

Aggregate Demand and Recessions

Spring 2026
Econ 256, College of the Holy Cross
Prof. Josh Abel

Roadmap

- This slide deck will (almost entirely) assume P is constant
 - Sticky price model of the short-run
- The key endogenous variables will be Y (output) and i (interest rate, the price of present spending)
 - Policy variables are G (government consumption), T (taxes), and μ (high-powered money supply)
 - Private sectors spending rules (discussed below) will be important exogenous variables
- To solve for those 2 endogenous variables, we will analyze two sets of markets:
 1. The market for goods/output (the “real” economy)
 2. The market for money/bonds (financial markets)

The Keynesian Cross and IS Curve

Planned Expenditure

- In his pathbreaking work, John Maynard Keynes argued that understanding recessions required focus on spending rather than production.
 - If Demand creates its own Supply, reductions in Demand could cause recessions
- IS-LM analysis therefore begins by focusing on how expenditure depends on Y and i .

The Consumption Function

- In the first week of class, we worked on a rigorous treatment of household consumption:

$$\text{Maximize: } u(C_1) + \beta \cdot u(Y_2 + (1+i) \cdot (Y_1 - C_1))$$

- We found that when income rises, consumption will rise, but less than 1-for-1:

$$\frac{dC}{dY} \in (0,1)$$

- Analyzing the impact of the interest rate is less straightforward and can depend on the utility function

- You will show on HW that for a standard $u()$:

$$\frac{dC}{di} < 0$$

- Intuition: Higher interest rate increases the return to saving, discourages spending

- Based on these insights, we will use a simplified consumption function (including taxation):

$$C = c_0 + c_1 \cdot (Y - T) - c_2 \cdot i, \text{ with } 0 < c_1 < 1$$

The Investment Function

- We will not spend time rigorously solving the investment problem of firms. Instead, we will assume a simple investment function of the form:

$$I = I_0 + I_1 * (Y - T) - I_2 * i$$

- This looks a lot like the Consumption Function, but for somewhat different reasons
 - When income is high, firms are optimistic about sales and so want to invest in their capacity
 - Similar idea to the game you played on the first day of class
 - When money in the bank can earn a lot, lenders require a high return, so only high quality investments are worth making

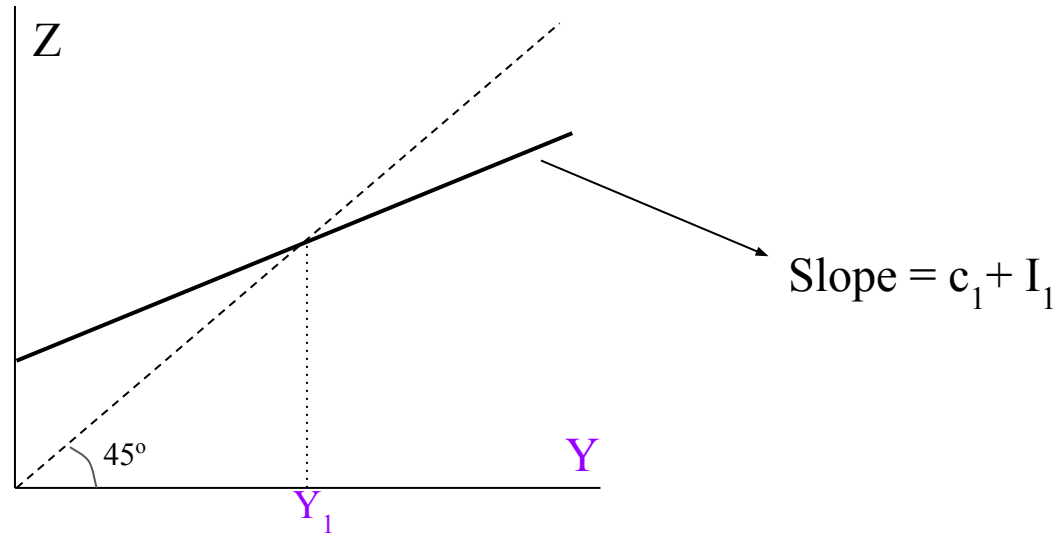
The Keynesian Cross

- Define Z to be planned expenditure (your book calls it “PE”)
- Holding i constant (for now!), as a function of income we have:

$$Z = c_0 + c_1*(Y - T) - c_2*i + I_0 + I_1*(Y - T) - I_2*i + G$$

- In equilibrium, our accounting identity tells us that spending must equal output, so $Z = Y$. Therefore:

$$Y = c_0 + c_1*(Y - T) - c_2*i + I_0 + I_1*(Y - T) - I_2*i + G$$

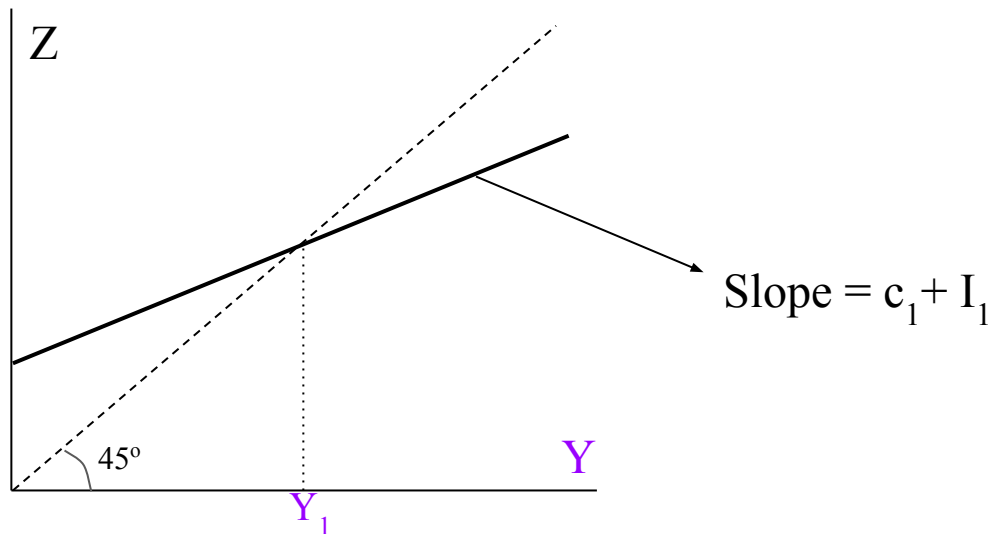


The Keynesian Multiplier

- Suppose G (or c_0) goes up by 1: how much does Y increase?
- Algebraically, we can solve for Y :

$$Y = (c_0 + I_0 - (c_1 + I_1) * T - (c_2 + I_2) * i + G) / (1 - c_1 - I_1)$$

- Call $c_1 + I_1$ the “marginal propensity to spend” – for the marginal dollar of income, it’s how much is spent.



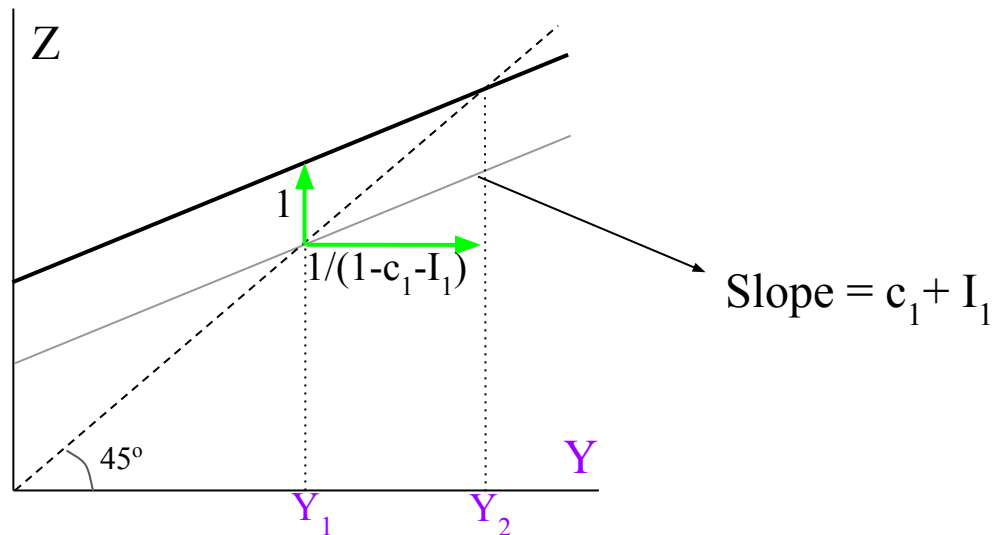
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$$\frac{dY}{dG} = \frac{1}{1 - c_1 - I_1}$$



Why is the Keynesian multiplier greater than 1?

- Government increases spending by \$1
 - From that extra \$1, the private sector's increase in spending is $\$(c_1 + I_1) * 1$
 - But that additional spending generates new income of $\$(c_1 + I_1)$
 - From that extra $\$(c_1 + I_1)$, the private sector's increase in spending is $\$(c_1 + I_1) * (c_1 + I_1) = \$(c_1 + I_1)^2$
 - This generates a new round of spending of $\$(c_1 + I_1)^3$, and so on.

- In sum, we get:

$$dY/dG = 1 + (c_1 + I_1) + (c_1 + I_1)^2 + (c_1 + I_1)^3 + (c_1 + I_1)^4 + \dots$$

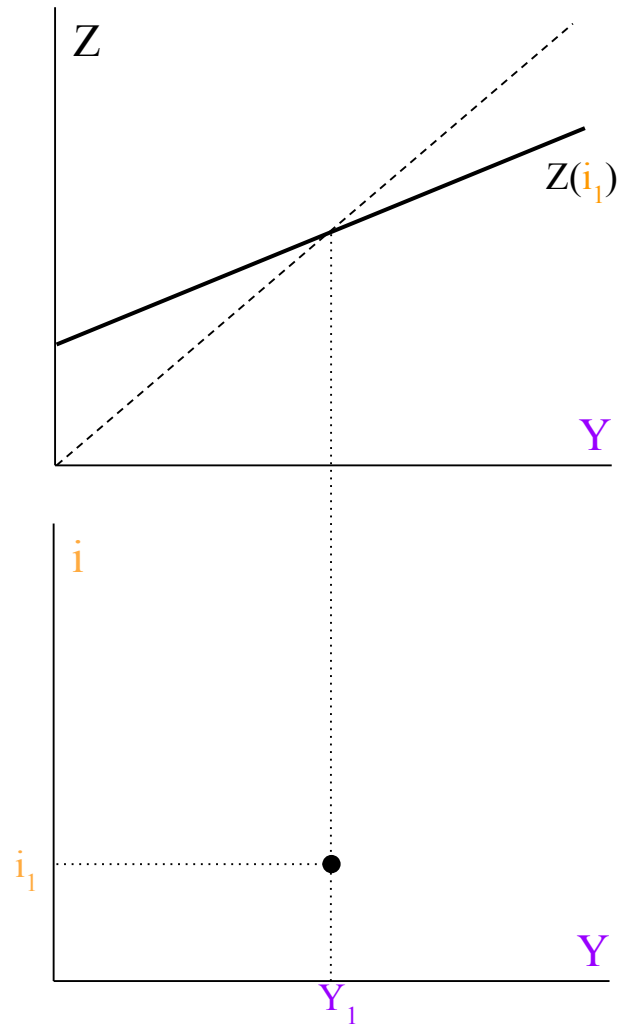
$$\frac{dY}{dG} = \sum_{j=0}^{\infty} (c_1 + I_1)^j = \frac{1}{1 - (c_1 + I_1)} \text{ if } c_1 + I_1 < 1$$

Exercises

- Suppose T goes up by 1: how much does Y change?
- Suppose T and G both go up by 1 (tax-financed spending): how much does Y change?

