



FEDERAL RESERVE BANK *of* NEW YORK

Policy Implementation with a Large Central Bank Balance Sheet

Antoine Martin

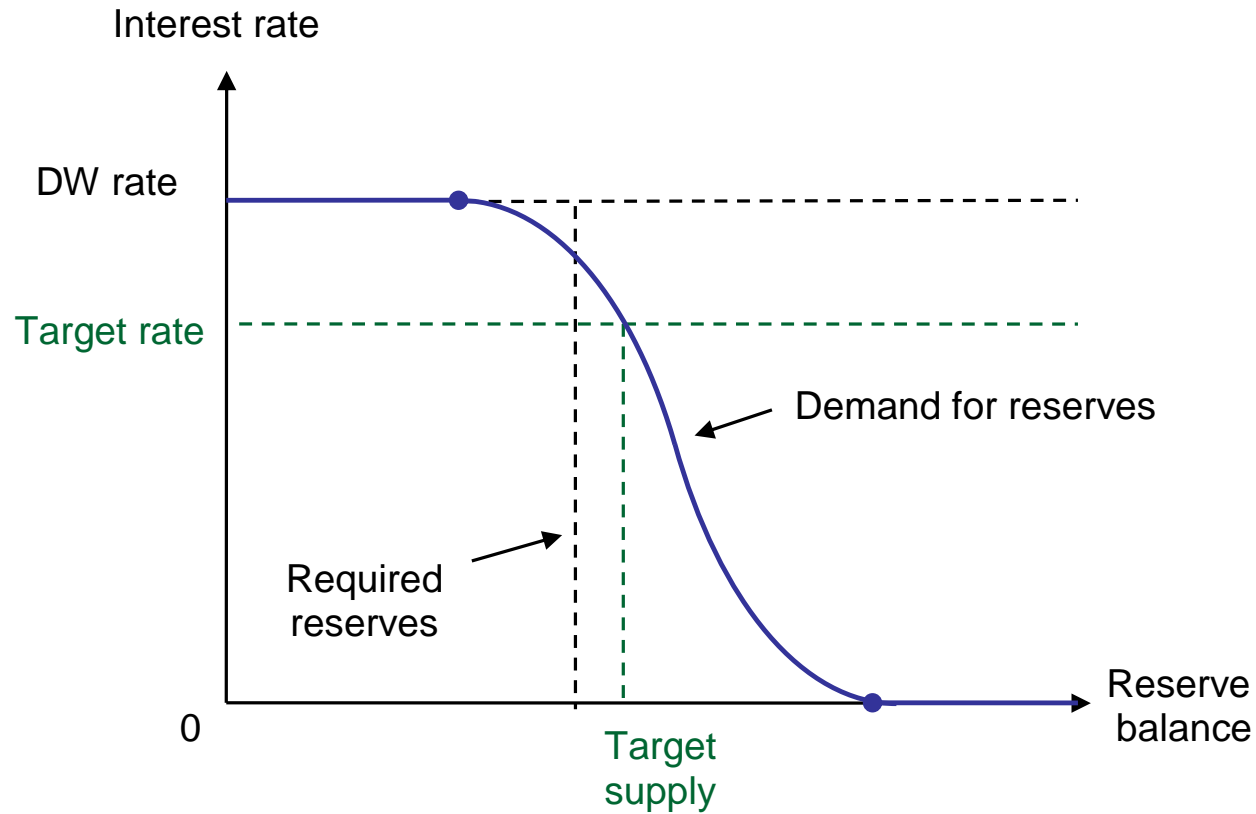
Fed 21, March 24 , 2015

Outline

- Monetary policy implementation before 2008
- Monetary policy implementation since 2008
- Tools available for normalization
- A framework to think about monetary policy implementation with large reserves



