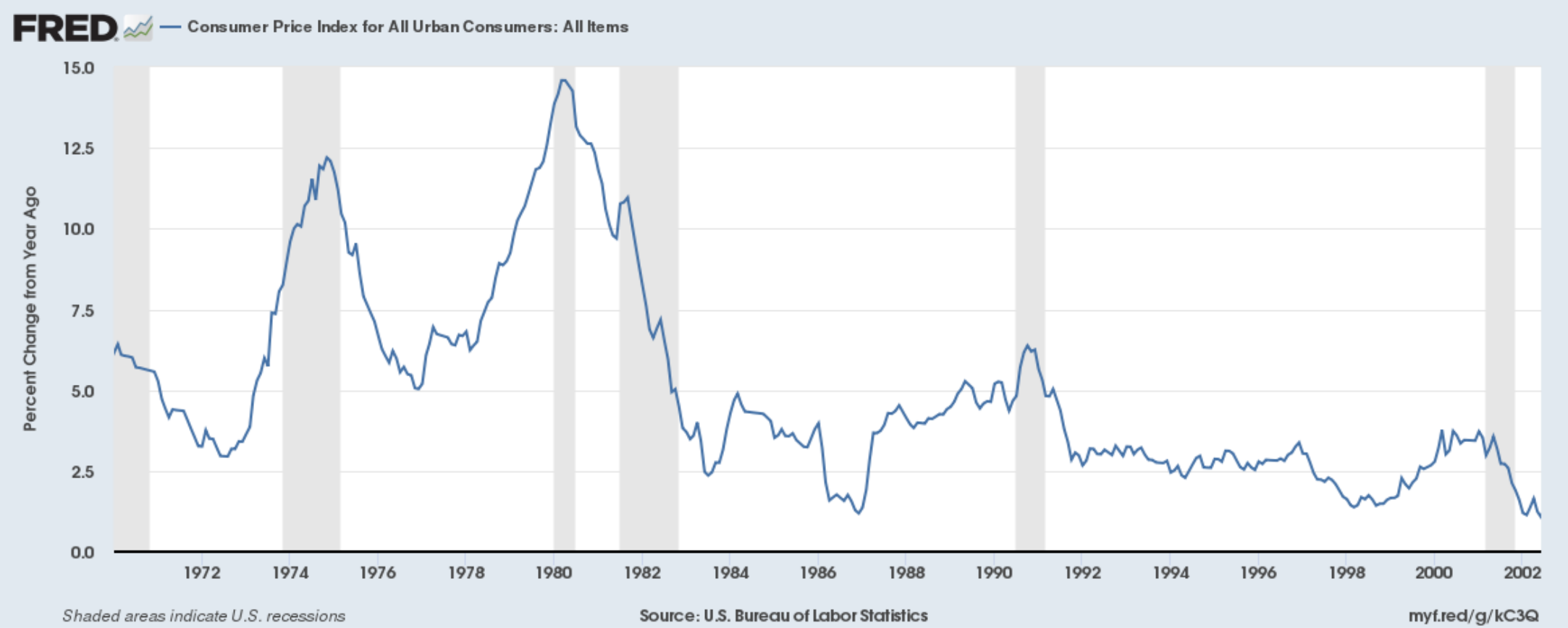
Example: Expansionary Monetary Policy



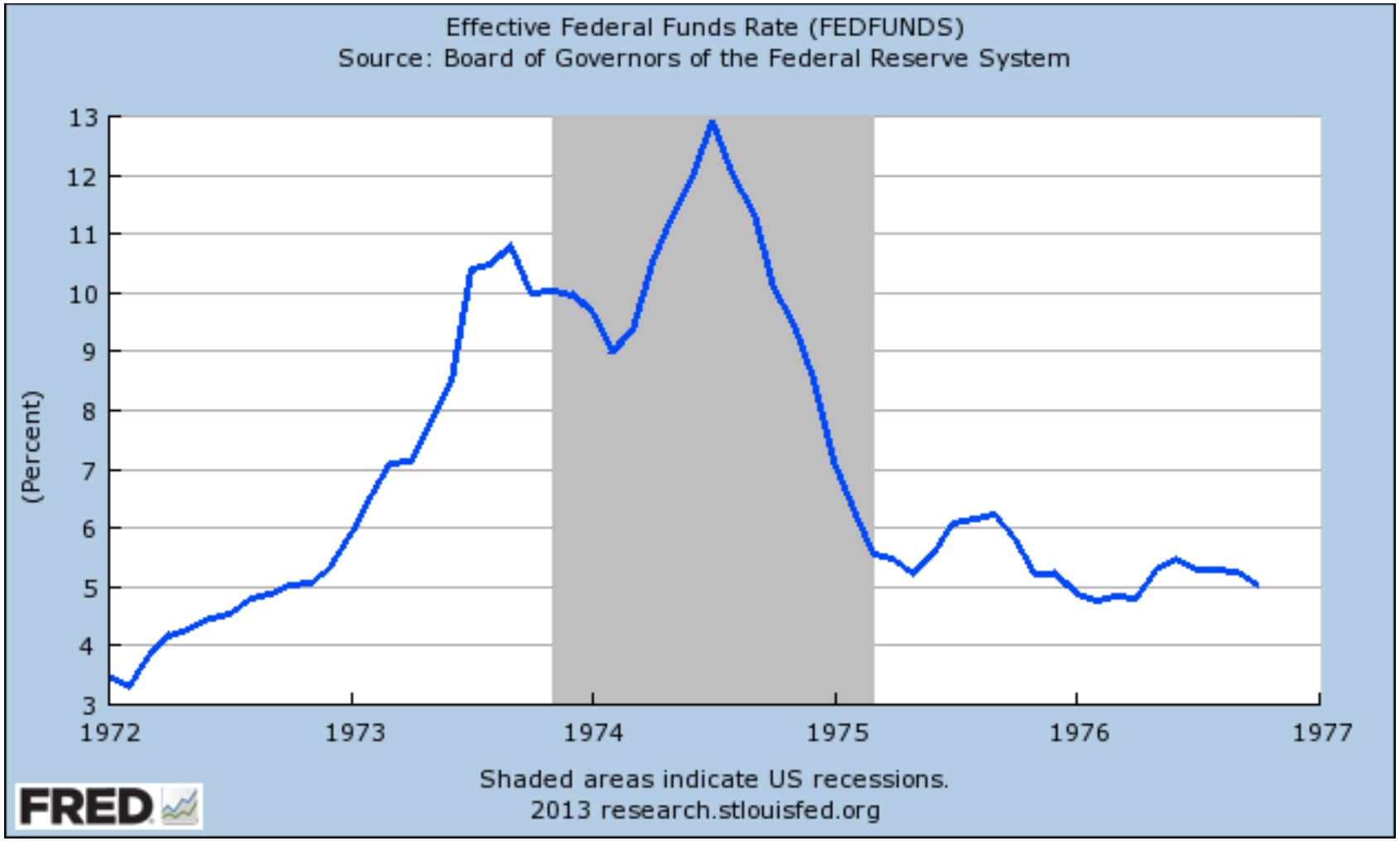
Fed Sets the Short Rate And Influences Other Rates