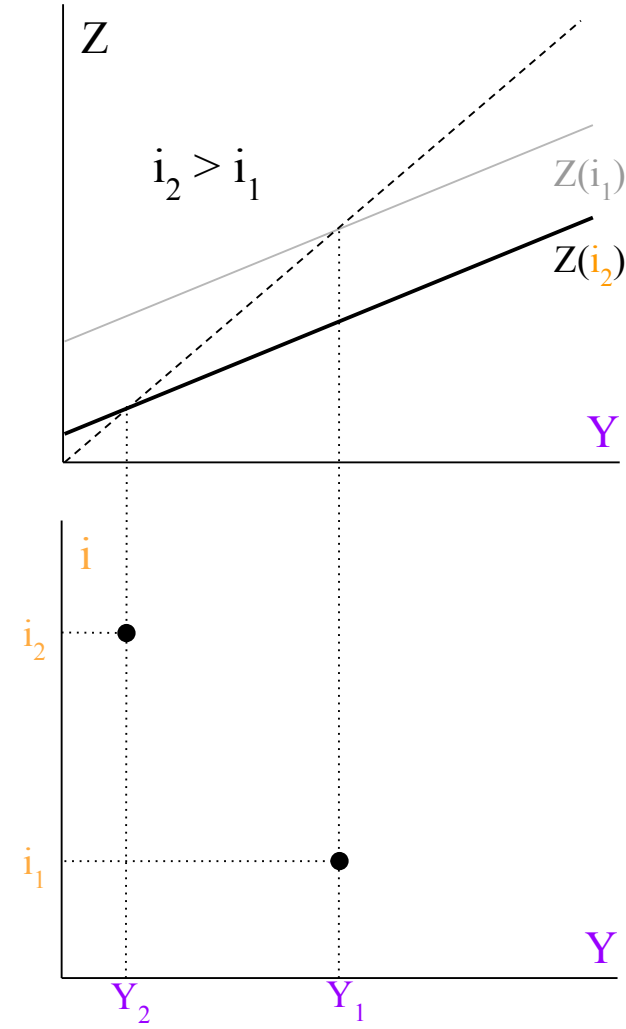
The IS Curve

- Now we return to the interest rate, i .
- We will derive the IS Curve, the relationship between Y and i in Y - i space implied by the Keynesian Cross



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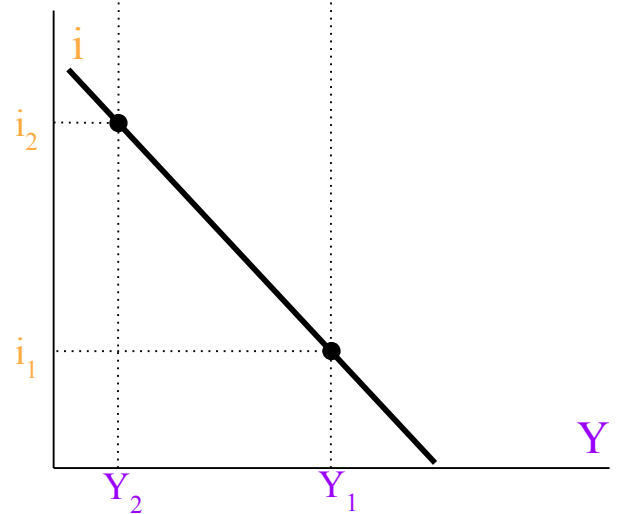
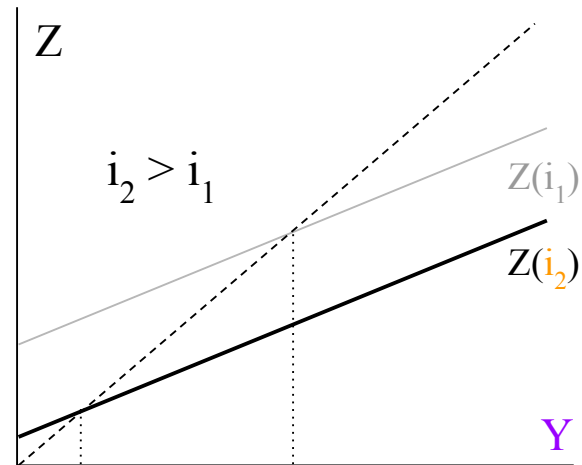
- Now we return to the interest rate, i .
- We will derive the IS Curve, the relationship between Y and i in Y - i space implied by the Keynesian Cross

IS curve

Investment = Savings

Goods market clears

What's bought is
produced and vice
versa



Financial Markets and the LM Curve

Financial Assets

- Financial assets are pieces of paper (or entries in an electronic ledger) that entitle their holder to a stream of payments.
 1. Stocks: infinite stream of dividends from a corporation
 2. Bonds: interest payments and return of principal
 3. Money/cash: ??
- Focus on 2 dimensions of a financial asset
 1. Return: how much will it earn/pay off?
 2. Liquidity: how easy is it to use in transactions?
- Like return, liquidity exists on a continuum. Ultimately it depends on “private information” about the asset
 1. Frequently-traded stocks/bonds are quite liquid because we can look up their values on the exchange
 2. Loans to businesses are less liquid because the buyer would want to learn more about the quality of the businesses to assess the safety of the loans
 3. Houses are illiquid because the buyer needs to inspect
 4. Money is totally liquid – we all know what a dollar is and what it should look like
- The choice between money and other assets (we’ll focus on bonds) is based on the tradeoff between return and liquidity
 - Cash is more liquid and so can be used for transactions; bonds offer the higher return

The Financial Sector and the Supply of Money

- Banks are central to all modern economies.
- Most people view banks as places to store their money, like a vault.
- But while banks do have vaults, they do much more: they create money! This can be:
 1. Extremely profitable to the bankers and beneficial to the economy
 2. Dangerous to bankers and – especially – the economy

A Bank's Balance Sheet

- Consider a banking system with \$10 of its own money (“equity”). It also has \$90 of “deposits” from customers
- If it were really just a vault, it would leave all \$100 “in reserve”

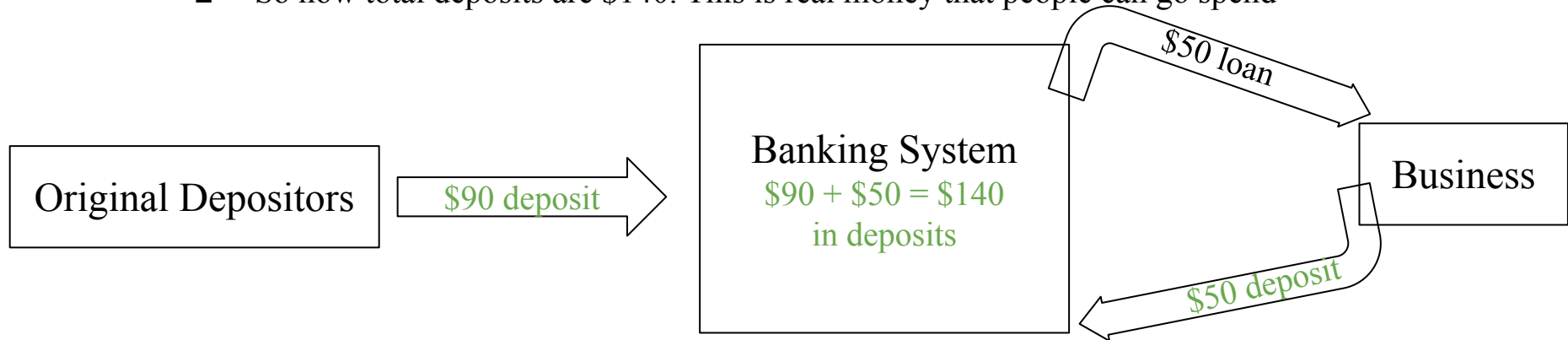
Assets	Liabilities
Reserves (\$100)	Deposits (\$90)
	Equity (\$10)

- Depositors may be willing to pay some money to have you guard their money, but this seems like a wasted opportunity: there's \$100 just sitting there!
 - “Reserves” means cash/money.
 - Deposits are owed to customers
 - Equity is by definition the difference

Fractional Reserve Banking

Assets	Liabilities
Reserves (\$100)	Deposits (\$90 \$140)
Loans (\$55)	Equity (\$10 \$15)

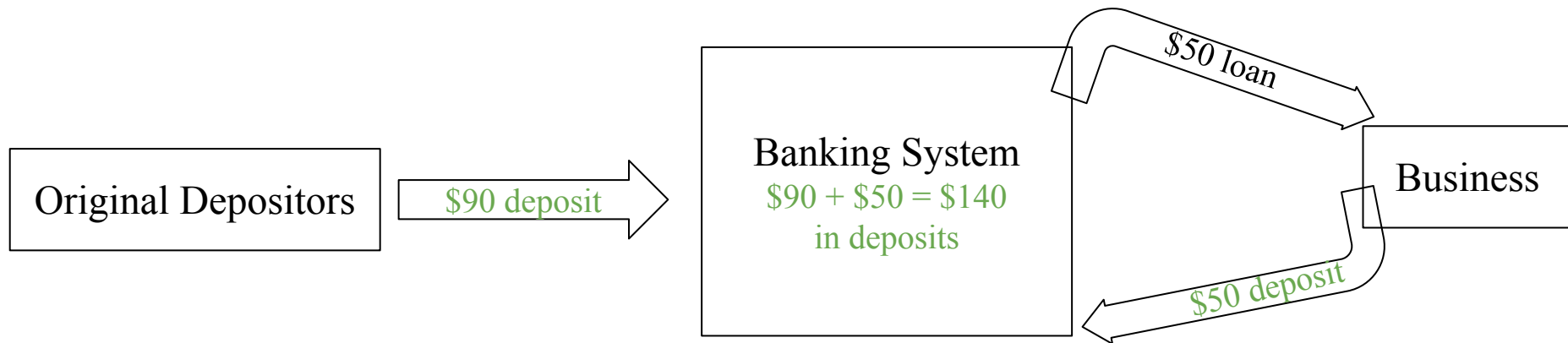
- Let's say they lend out \$50 to a business at a 10% interest rate.
- This creates \$50! How?
 - The original depositors can still access their \$90. As far as they're concerned, they have \$90 in banks.
 - But when the business takes the \$50 and puts it back in the banking system, they have \$50 in banks.
 - So now total deposits are \$140. This is real money that people can go spend



Fractional Reserve Banking: The Good

Assets	Liabilities
Reserves (\$100)	Deposits (\$90 \$140)
Loans (\$55)	Equity (\$10 \$15)