Monetary policy implementation before 2008

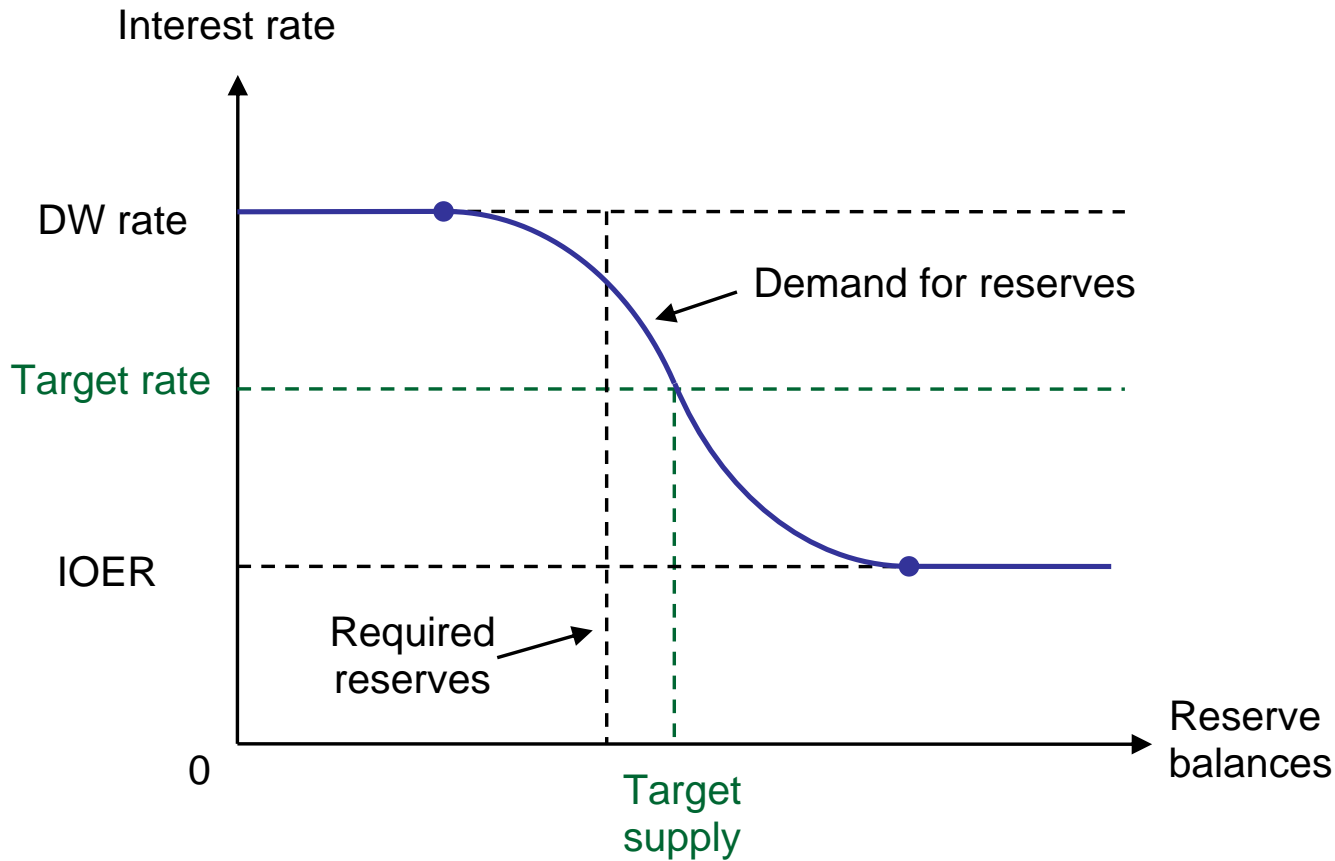


Pre-Crisis Operational Framework

- The level of reserve balances was quite low
 - Averaged around \$10 billion in 2006
- Desk and Board staff forecast factors driving supply of and demand for reserves
- Almost every day, conduct a repo operation to add enough reserves to hit the fed funds target rate
 - Averaged about \$5-10 billion per operation
- As demand for currency grew, banks' reserves would decrease, and the Desk would add reserves through purchases of Treasuries (long-run) and repos (short-run)