- In our example, we moved **along** the supply curve for T-bills
- This changes the rate offered on T-bills
- This, in turn, **shifted** the supply curve for T-bonds and corporate bonds
- Fed attempts to **influence output and inflation** **by changing interest rates** that households and businesses confront

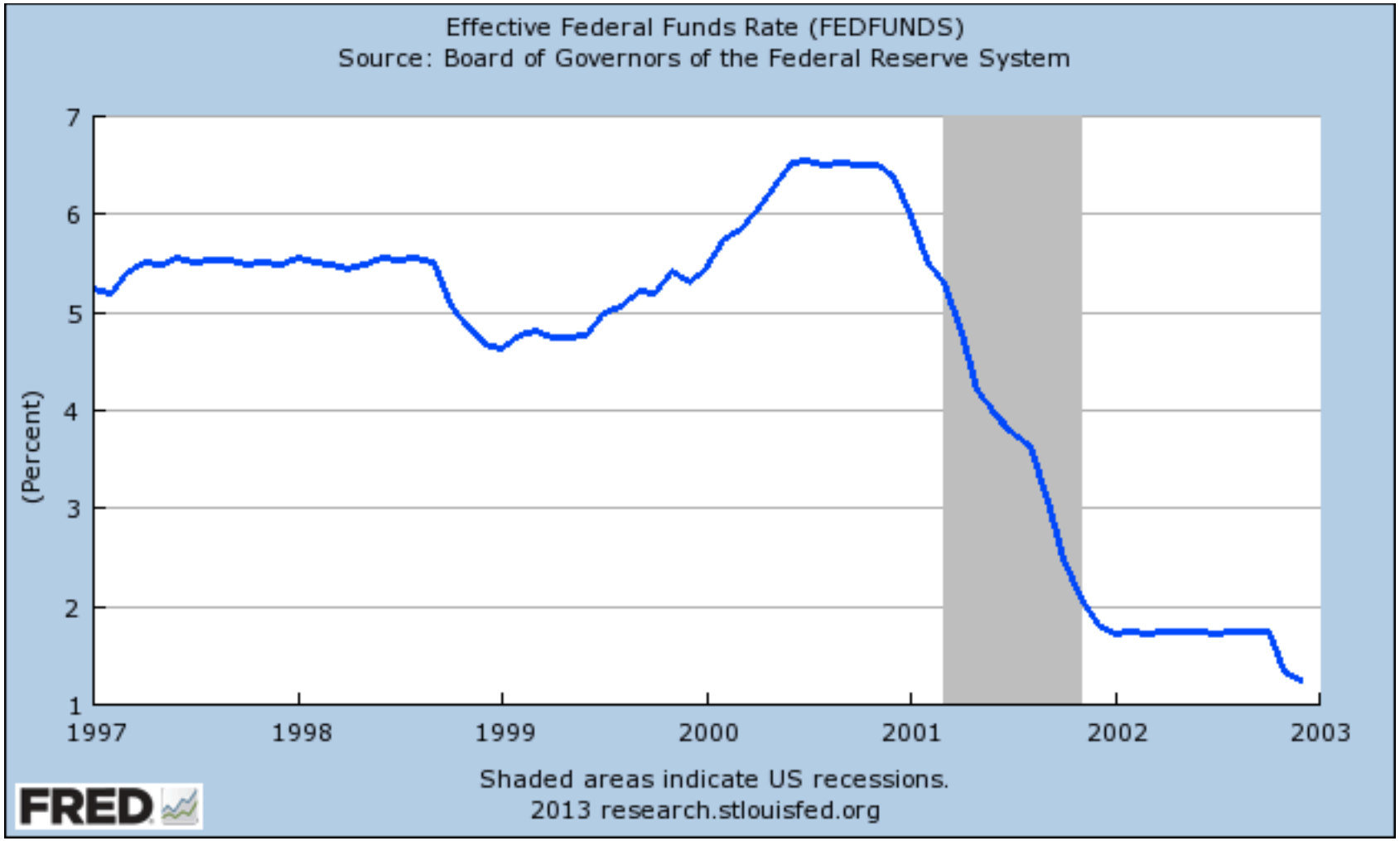
Example: Two Tightening Episodes



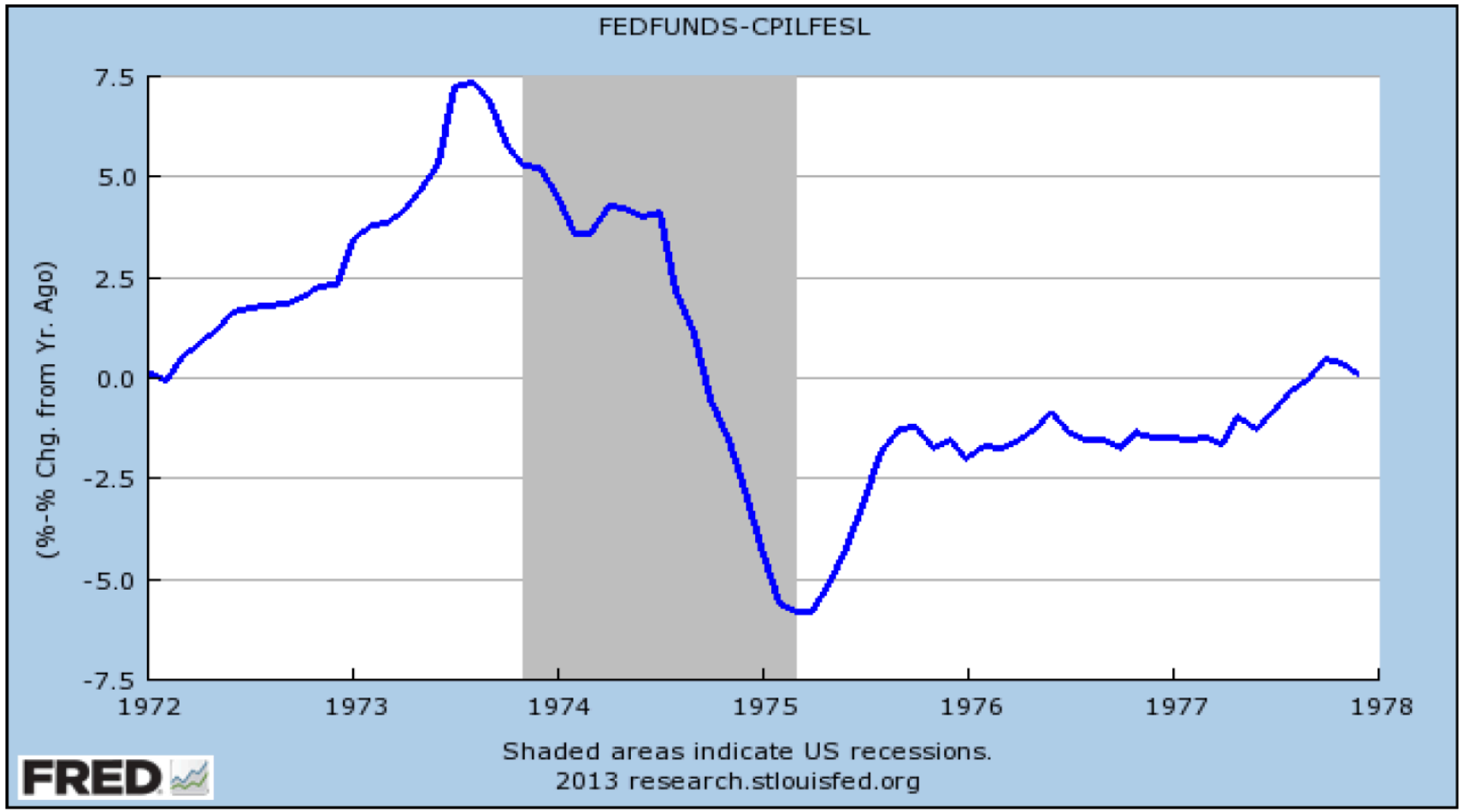
Mid-1970s: Fed Tightening Takes the FFR to 13%



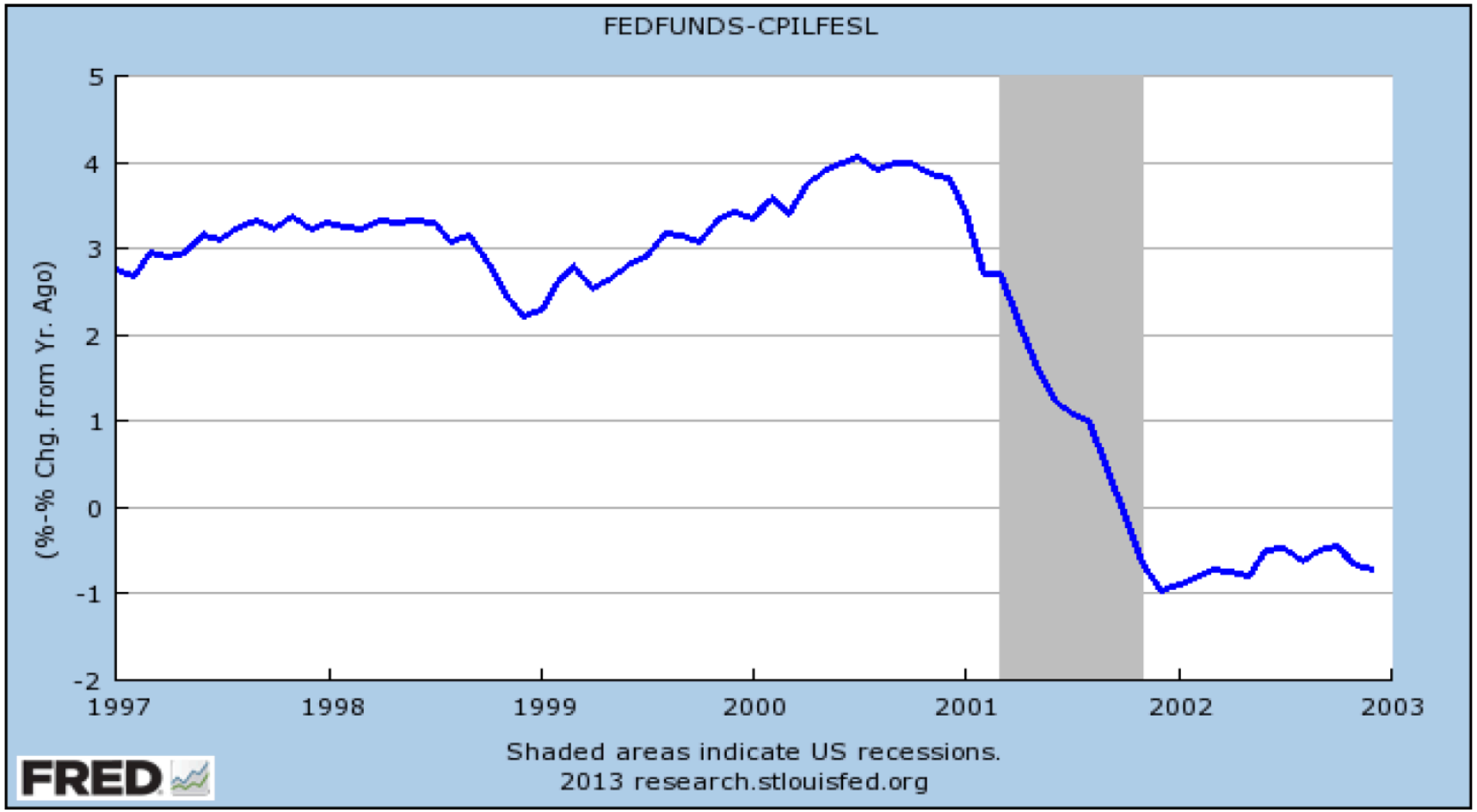
Turn of the Millennium: Fed Raised the FFR to 6.5%



Mid-1970s: Fed Tightening Takes the **Real** FFR to 7.5%



Turn of the Millennium: Fed Raised the **Real** FFR to 4%



Tightening by the Fed

- As the fed funds rate rises, **other rates follow**

	1972	1975		1998	2000
fed funds	5%	13%		4.5%	6.5%
10-year	6.4%	8.5%		4.7%	6.7%
Baa bond	8.3%	10.7%		7.1%	9.3%

What Level for the FFR?

- We saw **what** the Fed targets
- We saw a **model** of how the mechanism works
- But **how** does the Fed decides the **actual target** level?