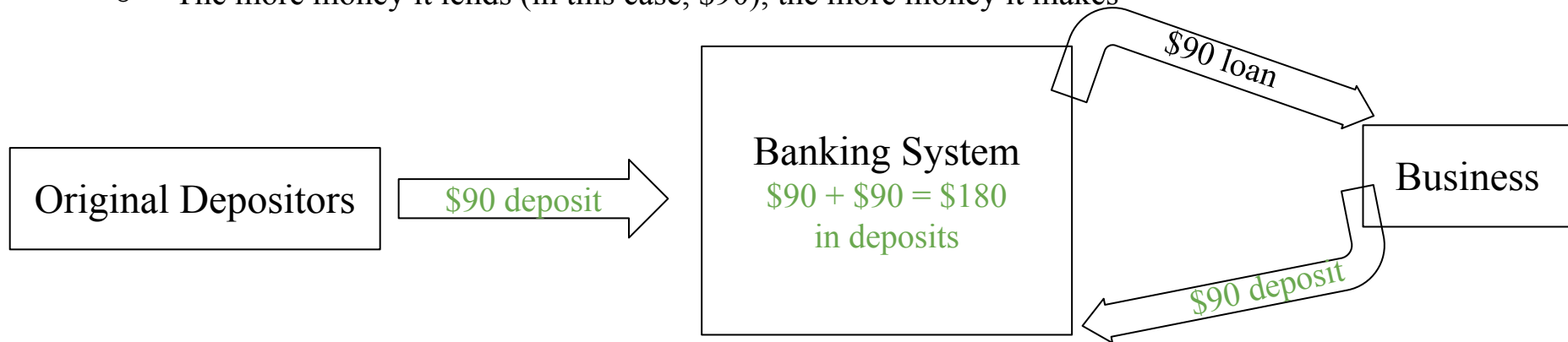
- By creating money, the banking system financed business investment spending – good for the business and the economy
- The banking system's equity also rose from \$10 to \$15, seemingly out of thin air.
 - This means that rather than charging depositors, banks can actually pay them for their deposits



Fractional Reserve Banking: The Good

Assets	Liabilities
Reserves (\$100)	Deposits (\$90 \$180)
Loans (\$55 \$99)	Equity (\$10 \$19)

- By creating money, the banking system financed business investment spending – good for the business and the economy
- The banking system's equity also rose from \$10 to ~~\$15~~ \$19, seemingly out of thin air.
 - This means that rather than charging depositors, banks can actually pay them for their deposits
 - The more money it lends (in this case, \$90), the more money it makes



Fractional Reserve Banking: The Bad

Assets	Liabilities
Reserves (\$100)	Deposits (\$90 \$140)
Loans (\$55)	Equity (\$10 \$15)

- Money creation – almost by definition – has an ugly side
- The bank system's liabilities are more liquid than its assets
 - If all depositors show up demanding their \$140 in deposits, the bank cannot satisfy them
 - It can try to sell the loans to make up the shortfall, but that may be hard since they are illiquid
 - The banking system would fail. Such “liquidity crises” have been common throughout history.

Fractional Reserve Banking: The Bad

Assets	Liabilities
Reserves (\$100)	Deposits (\$90 \$140)
Loans (\$55 \$30)	Equity (\$10 \$15 -\$10)

- Money creation – almost by definition – has an ugly side
- The bank system's liabilities are more liquid than its assets
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 - It can try to sell the loans to make up the shortfall, but that may be hard since they are illiquid
 - The banking system would fail. Such “liquidity crises” have been common throughout history.
- Or suppose the business flops and the loan ends up being worth only \$30 because it is not paid back in full
 - Now the bank is insolvent: Assets < Liabilities. It is essentially a matter of time until it fails.
 - Again, such solvency crises have occurred throughout history.
- When banks fail, money disappears from the economy and spending is slashed accordingly.
 - Perhaps worse, the system of credit weakens

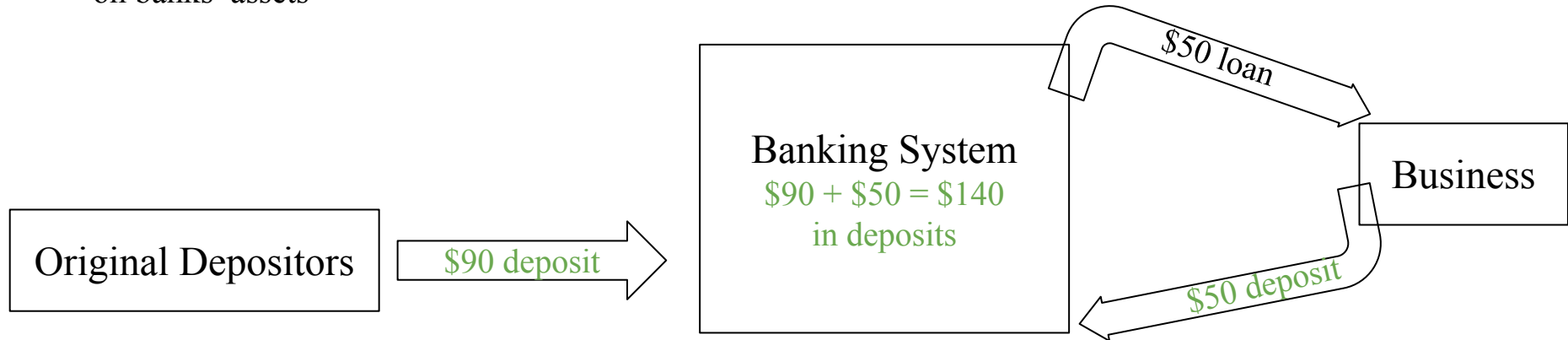
The Financial Accelerator

- Left to its own devices, the banking system will exaggerate the business cycle:
 - When the economy is strong, banks will be eager to make loans
 - This means they create money, which increases spending and boosts the economy even further
 - When the economy weakens, banks cut lending
 - This destroys money, which further weakens the economy
- This is a key reason why banks are heavily regulated.
 - A key regulator is the central bank. In the case of the United States, that is the Federal Reserve System.

A Central Bank in Ordinary Times

Assets	Liabilities
Reserves (\$100)	Deposits (\$140)
Loans (\$55)	Equity (\$15)

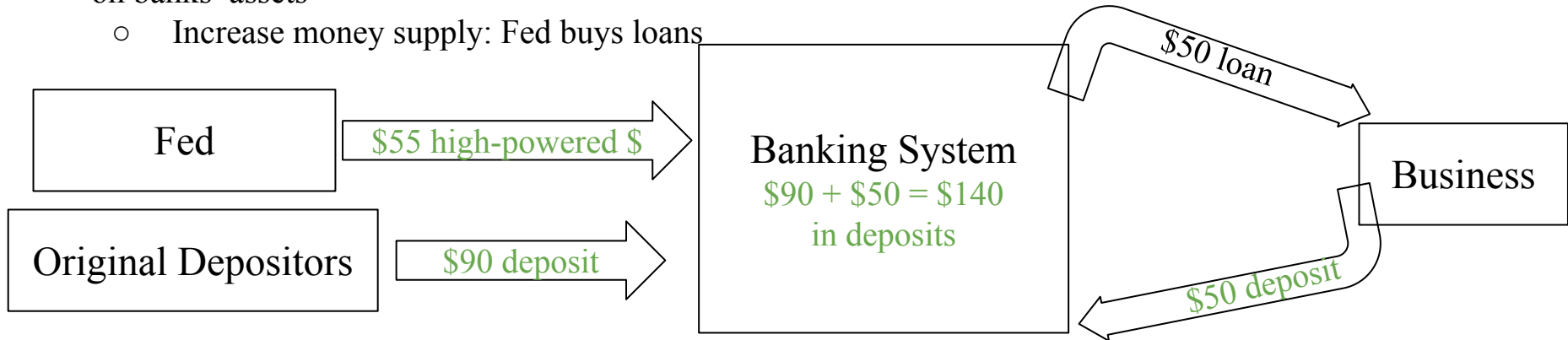
- So far, we've focused on money creation by the banking system, taking as given that there were \$100 in the economy originally (\$10 from the bankers and \$90 from the original depositors).
- In modern economies, the central bank can create that “high-powered money” out of nowhere and infuse it into the banking system. In the US, this is controlled by the “FOMC” doing open market operations, i.e. transacting on banks' assets



A Central Bank in Ordinary Times

Assets	Liabilities
Reserves (\$100 \$155)	Deposits (\$140)
Loans (\$55 \$0)	Equity (\$15)

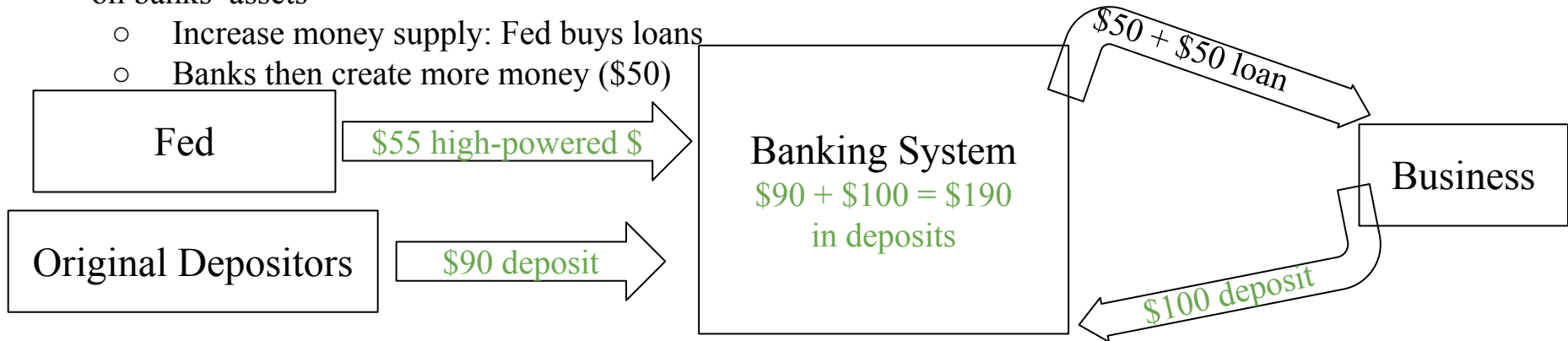
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 - Increase money supply: Fed buys loans



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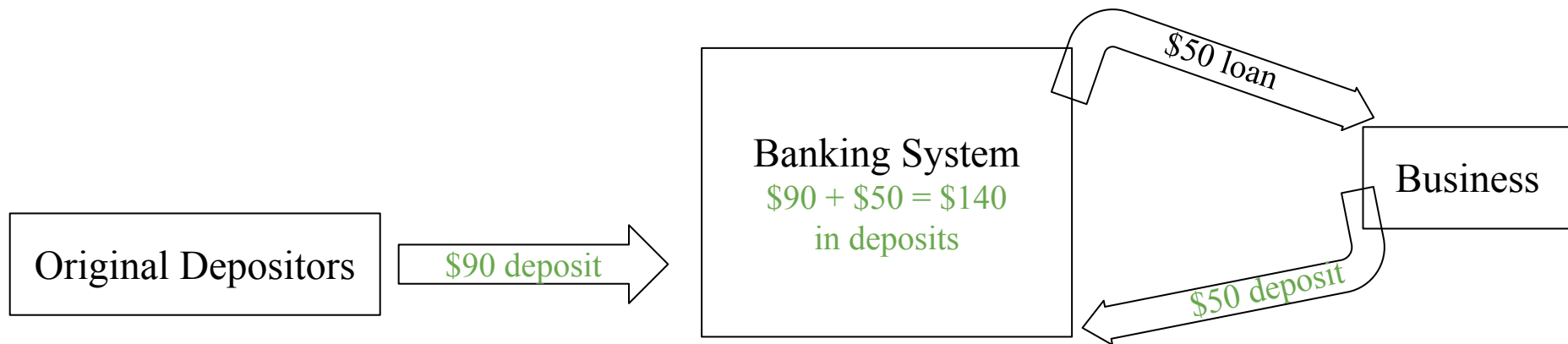
Assets	Liabilities
Reserves (\$100 \$155)	Deposits (\$140 \$190)
Loans (\$55 \$0 \$55)	Equity (\$15 \$20)