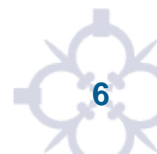


Framework was similar to a “corridor” system

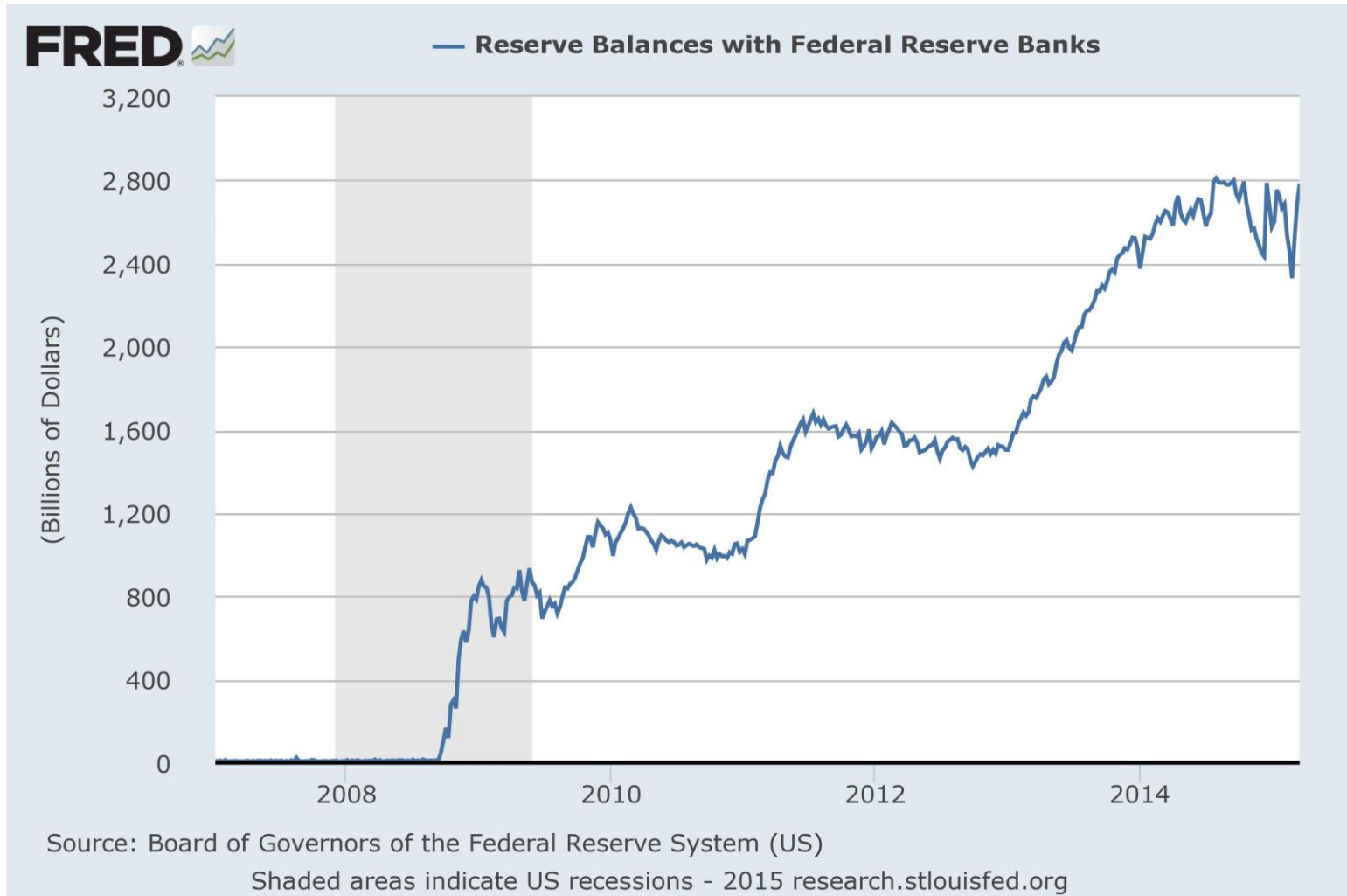


Outline

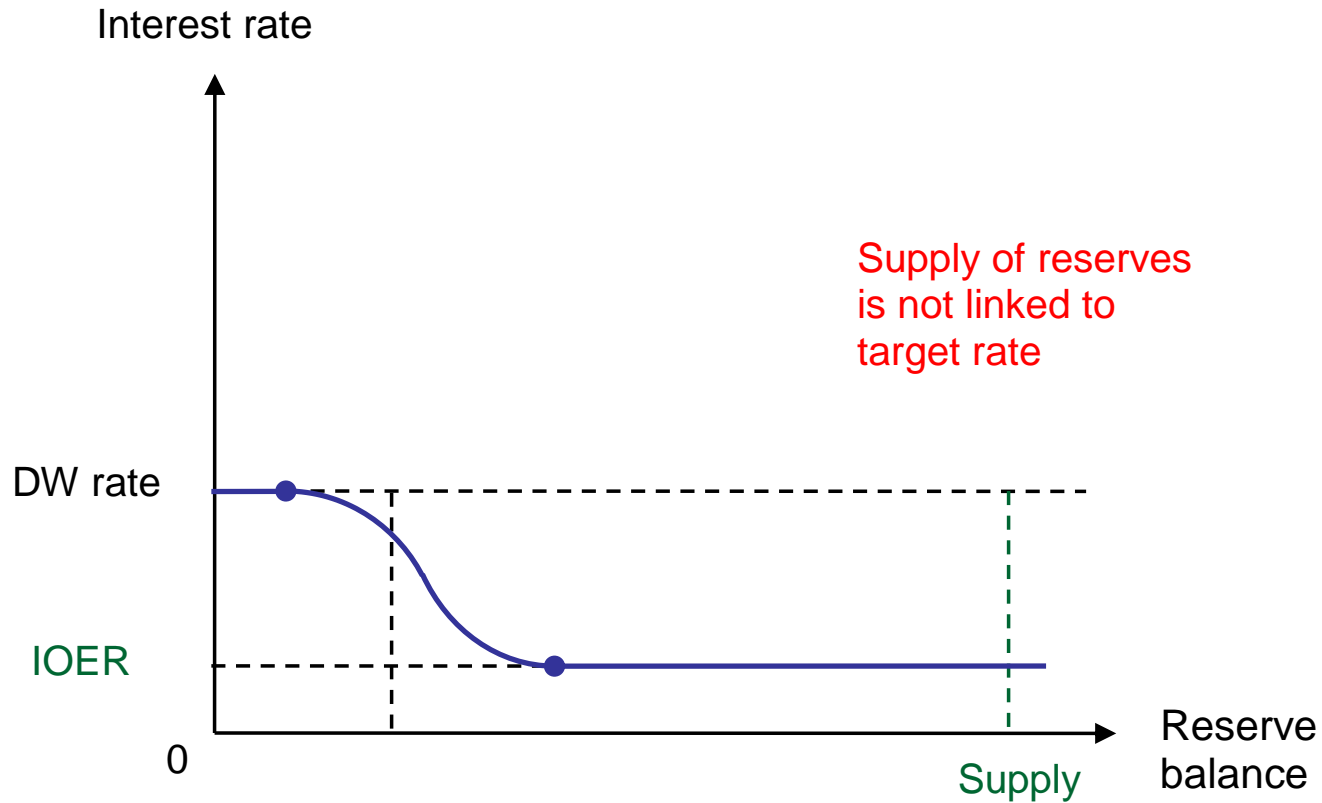
- Monetary policy implementation before 2008
- **Monetary policy implementation since 2008**
- Tools available for normalization
- A framework to think about monetary policy implementation with large reserves