Rules vs Discretion

- We know the Fed wants low inflation, high employment, strong growth and safe banks

- Should they **actively** pursue these goals?
  - **Policy discretion**: When policymakers make no commitment to future actions, but what they believe is the right decision for the situation

- Or should we **impose a rule** on the Fed?
  - **Policy rules**: Binding plans that specify how policy will respond (or not respond) to particular data such as U and π

Types of Rules

- **Nonactivist rules**: Do not react to economic activity
  - Milton Friedman's **monetarist rule** (constant-money-growth-rate rule)
  - Money supply is kept growing at a constant rate **regardless** of the state of the economy

- **Activist rules**: Monetary policy reacts to changes in economic activity (Y, π)
  - The **Taylor rule**

Milton Friedman's Monetarist Rule

- Set $\%\Delta M$ = 4%, and hope for: $\%\Delta Y$ = 2% and $\%\Delta P$ = 2%

- Milton Friedman **DID NOT** think this kind of rule would allow the economy to avoid recessions

- He **correctly** identified that 1960s Keynesians **overpromised**!
  - 60s produced economists who thought they had conquered the business cycle ➞ They could steer the economy clear of π and U problems
  - Friedman argued they would simply react **too late**, worsening situation
  - Fine tuning is not very fine at all

The Taylor Rule

- John Taylor came up with a rule to **replace money targeting**
- The rule **links** the Fed's target for the **FFR to economic variables**

$$ff = r^* + \pi + 0.5\ x\ (\pi - \pi^*) + 0.5\ x\ (U^* - U)$$

Federal funds target rate = Equilibrium real FFR
+ Current inflation rate
+ [(1/2) x Inflation gap]
+ [(1/2) x Output gap]

The Taylor Rule We'll Use

$$ff = r^* + \pi + 0.5\ x\ (\pi - \pi^*) + (U^* - U)$$

- Ben Bernanke (Fed Chair 2006-2014):
  - Economic research found a case for allowing a larger response of the funds rate to the output gap (specifically, a coefficient of **1 rather than 0.5**)

- Janet Yellen (Fed Chair 2014-2018):
  - FOMC's "balanced approach" in responding to π and U is more consistent with a coefficient on the output gap of **1.0, rather than 0.5**

Components of the The Taylor Rule

- What is r^*?
  - Real fed funds rate that neither speeds the economy up nor slows the economy down ➞ Neutral *real* interest rate

- **Inflation gap**
  - Difference between current inflation and a target rate

- **Output gap**
  - Difference of real GDP from potential GDP (at the natural rate of U)
  - In our case, unemployment gap

Why Does π Appear Twice in the Taylor Rule?

- If the Fed wants to **slow the economy**, they want to **raise real rates**
- If π jumps from 2% to 4% and the Fed wants a higher real rate, they must **raise** the **nominal FFR** *by more than the rise in* π
- In the equation, if π rises by 1%, then FFR is raised by 1.5%
- Taylor principle

What Does the Rule Tell the Fed to Do?

- Fed uses open market operations to set the FFR
- If π and U are ideal, Fed puts the FFR to **neutral**
- If π is too high, Fed targets a **restrictive** FFR
- If U is high with low π, Fed sets an **easy** FFR

Analyzing the Taylor Rule

- Let's look at the Equation as Taylor did:
  - Fed's **target inflation** rate is 2%
  - Fed's **target unemployment** rate is 5%
  - **Neutral real** short **rate** is 2%