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- In modern economies, the central bank can create that “high-powered money” out of nowhere and infuse it into the banking system. In the US, this is controlled by the “FOMC” doing open market operations, i.e. transacting on banks' assets
 - Increase money supply: Fed buys loans
 - Banks then create more money (\$50)



A Central Bank in Ordinary Times

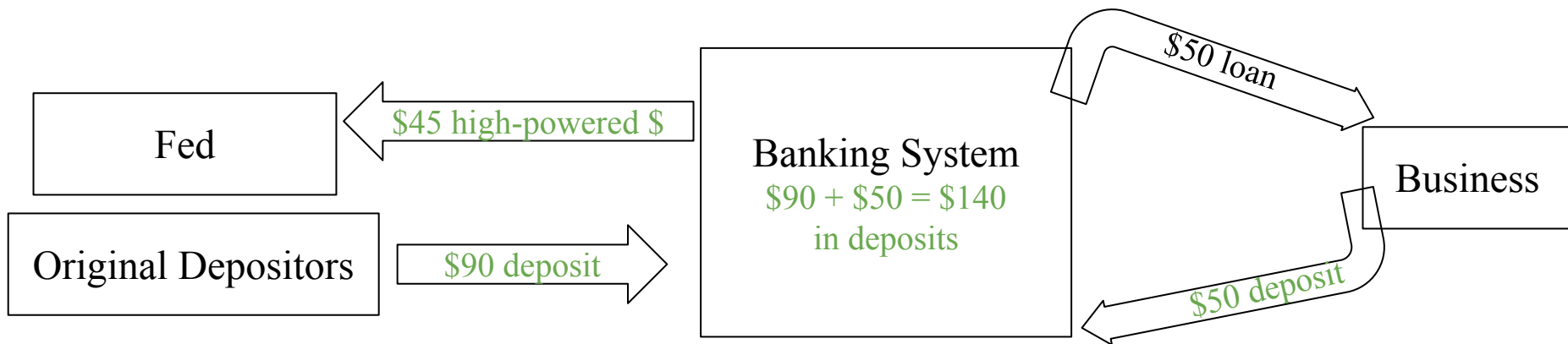
Assets	Liabilities
Reserves (\$100)	Deposits (\$140)
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A Central Bank in Ordinary Times

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Reserves (\$100 \$55)	Deposits (\$140)
Loans (\$55 \$100)	Equity (\$15)

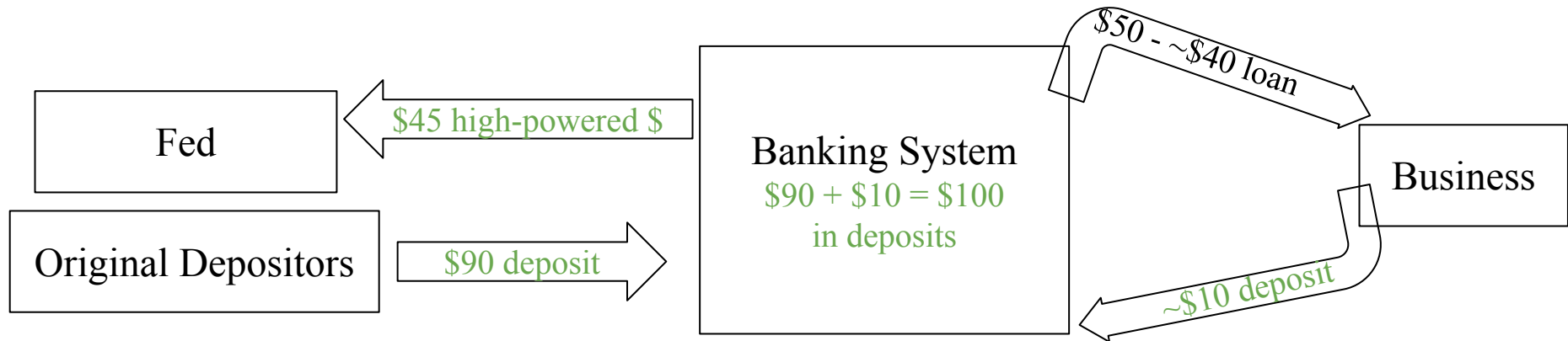
- Decrease money supply: Fed sells loans



A Central Bank in Ordinary Times

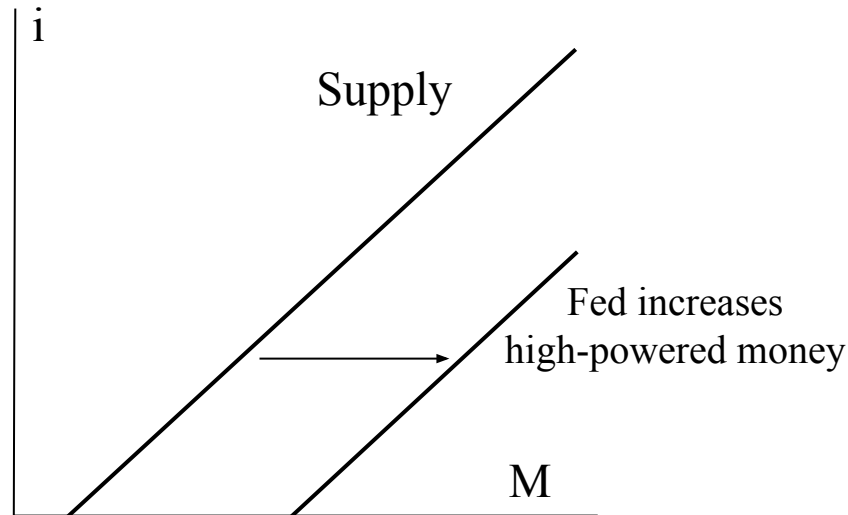
Assets	Liabilities
Reserves (\$100 \$55)	Deposits (\$140 ~\$100)
Loans (\$55 \$100 \$55)	Equity (\$15 ~\$10)

- Decrease money supply: Fed sells loans
- Banks then destroy money (~\$40) to make sure Reserve-Deposit ratio is not too low



The Supply of Money

- Money supply is upward-sloping because lending is more appealing to banks when there is a high return. Their lending process creates money, M .
- The Fed can shift the curve by increasing high-powered money, μ
 - The size of the shift will depend on:
 - The amount of high-powered money injected, μ
 - Banks' "reserve ratio," which determines "money multiplier" or "velocity of money"
 - If banks lend out a high fraction of reserves, shift will be large
- The banking sector can also shift out money supply by increasing velocity. You'll consider that in your problem set.



Households' Portfolio Choice Problem and the Demand for Money

- Return to the canonical consumption problem, but assume the household must allocate income between money and bonds:

$$\text{Maximize: } u(C_1) + \beta \cdot u(Y_2 + (1+i) \cdot B + (M-C_1))$$

such that:

$$\begin{aligned} C_1 &\leq M \\ M + B &= Y_1 \end{aligned}$$

- This is basically the same problem we already did, we ignored the financial assets and just assumed that anything you don't consume in period 1 ($Y_1 - C_1$) automatically returns $(1+i)$ in period 2.
- But now we're modeling the liquidity-vs.-return tradeoff of financial assets:
 - Consumption requires money – you need at least enough money to pay for the goods you will consume
 - Bonds pay off $(1+i)$ in the next period, whereas any leftover cash $(M-C_1)$ simply returns 1.
- Given this setup, explain why the optimal portfolio choice is to set $M = C_1$, assuming $i > 0$.

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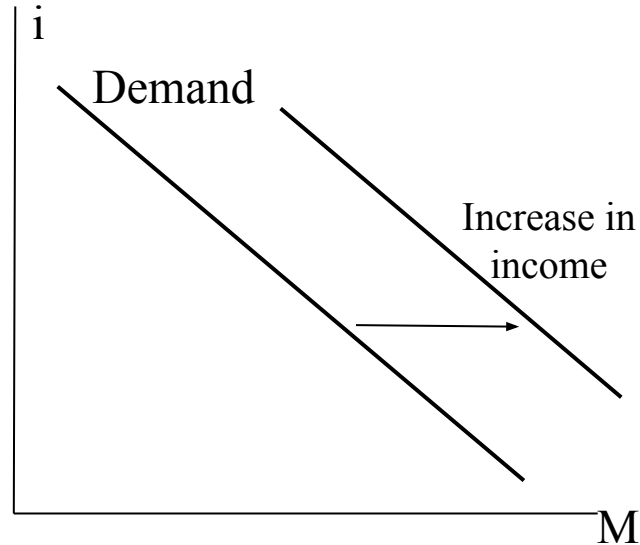
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- Given this setup, explain why the optimal portfolio choice is to set $M = C_1$, assuming $i > 0$.
 - No point in hoarding cash – if you're not going to spend it, it's better to invest it in bonds and get the return

Households' Portfolio Choice Problem, Refactored

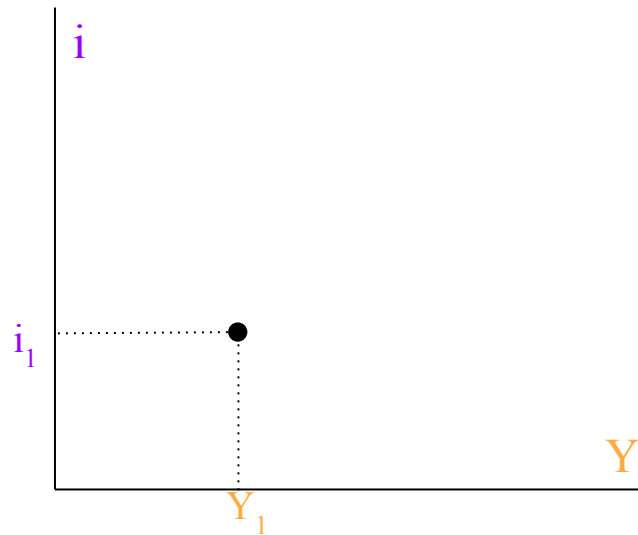
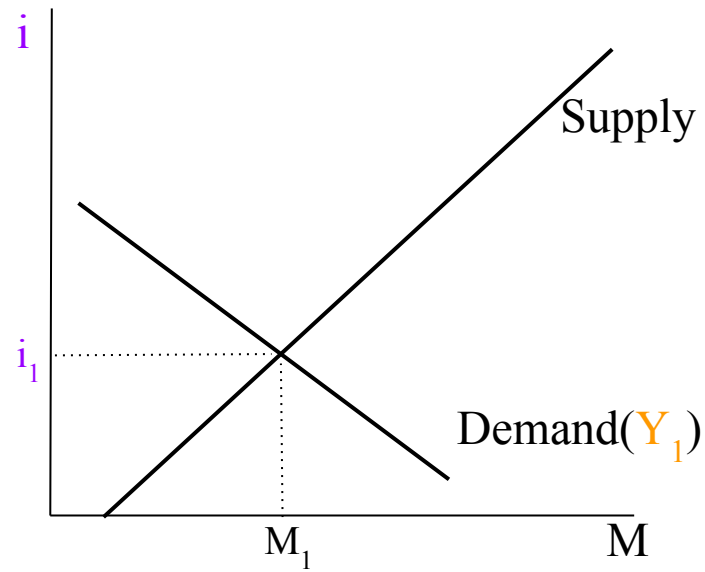
$$\text{Maximize: } u(M) + \beta \cdot u(Y_2 + (1+i) \cdot (Y_1 - M))$$