The crisis lead to a huge increase in reserves



Monetary policy implementation since 2008



Current Framework

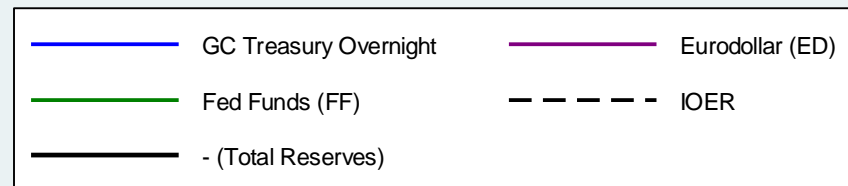
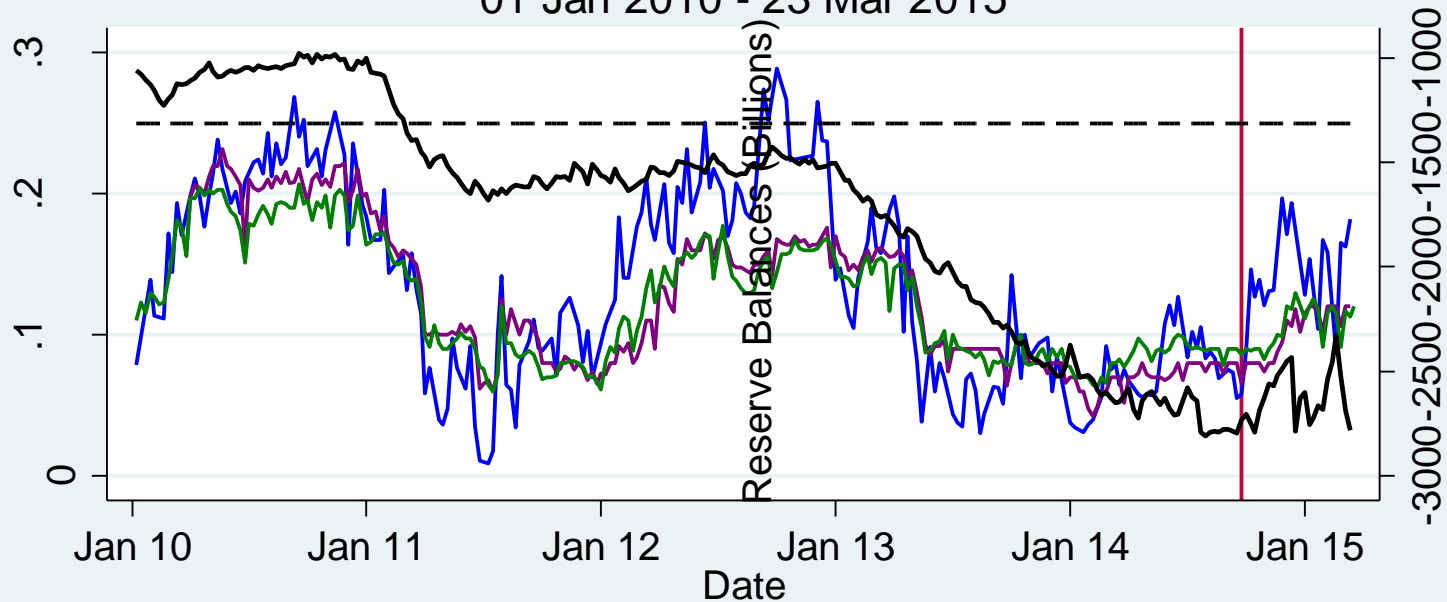
- The level of reserve balances is much higher
 - Around \$2.7 trillion; a 27,000% increase!
- Little need to forecast factors driving supply of and demand for reserves each day
 - But market interest rates, including the fed funds rate, have been below IOER
- No need to conduct a repo operation to set the supply of reserves to the desired level
 - Relatively small-scale adjustments to the supply of reserves might do little to move the fed funds rate
- Large-scale asset purchase programs have meant that currency is no longer our largest single liability



Reserves and money market rates

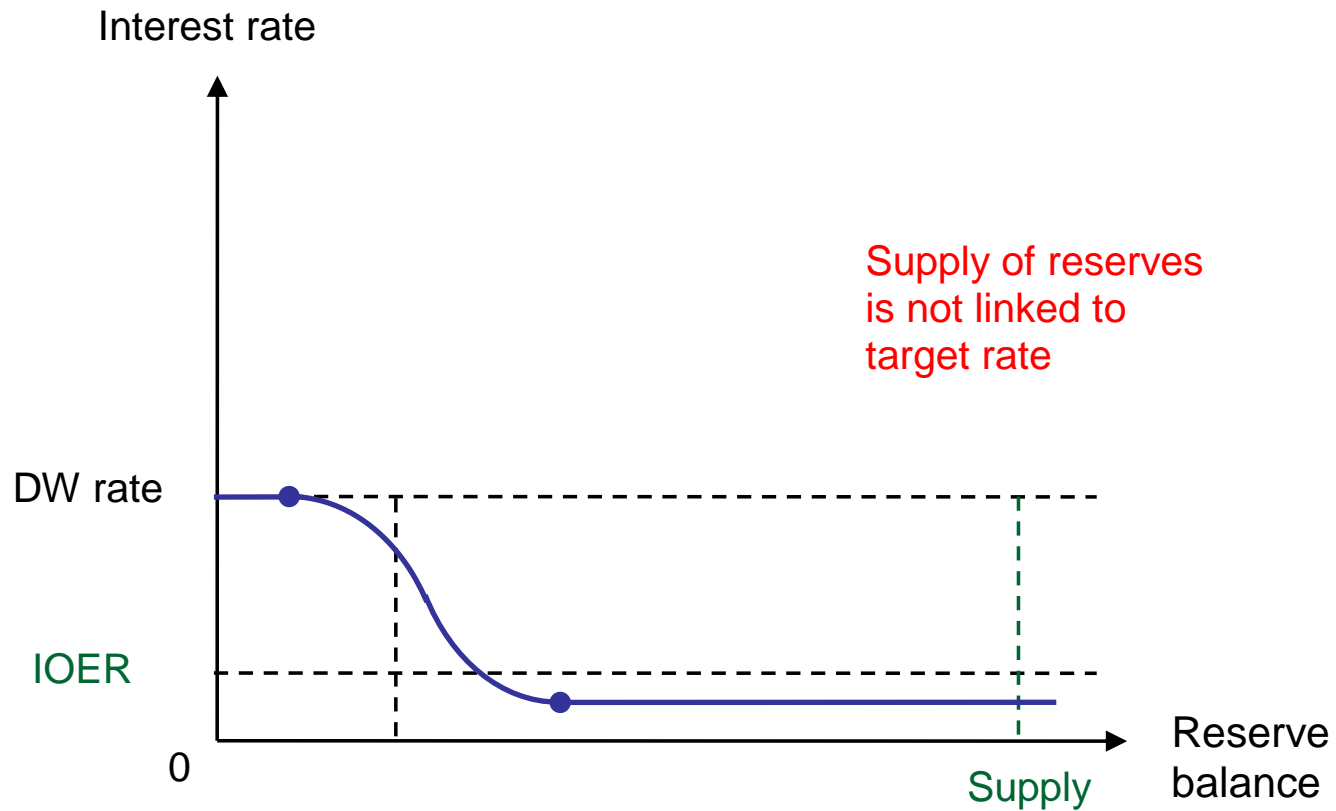
GC Treasury Overnight, Effective Fed Funds, IOER, Eurodollar, and Total Reserves