$$ff = r^* + \pi + 0.5\ x\ (\pi - \pi^*) + (U^* - U)$$

$$ff = 2 + \pi + 0.5\ x\ (\pi - 2) + (5 - U)$$

- In equilibrium, $ff = 4\%$

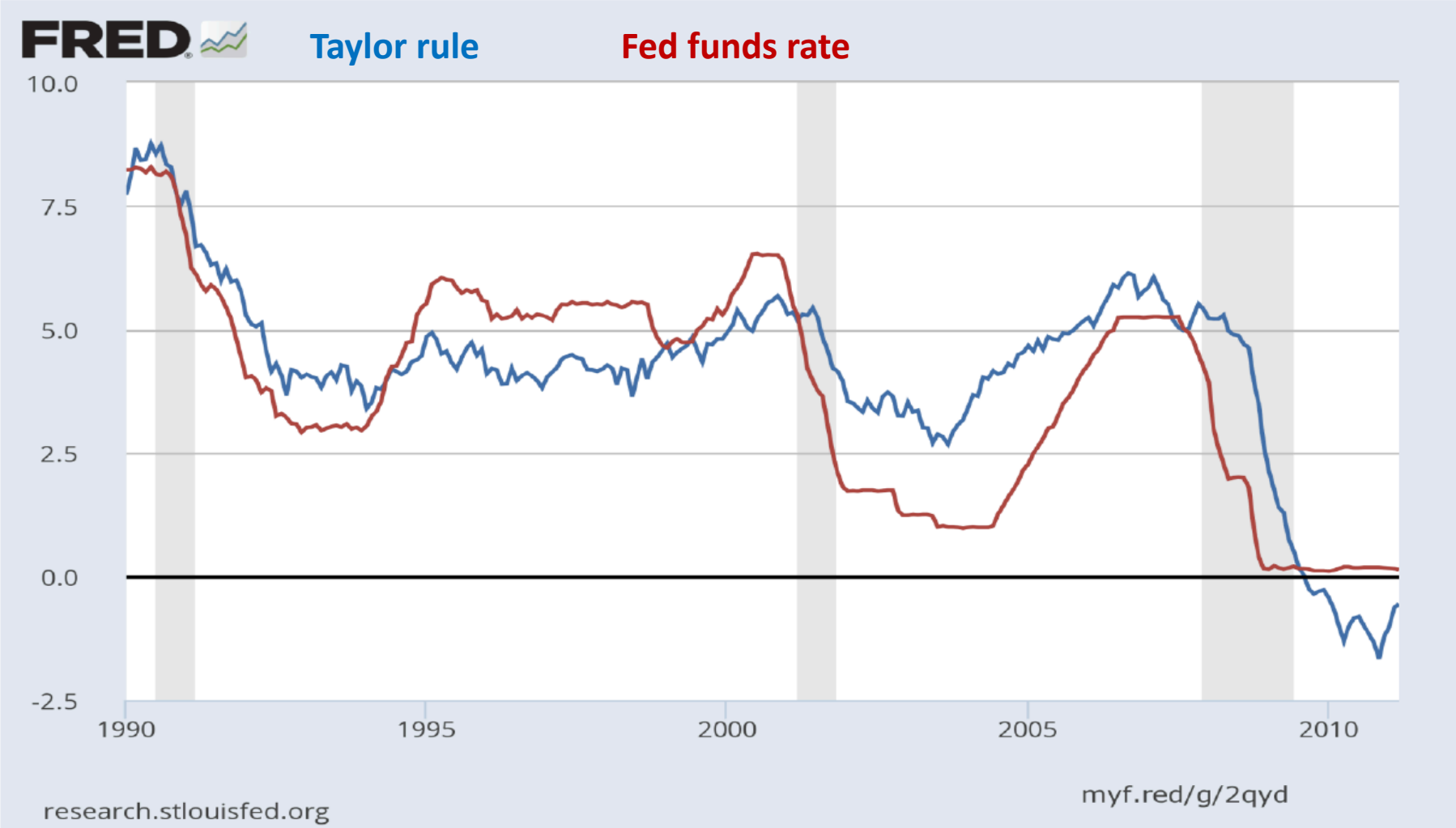
Applying the Taylor Rule

- If the economy is **overheating**:
  - Unemployment = 4%
  - Inflation = 3%

$$ff = 2 + \pi + 0.5\ x\ (\pi - 2) + (5 - U)$$

$$ff = 2 + 3 + 0.5\ x\ (3 - 2) + (5 - 4) = 6.5\%$$

The Taylor Rule for the FFR



Taylor Rule Message and Monetary Policy Reality

- Taylor rule **June 2006**:

$$ff = 3 + 0.5\ x\ (3 - 2) + (5.5 - 4.5) + 2 = \mathbf{6.5\%}$$

- Actual FFR June 2006: **6.5%**

- Taylor rule **June 2008**:

$$ff = 2.5 + 0.5\ x\ (2.5 - 2) + (5.5 - 5.5) + 2 = \mathbf{4.75\%}$$

- Actual FFR June 2008: **2%**

Why Taylor Rule Failed to Capture Fed's Actions in 2008?

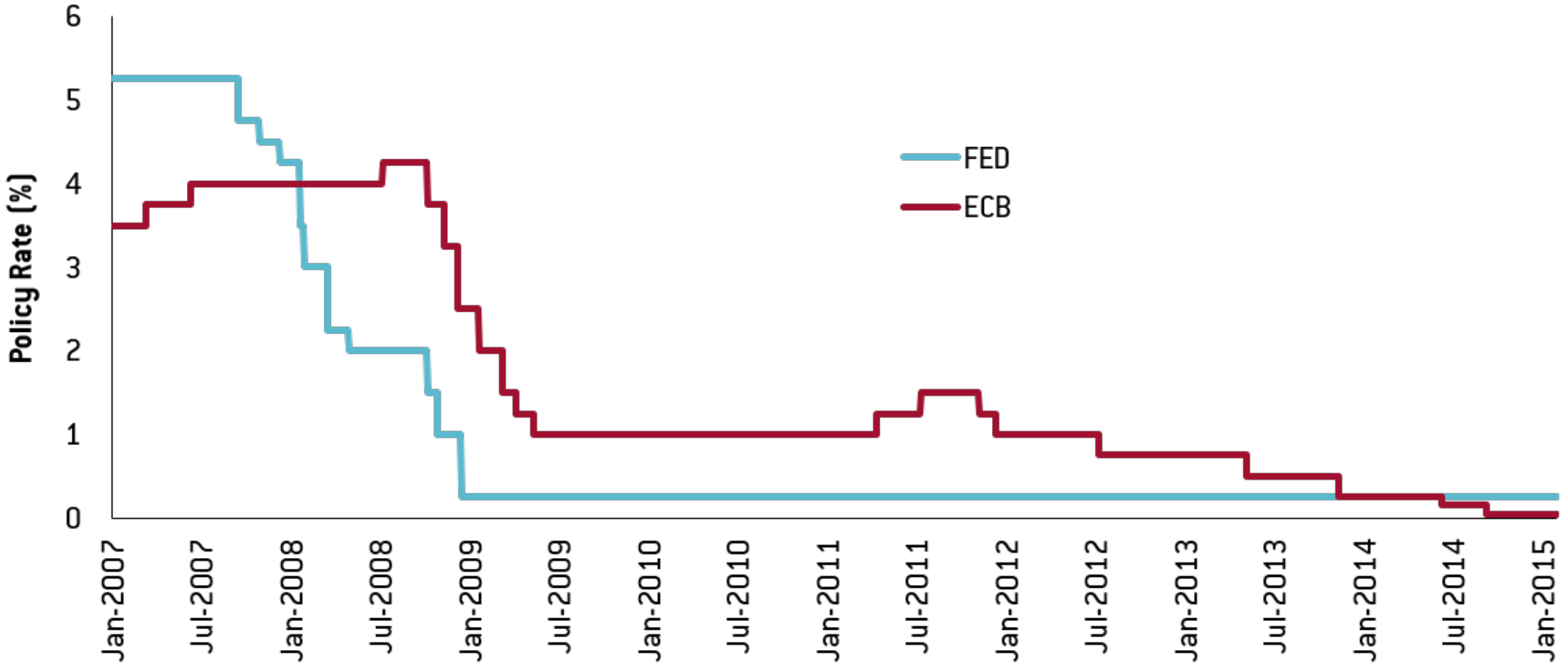
- In mid-2008, banks began to collapse
- In mid-2008, financial stability issues suggested there was a **big risk** of a **bad recession**
- So, Fed **ease was much bigger** than what was implied by a Taylor rule

The Taylor Rule: A Good Tool But Not a Rule!

- What are the Fed's goals?
  - Low π, low U, strong ΔY
  - AND A SECURE BANKING SYSTEM!!!

- When the **financial system** is **in trouble**, you may want to **ignore the rule**
  - Counterexample: ECB decisions of July 2008 and April 2011

The Taylor Rule: A Good Tool But Not a Rule!



Also, What Might Not Stay The Same?

- We said $r^* = 2\%$
- Fed **now believes** r^* might be 0%!
  - After the Great Recession, firms unwilling to invest and homebuyers unwilling to buy homes
  - Therefore, the r^* suddenly looks like **zero**, not 2%

$$ff = 0 + \pi + 0.5\ x\ (\pi - 2) + (5 - U)$$

- So, neutral $ff = 2\%$
- Plus U^* **may be 4%** (instead of 5%)

Summarizing: A Good Tool But Not a Rule!