- Now, this really is the same exact consumption problem from before, just we've replaced C_1 with M .
- So from those results, we know:
 1. $\frac{dM}{dY_1} > 0$
 2. $\frac{dM}{di} < 0$ is the typical case (see homework)
- Therefore, the Demand for Money is downward-sloping in M - i space, and an increase in Y shifts it up/right



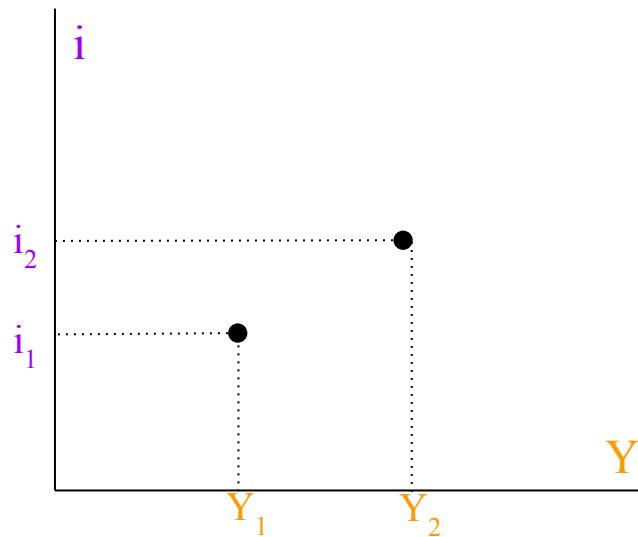
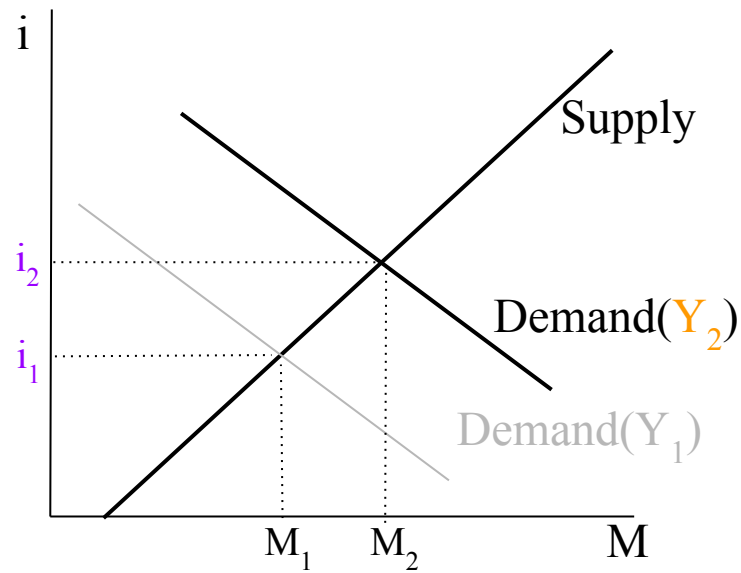
The LM Curve

- We will derive the LM Curve, the relationship between Y and i in Y - i space implied by the money market



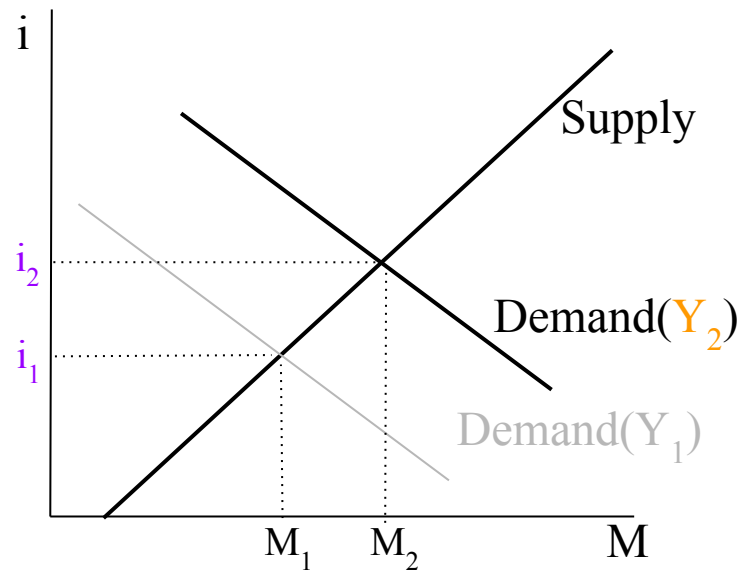
The LM Curve

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- When the economy booms, people want more money so they can spend more
 - To some extent, this is accommodated by the banking system creating money
 - But it also leads the price of money (i) to rise to dampen demand
 - To get banks to lend more money, you have to offer a higher rate of rate of return

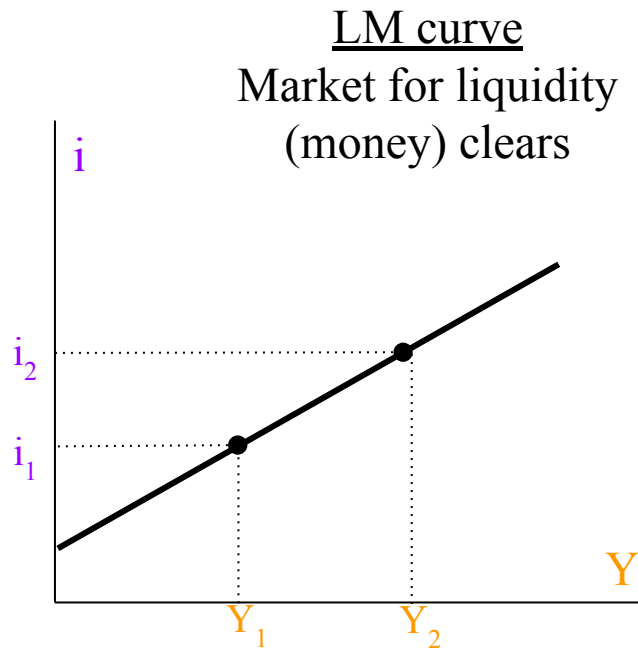


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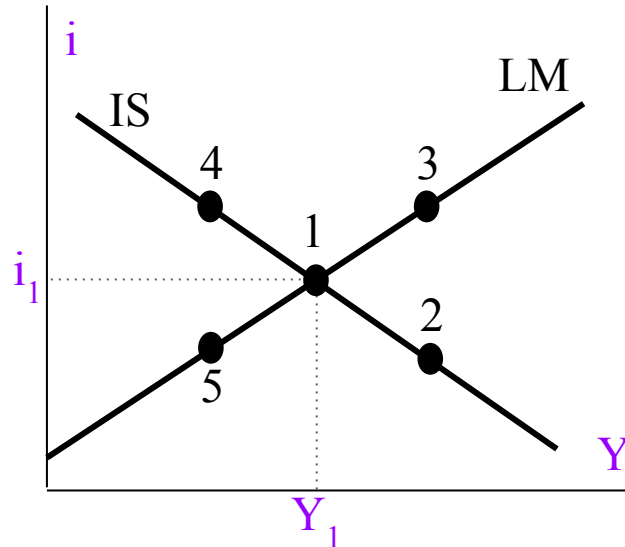
$$Y_2 > Y_1$$



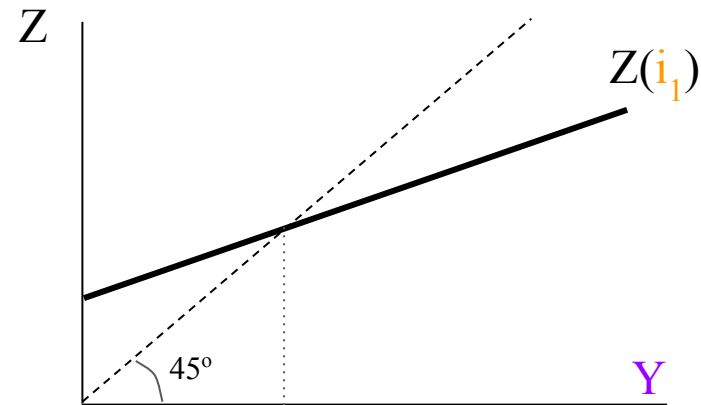
IS-LM

IS-LM

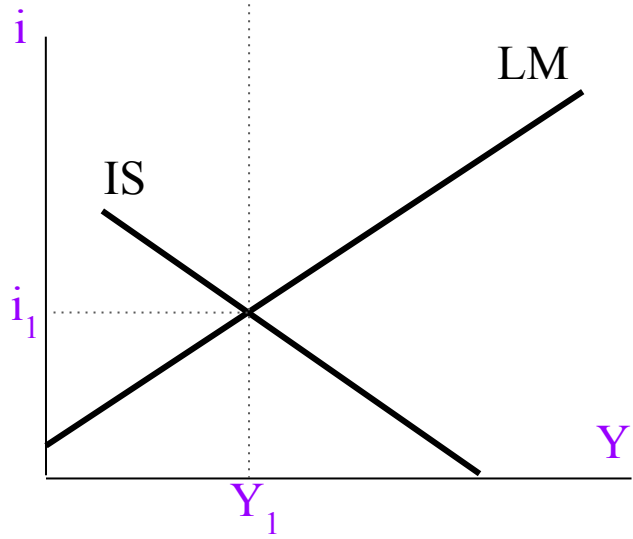
- Endogenous variables are Y and i
- IS curve slopes down because higher interest rate depresses spending on goods
- LM curve slopes up because higher output increases demand for money, so a higher interest rate is required to keep demand for money in line with supply
- Main exogenous variables are c_0 , I_0 , G , T , M
 - Technically the Fed controls high-powered money (u), not M itself but we'll mostly ignore that.
- (Y_1, i_1) is the unique combination such that spending equals production and demand for money equals supply
 - Why can the economy not be at point 2?