01 Jan 2010 - 23 Mar 2015



Sources: FRED, Federal Reserve Economic Data, from the Federal Reserve Bank of St. Louis, Bloomberg, and Federal Reserve Data Releases, H15

The “leaky floor”

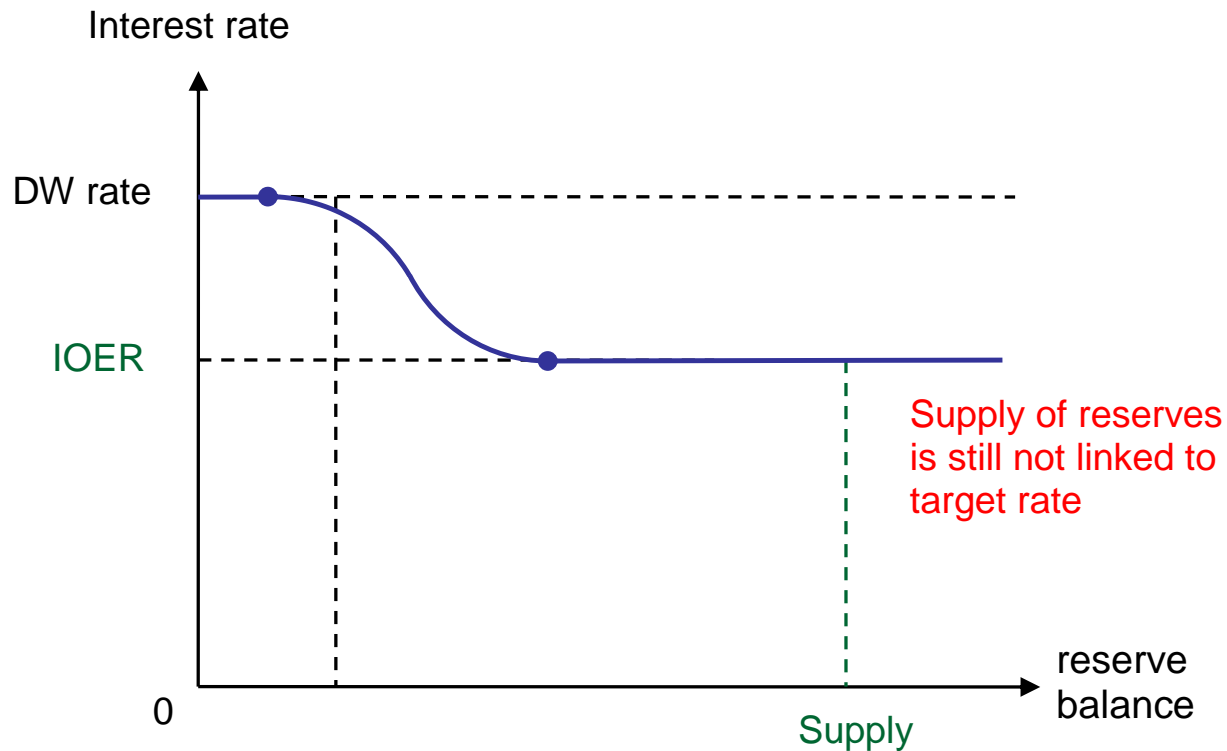


Why are market rates below the IOER?

- Why is the federal funds (FF) rate below IOER?
 - The role of GSEs and FHLBs
- Why are other market rates below IOER?
 - Role of non-banks, particularly money market mutual funds (MMFs)



Similar to a “floor” system



Outline

- Monetary policy implementation before 2008
- Monetary policy implementation since 2008
- **Tools available for normalization**
- A framework to think about monetary policy implementation with large reserves



Exit and Patching the Leaks

- Last September the FOMC published its Policy Normalization Principles and Plans. Fed intends to
 - Keep a target range for the FF rate
 - Move the FF rate primarily by adjusting IOER
 - Use overnight reverse repos and other tools as needed
 - Reduce securities primarily by ceasing reinvestments
- 3 tools have been discussed recently: IOER, overnight RRP, and TDF
 - What are they?