- There is still **discretion** when choosing π^*, U^*, r^*
- Different opinions about the **coefficients** for the gaps
- It does not consider the **financial system**
  - You may need to ease faster than what the rule says
- Plus: **Zero lower bound** problem

Monetary Policy and the Zero Bound

- What if the fed funds rate hits **zero**?
  - Standard Fed move to step on the gas pedal is missing

- Assume $\pi^* = 2\%$, $U^* = 5\%$, $r^* = 2\%$. For 2010, $\pi = 1\%$, $U = 10\%$

$$ff = 2 + 1 + 0.5 \times (1 - 2) + (5 - 10) = \mathbf{-2.5\%}$$

- Taylor rule signals a need for **impossible to deliver ease**
  - Note: Nominal FFR target is -2.5% and real FFR is -3.5%

The Zero Bound

- Fed does not want to engineer a negative FFR

- What does a **negative nominal** interest rate mean in practice?
  - Imagine T-bill rate = 2%. You give the government $100 today and it gives you $100.5 in 3 months
  - Imagine T-bill rate = **–2%**. You give the government $100 today and it gives you $99.5 in 3 months

- Problems?
  - Mattresses, self-storage, bitcoins

On the Failure of CMP Tools in the Great Recession

- So far conventional MP → Standard (textbook) theory
  - In a full-scale financial crisis conventional MP tools become **powerless**
- Never succeeded for very long in attaining the dual mandate, there is **still a lot to learn**
- Global financial crisis led to a **reformulation of** how **monetary policy** is or should be done
  - Re-examine traditional notions of MP

On the Failure of CMP Tools in the Great Recession

- By December 2008, nominal FFR was essentially 0%
  - Eventually same situation in UK and euro area
  - Japan in that situation since the 90s

- How to make financial conditions **more accommodative** (e.g. lower **long-term** rates) if can't lower the FFR?

- Fed invented methods to push long rates lower!
  - Other central banks also ended up doing **nontraditional** things

1. Forward Guidance

- One option for achieving lower long-term interest rates:
  - Fed's commitment to **keep** the **FFR at zero** **for a long time**

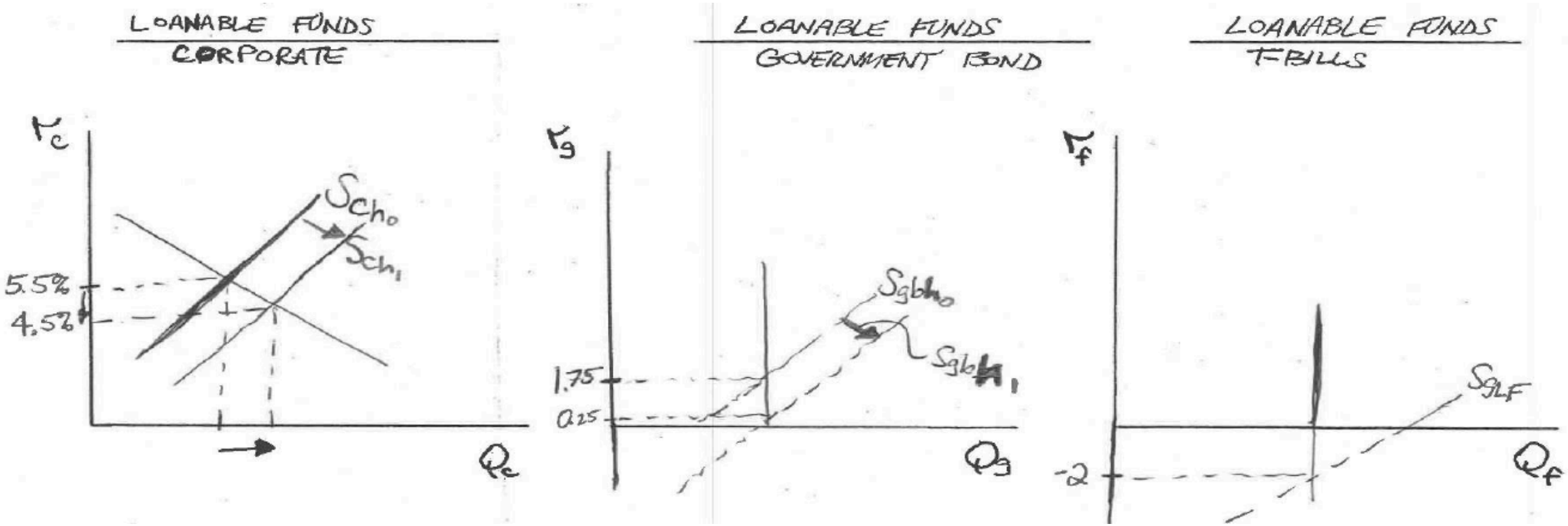
- By committing to this, Fed could lower the market's **expectations** of future short-term interest rates → Long-term rates fall

- **Example**: 5-Year note buyers and average FFR over the 5 years

	(year)	1	2	3	4	5	average
fed funds	(temporary ease)	0	3	3	3	3	2.4
fed funds	(enduring ease)	0	0	0	3	3	1.2