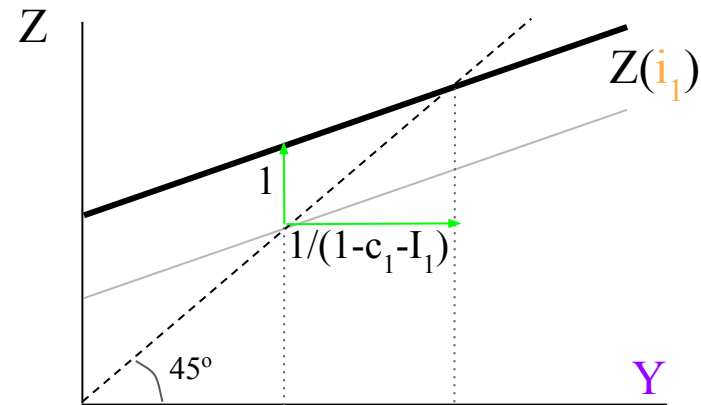
IS-LM vs. Keynesian Cross for Government Multiplier



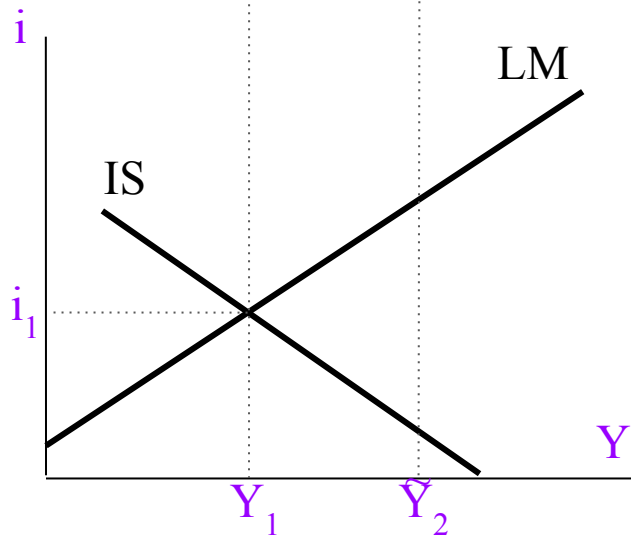
- Both are approaches to model Y , but KC assumes i is constant (exogenous), whereas IS-LM lets it adjust (endogenous)



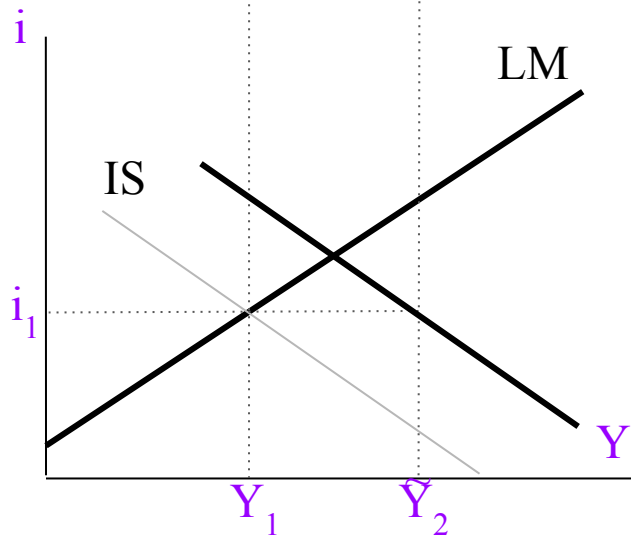
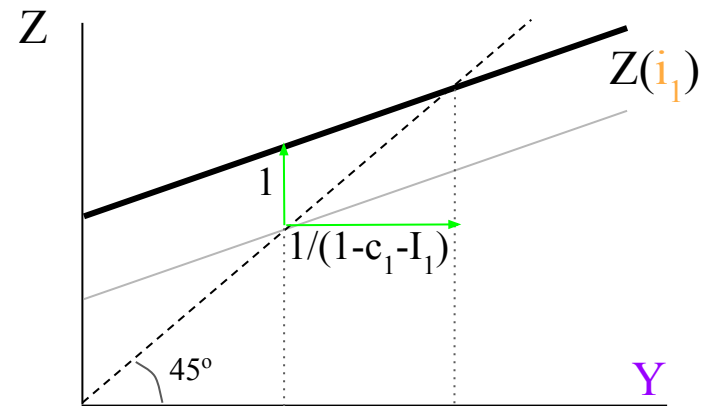
IS-LM vs. Keynesian Cross for Government Multiplier



- Both are approaches to model Y , but KC assumes i is constant (exogenous), whereas IS-LM let's it adjust (endogenous)
- Holding i constant, the government multiplier is $1/(1 - (c_1 + I_1))$, bringing output to $\tilde{Y}_2$.

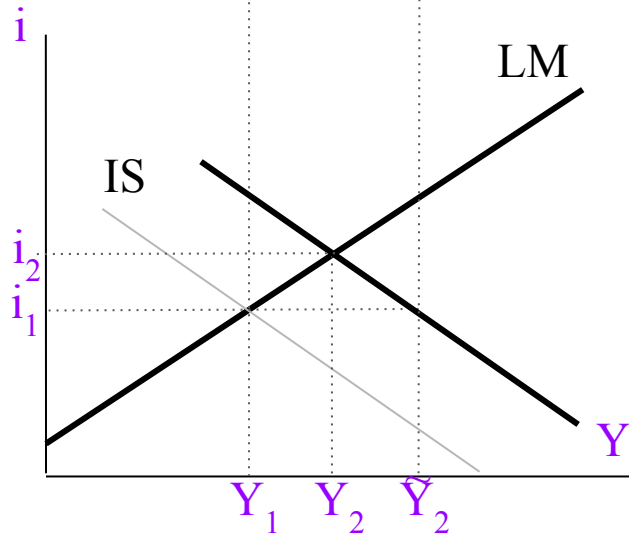
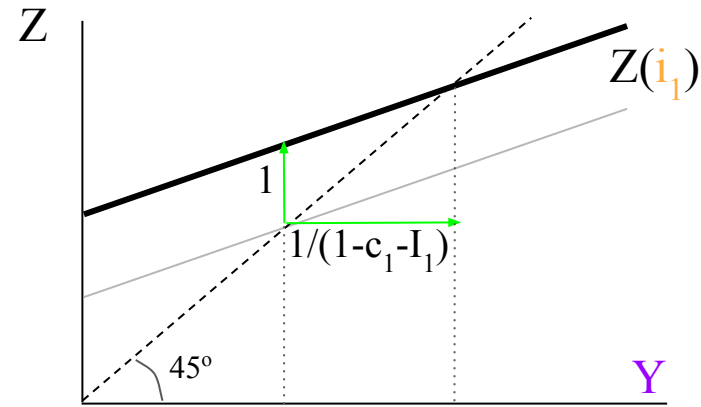


IS-LM vs. Keynesian Cross for Government Multiplier



- Both are approaches to model Y , but KC assumes i is constant (exogenous), whereas IS-LM lets it adjust (endogenous)
- Holding i constant, the government multiplier is $1 - (c_1 + I_1)$, bringing output to $\tilde{Y}_2$.
 - For KC, that's the end of the story.
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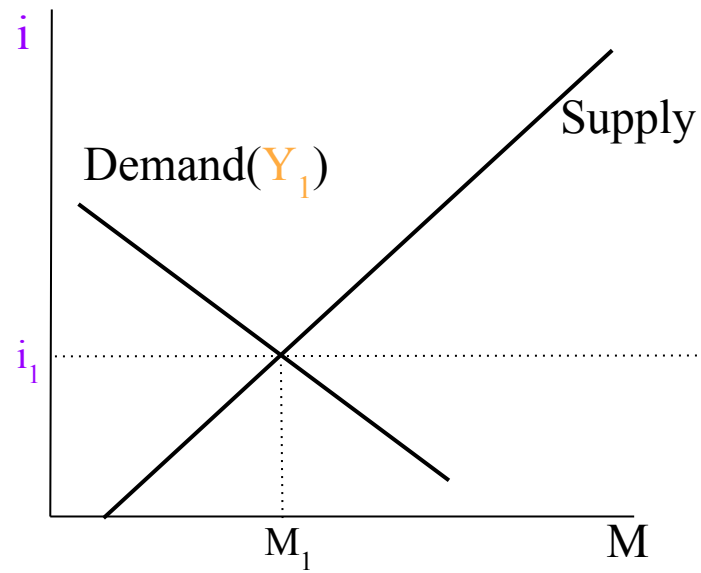
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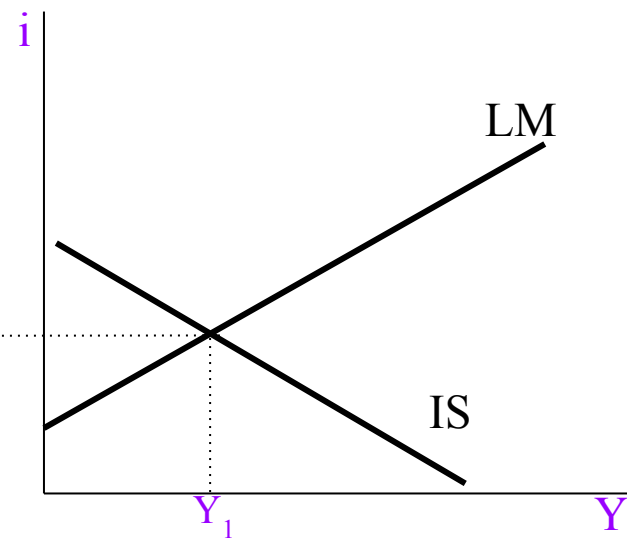
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- Holding i constant, the government multiplier is $1 - (c_1 + I_1)$, bringing output to $\tilde{Y}_2$.
 - For KC, that's the end of the story.
- But in IS-LM, that just shifts the IS curve.
- In full IS-LM model, i endogenously rises, partly cutting off the increase in Y
- Intuition:
 - Increase in G increases Y
 - That increase in Y increases demand for money
 - Banks respond in part by increasing supply of money but also by increasing i
 - The increase in i pushes Y down somewhat
 - Government spending crowds out private spending through the interest rate
 - This is different from the crowding out through P that we talked about before (and will again)

IS-LM vs. Money Market for Monetary Policy

Money Market



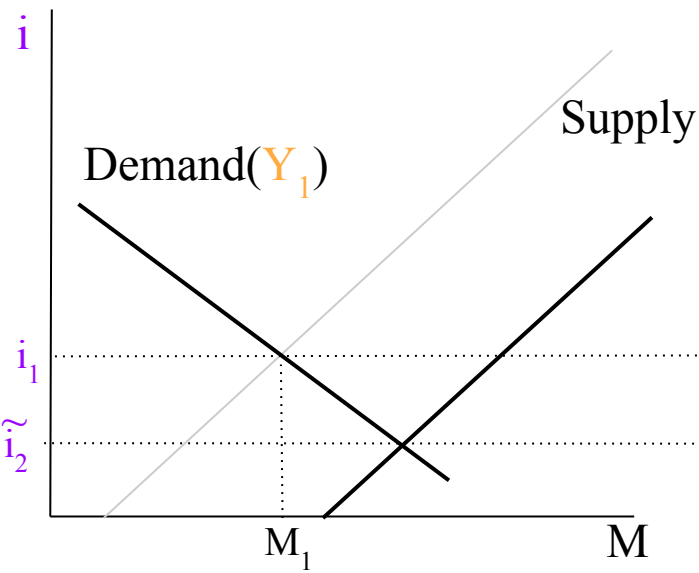
Economy



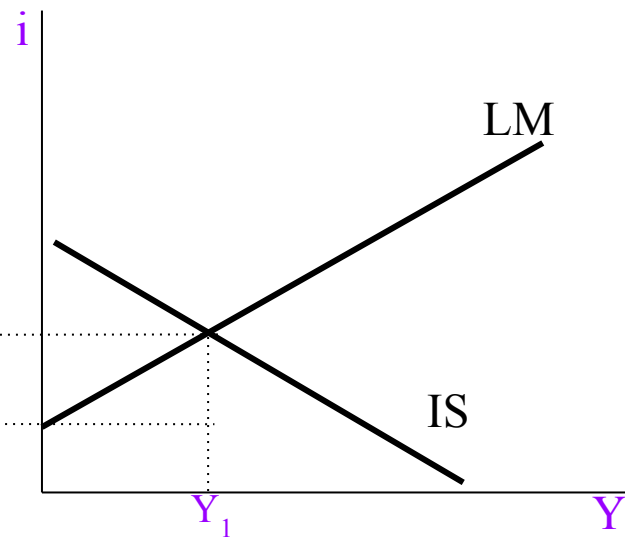
IS-LM vs. Money Market for Monetary Policy