- Relatively recent authority granted to the Fed in 2008
- Allows the Fed to pay interest to banks on the balances that they leave in their account with the Fed
- How does it work?
 - If banks can earn, say, 0.25% leaving money in their Fed account, they won't have an incentive to lend it out below that rate
 - Provides a floor on interbank rates

Overnight RRP

- A tool we have used for decades
- New wrinkle: instead of operating in fixed size, operate at a fixed rate with a broader set of firms
- How does it work?
 - In tri-party repo system, investors give the Fed cash overnight and we give them Treasury securities as collateral (essentially, a collateralized loan to the Fed)
 - Used to support a floor under rates
 - Similar to IOER, if an investor can earn, say, 0.05% investing at the Fed, why invest with a private counterparty below that level?



- A relatively new tool
- Similar to IOER in many ways, but instead of overnight, deposit is for a specified term
- How does it work?
 - Banks can choose to place a fixed amount of their reserves in the TDF
 - Used to support a floor under rates--why lend below TDF rates?--and to drain reserves--transforms one type of liability (reserves) into another (TDF)
 - Typically needs to be offered above IOER; otherwise, why lock up your money for longer than you need to?



Outline

- Monetary policy implementation before 2008
- Monetary policy implementation since 2008
- Tools available for normalization
- A framework to think about monetary policy implementation with large reserves



Monetary policy with large reserves

- Questions:
 - Why are money market rates below IOER?
 - Do we have the tools to raise market rates?
 - If so, what is the most effective way to use our tools?
- Longer-term question:
 - How should we implement monetary policy?



A framework

- We build a simple model with households, firms, banks, and nonbanks
- In our model:
 - Households use the financial system to save for consumption at a later date
 - Firms produce consumption goods
 - Banks lend to firm, offer deposits, and have access to IOER
 - Nonbanks hold government debt on behalf of households and cannot earn IOER



Key Frictions

- There are two main frictions:
 - Banks face convex balance sheet costs: Explains why money market rates are below IOER
 - Banks face convex interbank monitoring costs (reserve scarcity): Explains why interbank rates are above IOER
- Nonbanks do not face balance sheet costs because they are more transparent



A Simple Real Economy

- Three periods: 0, 1, and 2
- Households
 - Sell endowment at $t=0$
 - Buy goods for consumption $t=2$
- Firms
 - Buy household endowment at $t=0$, use it as input for production, and sell goods at $t=2$

A More Complex Financial System

- Households can save through a variety of liquid or illiquid assets issued by banks, nonbanks, and the public sector (Government and CB)
- Households enjoy liquidity benefit from liquid assets
- Private sector prefers to issue liquid assets but banks must issue equity (moral hazard)



Benchmark Timeline

- Date 0: Bonds, deposits, equity, and loans
 - Yield return at $t=2$
 - Deposits can be withdrawn early at date 1
- Date 1: One sector has a liquidity shock
 - Potentially leads to interbank transactions
- Date 2: Assets mature and consumption

Agents' balance sheets



t=1

t=2

Agents' balance sheets

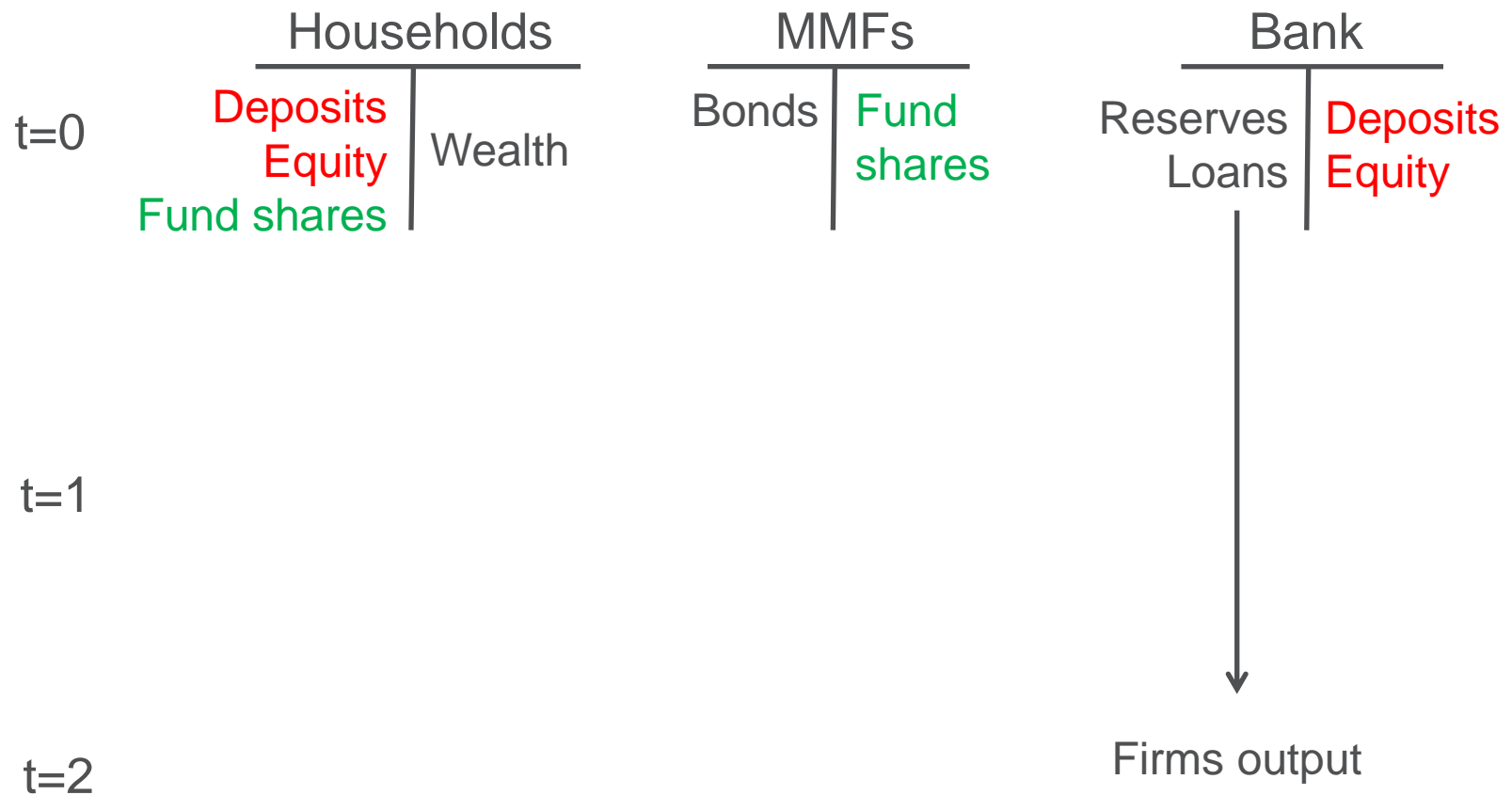
	Households	MMFs	Bank										
t=0	<table><tr><td>Deposits</td><td rowspan="3">Wealth</td></tr><tr><td>Equity</td></tr><tr><td>Fund shares</td></tr></table>	Deposits	Wealth	Equity	Fund shares	<table><tr><td>Bonds</td><td>Fund shares</td></tr></table>	Bonds	Fund shares	<table><tr><td>Reserves</td><td>Deposits</td></tr><tr><td>Loans</td><td>Equity</td></tr></table>	Reserves	Deposits	Loans	Equity
Deposits	Wealth												
Equity													
Fund shares													
Bonds	Fund shares												
Reserves	Deposits												
Loans	Equity												