Forward Guidance

- Fed convinces HH of **lower future FFR**

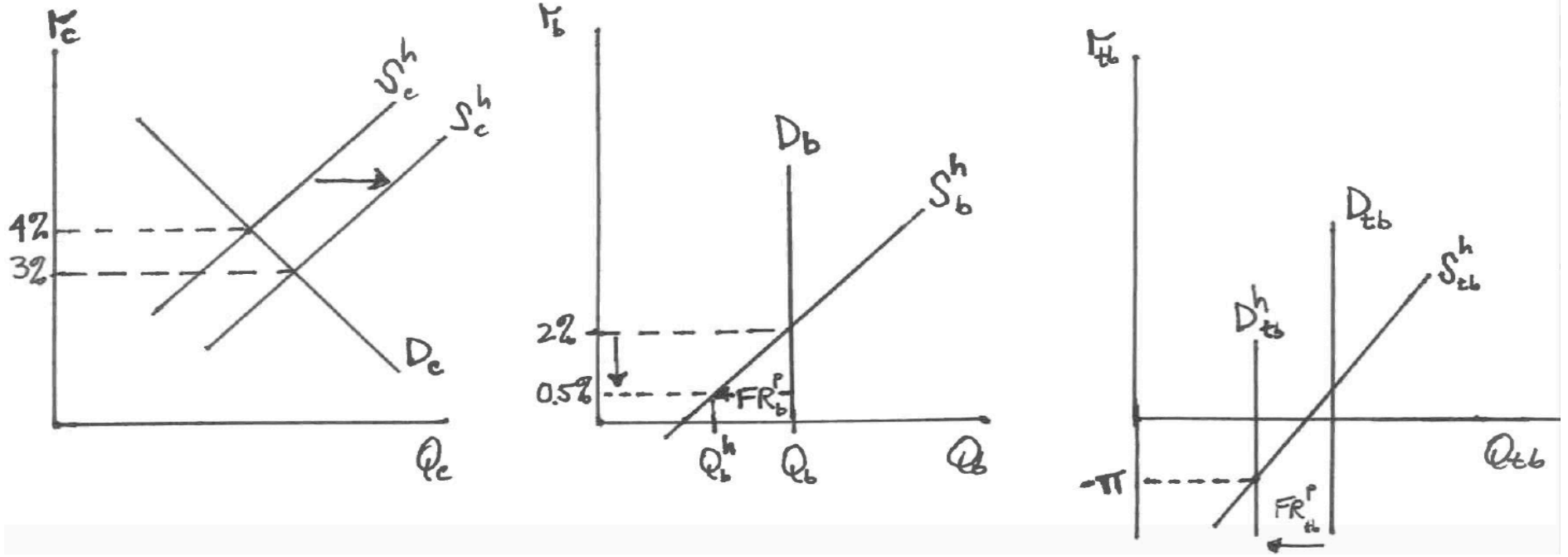


2. Quantitative Easing

- Fed usually buys **T-bills** to lower the FFR
- **QE**: Directly pushing long-term bond yields down by buying **government** bonds and **corporate** bonds (Prices ↑, Yields ↓)
- Where does the Fed get the money for the purchases?
  - It 'prints' the money
- 3 rounds in US : QE1 (2009-10), QE2 (2010-11), QE3 (2012-2014)
  - **Example**: Fed bought $85 bn of bonds per month from 2013 to 2014

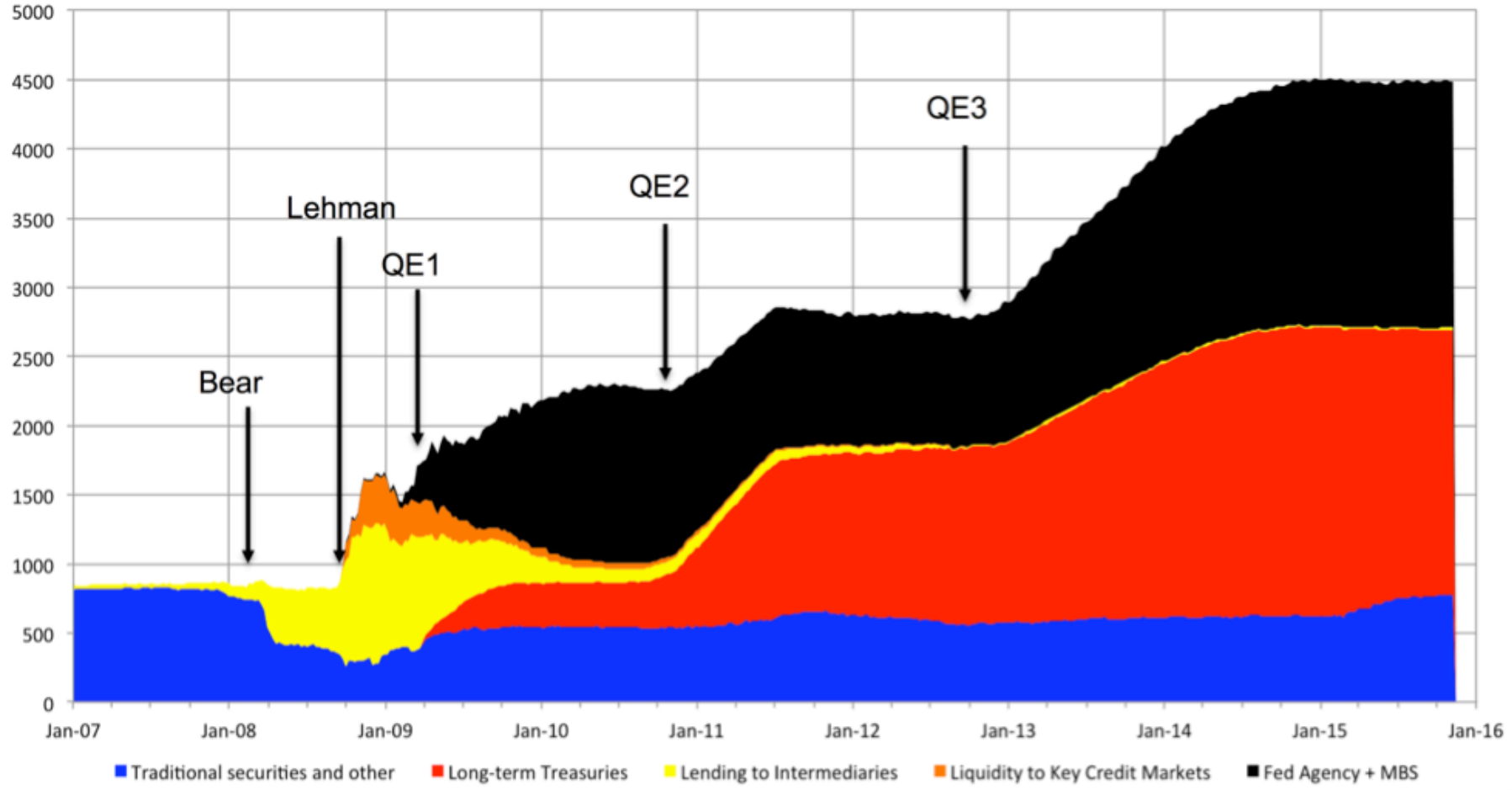
QE: The Fed Provides the Funds

- THE FRB BUYS T-BONDS
- HOUSEHOLDS ACCEPT A LOWER REAL RATE AS THEY NEED TO BUY FEWER T-BONDS
- HOUSEHOLDS SHIFT OUT THEIR SUPPLY CURVE FOR RISKY BONDS



Expansion of Federal Reserve Balance Sheet, 2007-2015

Bernanke: "The problem with QE is that it works in practice, but not in theory."