- Increase in high-powered money shifts out supply in the money market and lowers the interest rate
- If the money market existed in isolation, that would be it – more money at a lower interest rate

Money Market

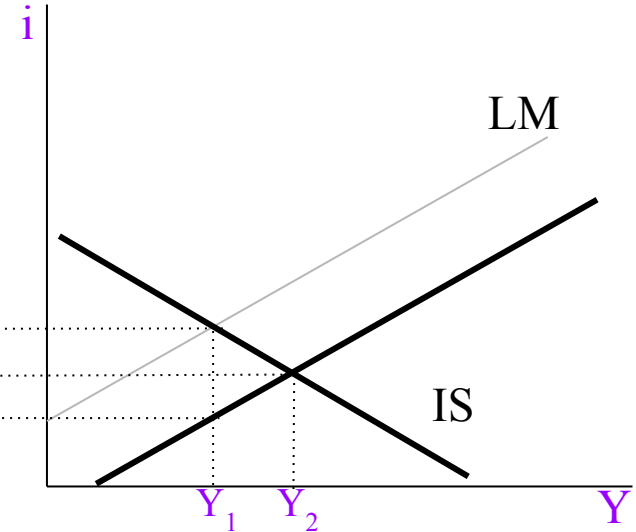
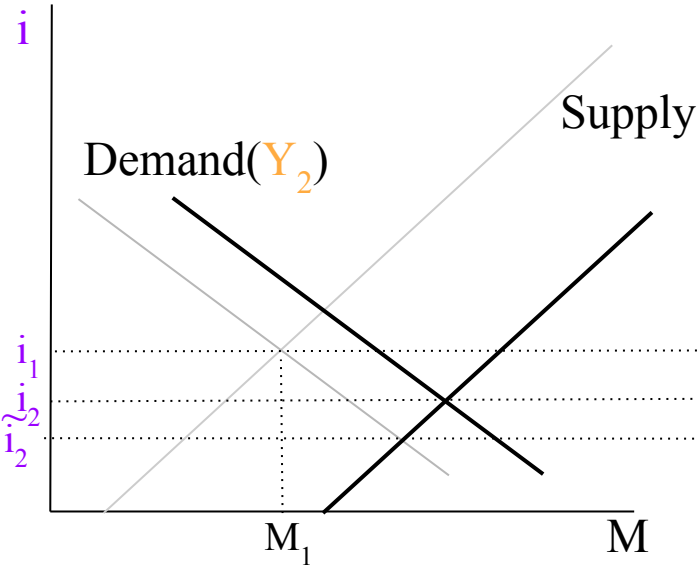


Economy



IS-LM vs. Money Market for Monetary Policy

- Increase in high-powered money shifts out supply in the money market and lowers the interest rate
 - If the money market existed in isolation, that would be it – more money at a lower interest rate
 - But in IS-LM, it is just a shift in the LM curve
 - In equilibrium, output increases, which further increases the demand for money and pushes the interest rate back up some.
 - This is why the Fed is so powerful: by creating money, they spur the economy with lower interest rates
- Money Market



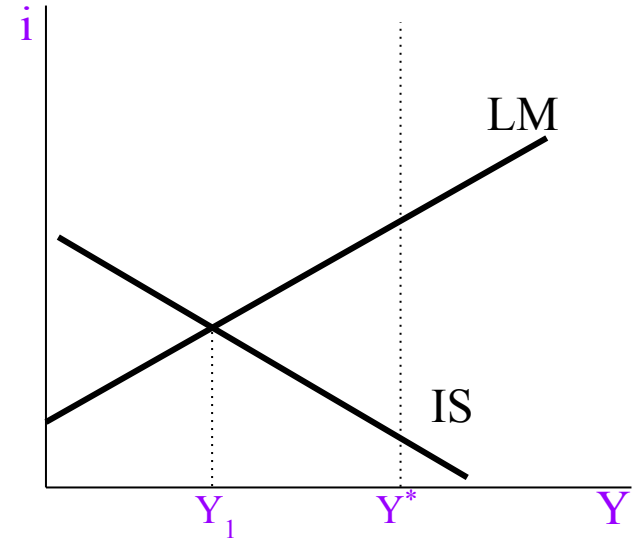
Policy Responses to Recessions

Macro Stabilization Toolkit

- Suppose we are in a recession and want to increase output. There are 3 basic approaches:
 1. Fiscal policy (**G**, **T**)
 2. Monetary policy (**M**)
 3. Do nothing

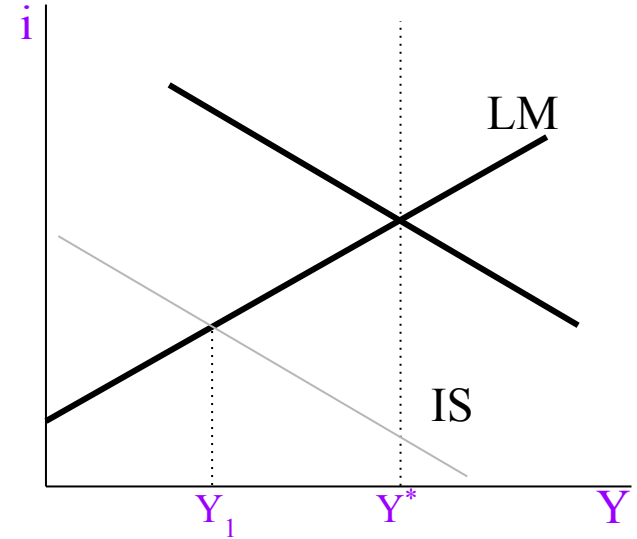
Fiscal Policy

- Suppose you want to move output from Y_1 to Y^* . How could you use G and/or T to accomplish this?



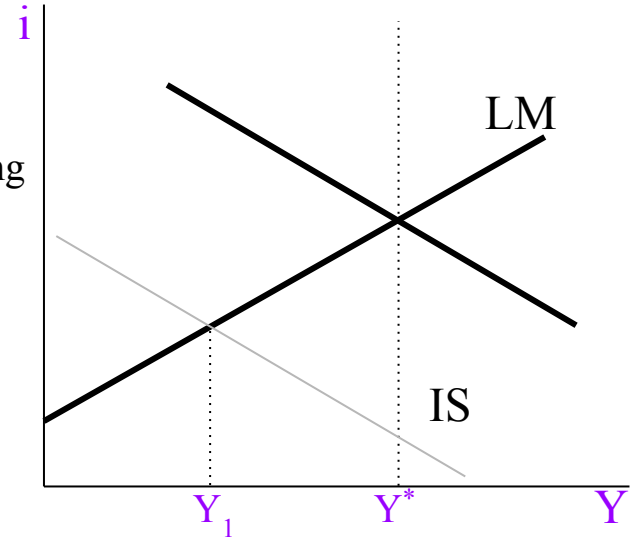
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 - Increase G or decrease T .
 - Concerns?



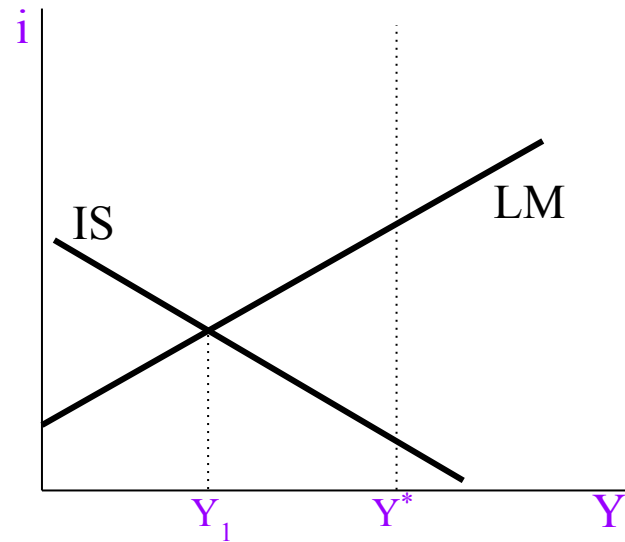
Fiscal Policy

- Suppose you want to move output from Y_1 to Y^* . How could you use G and/or T to accomplish this?
 - Increase G or decrease T .
 - Concerns?
 1. Timeliness – can Congress act quickly?
 2. For G , do we have projects worth doing?
 - Do we care? ...
 3. For T , do we know people will actually spend the money?
 4. Increase in i crowds out private spending.
 5. Increases government debt
 - What if we finance increase in G with increase in T ?
- Despite concerns, fiscal policy is definitely a handy part of the toolkit.
 - Should run “full-employment” surpluses to finance deficits during recessions.
 - We do not do this in the US anymore...



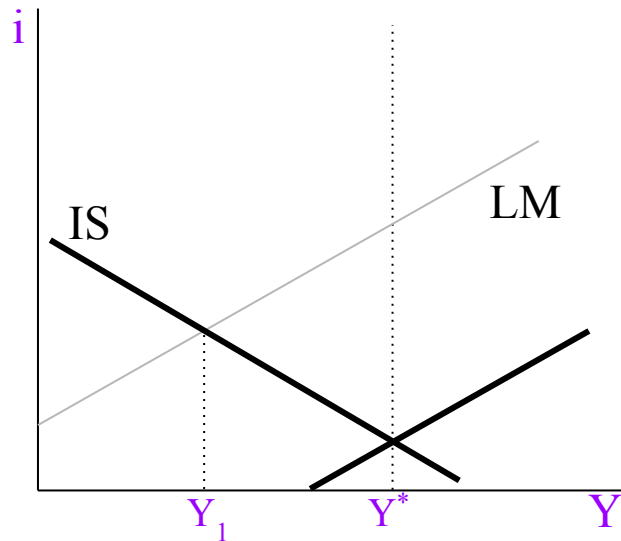
Monetary Policy

- Suppose you want to move output from Y_1 to Y^* . How could you use M to accomplish this?