t=1

t=2



Agents' balance sheets



Agents' balance sheets

t=0

Households		MMFs	
Deposits	Wealth	Bonds	Fund shares
Equity			
Fund shares			

Bank	
Reserves	Deposits
Loans	Equity

t=1

t=2

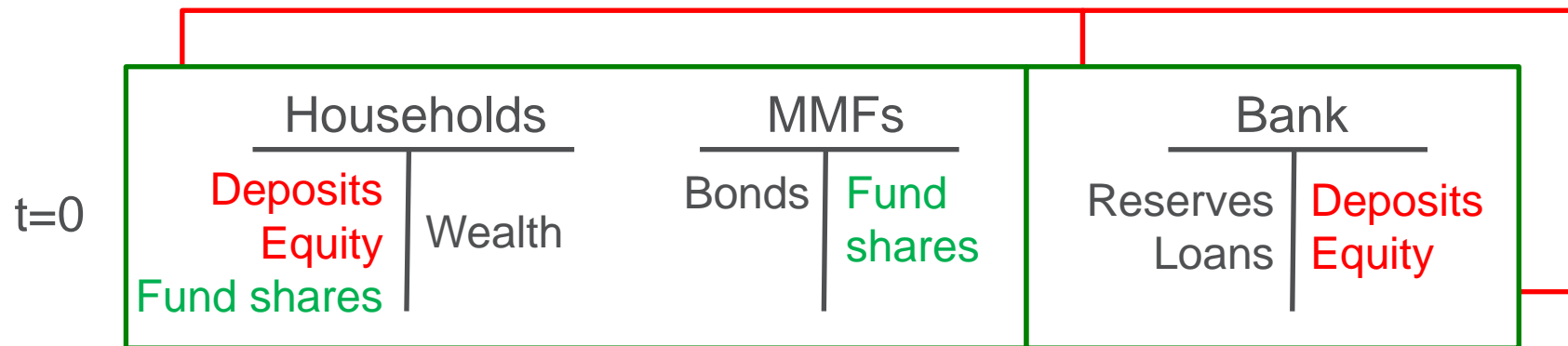
Agents' balance sheets

	<u>Households</u>		<u>MMFs</u>		<u>Bank</u>
t=0	Deposits Equity Fund shares	Wealth	Bonds	Fund shares	Reserves Loans Deposits Equity