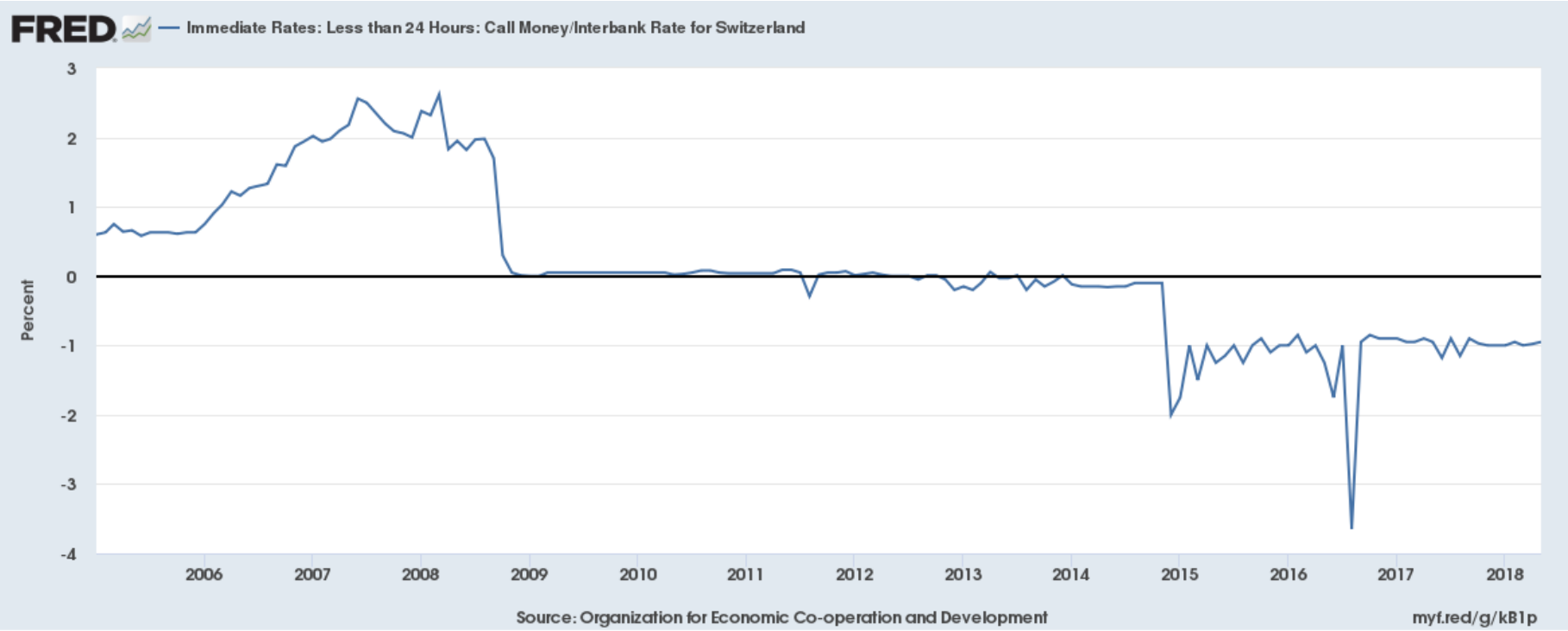
https://www.moneyandbanking.com/commentary/2015/12/7/unconventional-monetary-policy-through-the-feds-rear-view-mirror

3. Promise Higher Inflation in the **Future**

- Some argue the Fed can get lower real rates by promising **higher π**
  - Bank of Japan first to try it in September 2016
- Pushing π up is a bit like promising a future economic boom
  - If public believes a boom is coming, they may **invest/spend** more **today**
- Risks?
  - Unpopular with the public
  - Fed may lose hard-fought **credibility** as vigilant against π

4. Negative **Nominal** Interest Rates

- Push policy interest rates negative
  - **Lenders pay borrowers** for taking loans
  - ECB, Japan, Sweden, **Switzerland**, Denmark



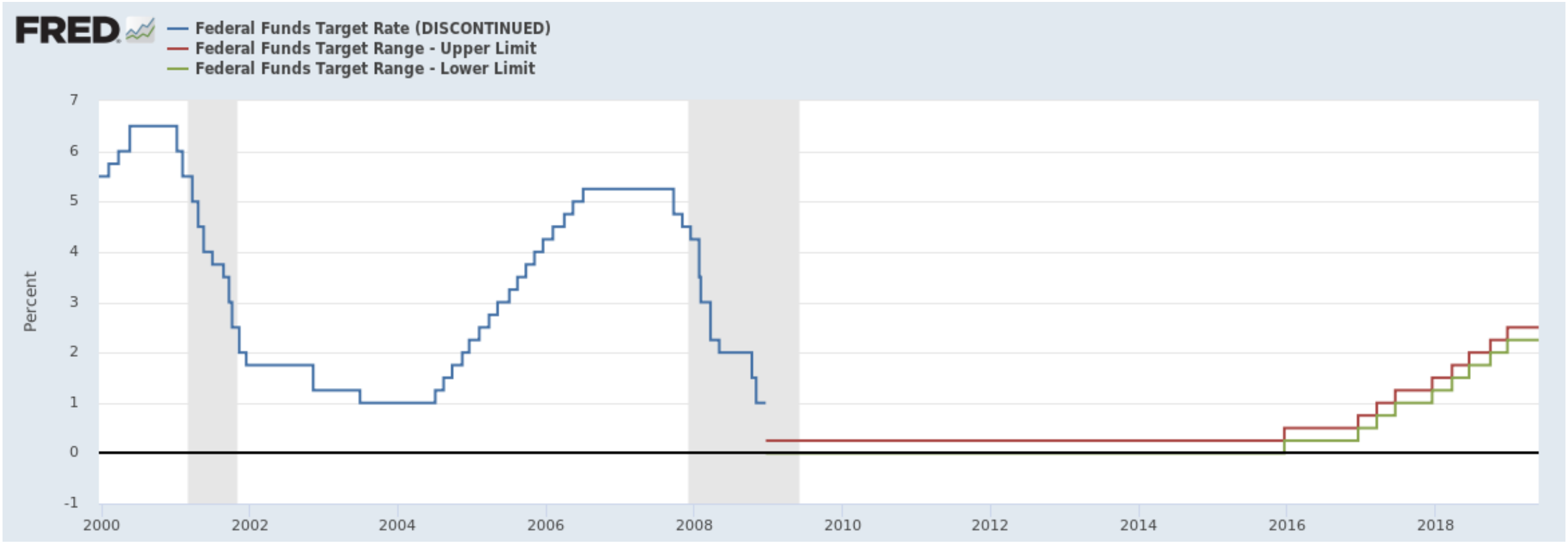
Unconventional Monetary Policy Tools

- Extensions of liquidity provisions
- Forward guidance
- Large-scale asset purchases (QE)
- Increase the target for π
- Negative nominal interest rates

What Do We Know About These Tools?

- Some of these tools seem to be very weak
- Some may do more harm than good
- We are not very sure about either the short-term or long-term effects

Federal Funds Rate Target: Level and Range



Lessons from the Financial Crisis

- Developments in the **financial sector** have a **far greater impact** on economic activity than was realized before

- **Cost** of cleaning up after a financial crisis is **very high**
  - Financial crises are followed by **deep recessions**

- Price and output stability **do not** ensure financial stability
  - Asset-price bubbles