t=1

t=2

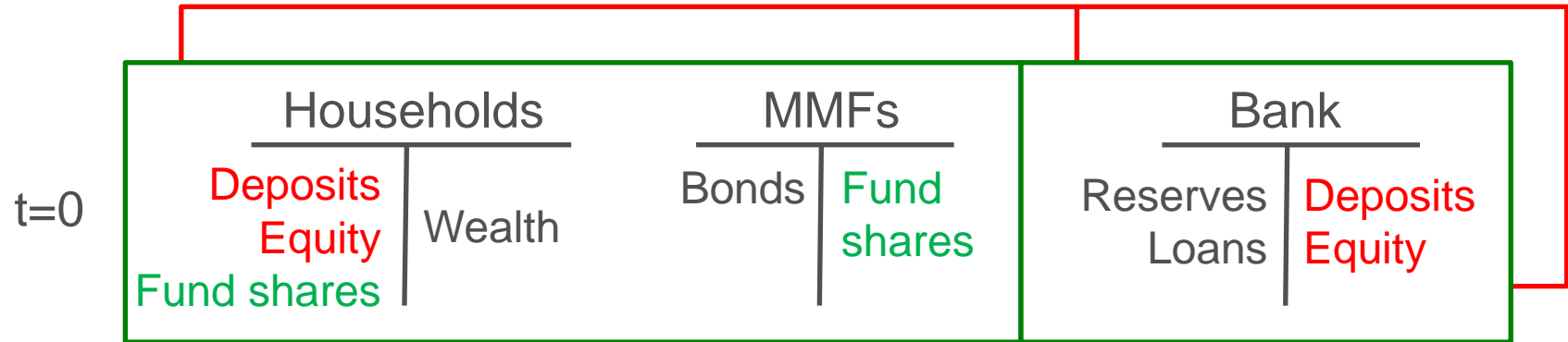
Two sectors and liquidity shock



t=1

t=2

Two sectors and liquidity shock

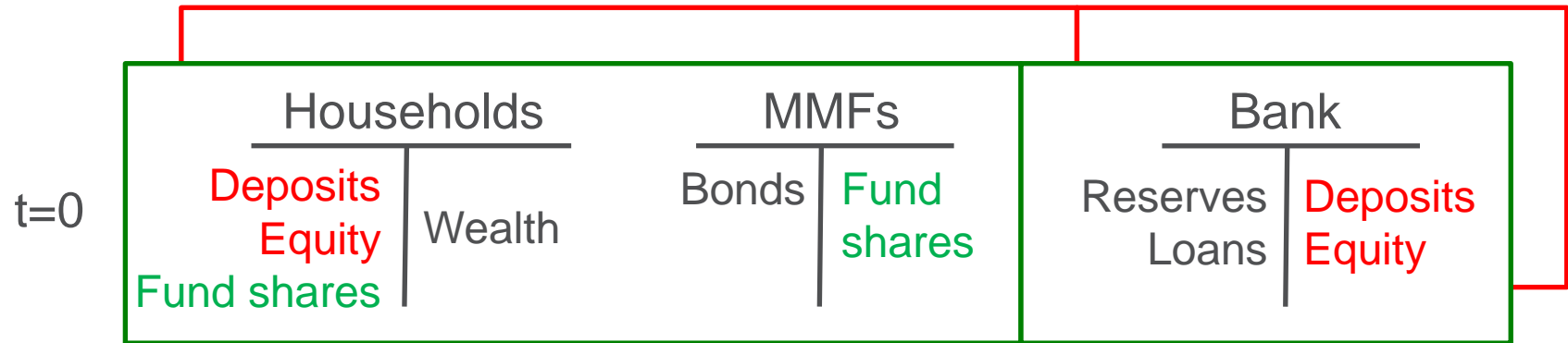


Liquidity shock to **one** sector:

- t=1
- Bank meets withdrawal with:
 - Reserves (IOER)
 - Interbank loans (FF)

t=2

Agents' balance sheets



Liquidity shock to **one** sector:

- t=1
- Bank meets withdrawal with:
 - Reserves (IOER)
 - Interbank loans (FF)

t=2 Consume firm's output

Assets paid and profits realized

Implications of the model

- Firms:
 - Interest rate on loans equals return on marginal loan
- Households:
 - Expected return of different assets are equalized
- Banks:
 - Interbank market is inactive if reserve supply is high
 - Interbank monitoring costs create a wedge between IOER and bank lending rates (interbank/loan rates)
 - Balance sheet costs create a wedge between IOER and bank borrowing rates (deposit rates)

Two polar cases

- When the supply of reserves is small
 - Interbank market is active
 - Interbank market frictions are high
 - Balance sheet costs are low
- When the supply of reserves is high
 - Interbank market is inactive
 - Interbank market frictions are low
 - Balance sheet costs are high

New Federal Reserve Tools

- We study two tools (tested recently)
 - Term Deposit Facility (TDF)
 - Banks can deposit reserves with the Fed for a term maturity
 - Reverse Repurchase agreements (RRPs)
 - Banks and non-banks, such as MMFs, can lend to the Fed (against collateral)
 - Of particular interest are fixed-rate overnight RRP
- We study other tools in the paper and could adapt the framework to study additional tools

How do the tools work?

- The tools work by affecting the two frictions that determine interest rates:
 - Balance sheet costs: Reducing balance sheet size raises market rates by decreasing the spread to IOER
 - Interbank market frictions: Increasing the interbank market activity raises interbank market rates
- Assessment:
 - TDF: Creates reserve scarcity but does not affect balance sheet size
 - RRP: Create reserves scarcity and reduce balance sheet size (if RRP rate < IOER)



Do we have the tools to raise rates?

- Yes, TDF and RRP's will help raise rates
- Large reserves → RRP's are more effective
 - RRP's (but not TDF) reduce balance sheet size
 - Creating scarcity through TDF only would require massive drain of reserves



How should we use our tools?

- Welfare in our economy can be measured as the (negative of the) sum of the two frictions
- TDF: Increases rates by increasing interbank market costs
→ Lower welfare
- RRPs: Increase rates by lowering balance sheet costs and increasing interbank costs
 - Trade-off: Effect on welfare can be ambiguous but likely positive when reserves are large
 - ON RRPs also stabilize rate by absorbing liquidity shocks



Implications for long-term framework

- What is the optimal supply of reserves?
 - Trade-off: Reserves alleviate interbank market cost but increase bank balance sheet costs
- Optimal amount is likely larger than pre-crisis supply
- Additional potential benefits:
 - Improves timing of payments
 - Increases public supply of safe assets



Conclusion

- Challenge of normalization in the US is to raise market rates with a large supply of reserves
- Our current set of tools is likely effective to raise market rates
 - RRP's can reduce bank balance sheet costs
 - TDF and RRP's can create scarcity if used in high enough quantity
- Our framework suggests benefits of (fairly) large reserves in the long run



Questions?