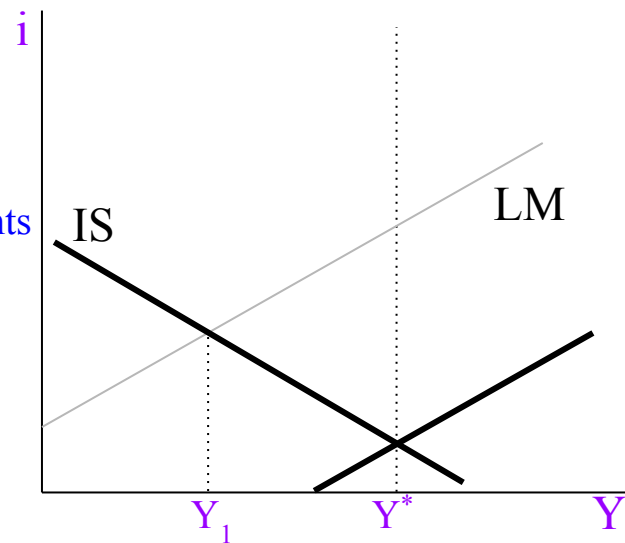
Monetary Policy

- Suppose you want to move output from Y_1 to Y^* . How could you use M to accomplish this?
 - Increase M .
 - How does this address our concerns about fiscal policy?
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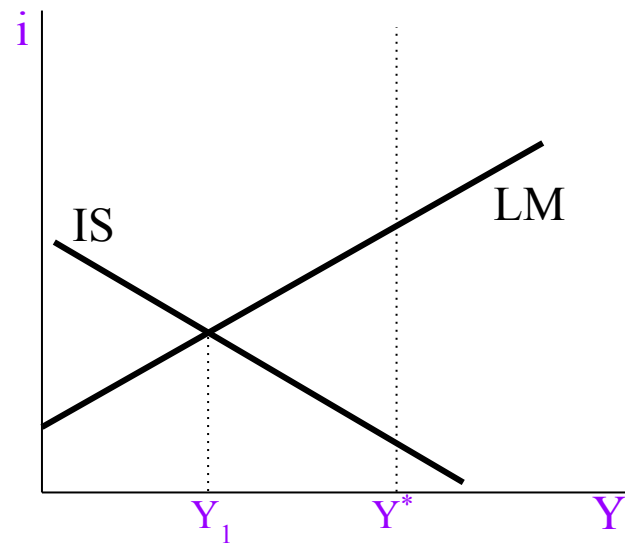
Monetary Policy

- Suppose you want to move output from Y_1 to Y^* . How could you use M to accomplish this?
 - Increase M .
 - How does this address our concerns about fiscal policy?
 - Timeliness – can Congress act quickly?
 - Fed can typically act more quickly – FOMC meets every ~6 weeks.
 - For G , do we have projects worth doing?
 - We let the private sector choose what to spend on.
 - For T , do we know people will actually spend the money?
 - Same concern: will banks lend as desired?
 - Increase in i crowds out private spending.
 - This lowers i and encourages investment.
 - Increases government debt
 - No impact on budget. In fact, lowers interest payments
- For some combination of these reasons, monetary policy became the dominant macro stabilization tool for decades



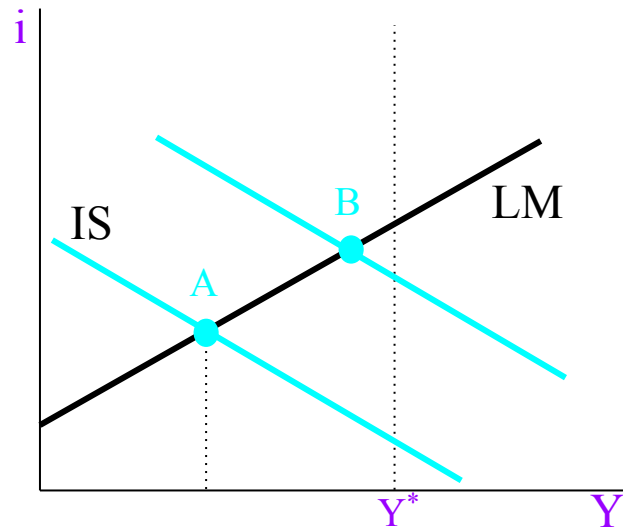
Doing Nothing

- In the long-run, prices are totally flexible and so a recession will end eventually even if you do nothing.
 - IS-LM doesn't show this because of sticky prices, but we'll eventually have a model that does.
- Nonetheless, why would anyone consider such an option when fiscal and monetary policy can end the recession more quickly?
- Some caution is warranted for basically two reasons that make the real world harder than the model



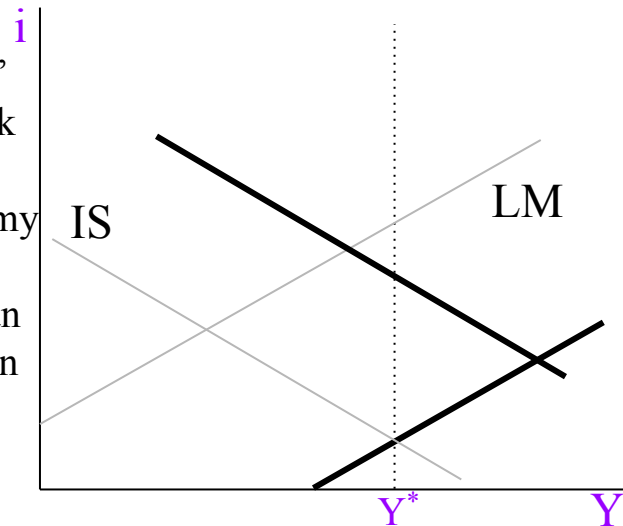
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 - We never have a totally up-to-date picture of how the economy is doing.
 - What if you weren't sure whether you're at A or B?
 - The correct policy is very different for the two situations



Doing Nothing

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 - We never have a totally up-to-date picture of how the economy is doing.
 - What if you weren't sure whether you're at A or B?
 - The correct policy is very different for the two situations
 - Even monetary policy is thought to have “long and variable lags”
 - The recession-fighting policy may not actually start to work until the recession is over, overheating the economy
- For these two reasons it is plausible that policies to stabilize the economy could be at best wasteful and at worst destabilizing.
 - Most economists agree that policy is in fact stabilizing, but it is an important consideration and we should be realistic about what can be achieved.

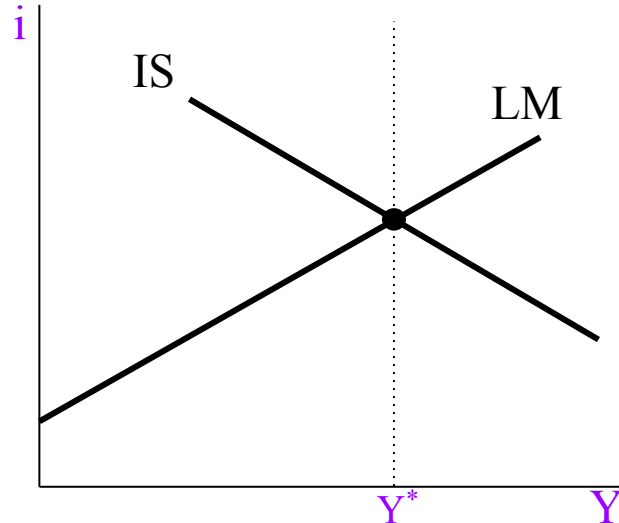


Automatic Stabilizers

- A middle ground in the debate about stabilization policy is automatic stabilizers. Two prominent examples are:
 1. Income taxation
 - When your income is high, your tax bill is high; when your income falls, your tax bill shrinks
 2. Unemployment insurance
 - We pay into a pool of money when we are employed; when we lose our jobs, we get payments from that pool
- These are stabilizers in that they reduce income when income is high and they increase income when income is low
- They are automatic in that they do not require active decisions by policymakers (or anyone) – once they are set up, they perform stabilizing fiscal policy automatically.

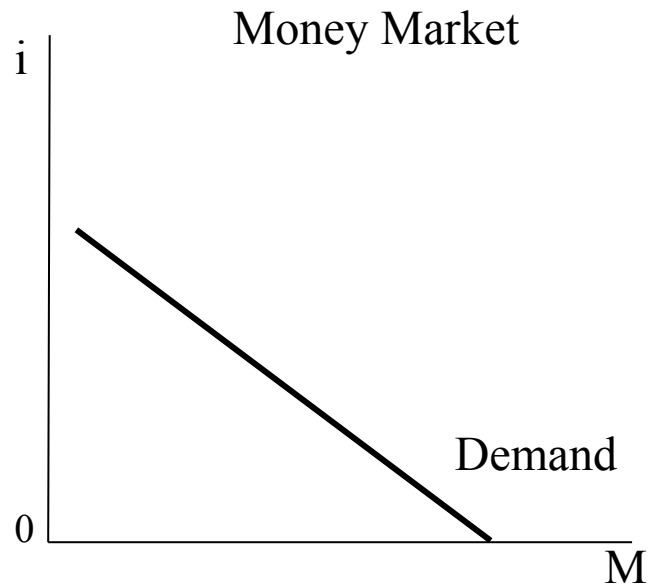
Exercise

- Suppose you are at desired output, Y^* , but you fear the government debt is too large (i.e. you want to increase T - G). If you control fiscal and monetary policy (i.e. T , G , and M), how could you lower the deficit while keeping the economy strong?



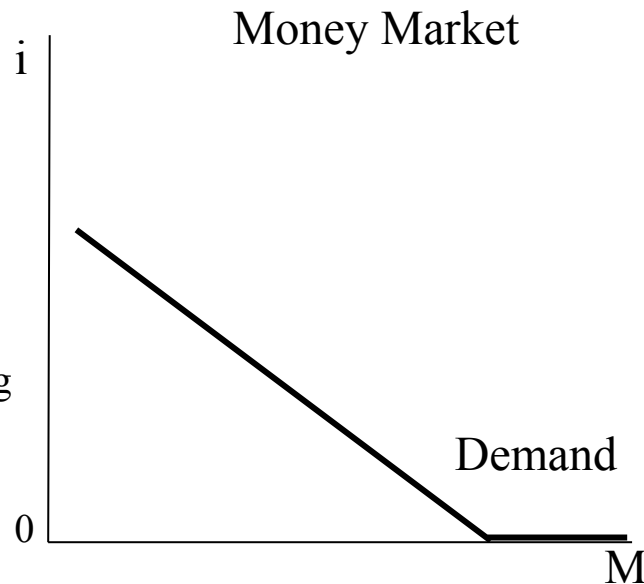
Zero Lower Bound (ZLB)

- So far we have assumed $i > 0$, meaning bonds give a higher return than money
- This means households have to balance the liquidity of money with the return of bonds in their portfolio choice problem
 - They don't want to hold too much money because it is an inferior way of saving for the future
- To get people to hold more money, i needs to fall.



Zero Lower Bound (ZLB)

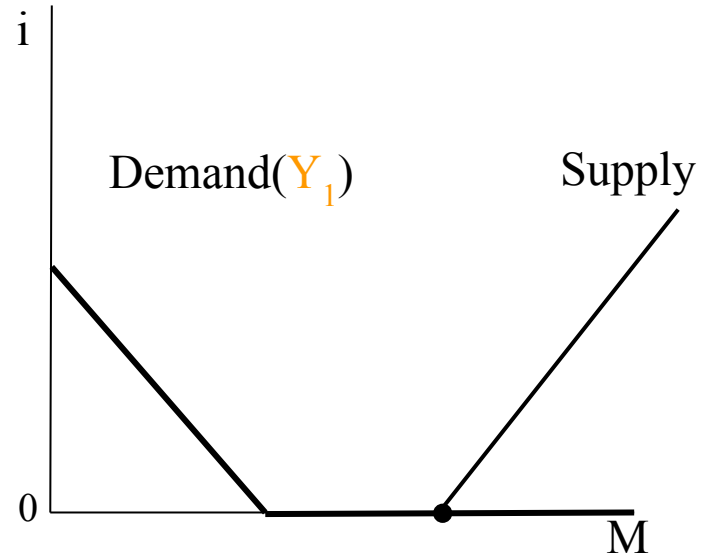
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- This means households have to balance the liquidity of money with the return of bonds in their portfolio choice problem
 - They don't want to hold too much money because it is an inferior way of saving for the future
- To get people to hold more money, i needs to fall.
- Once $i = 0$, this is no longer true. Bonds do not offer a higher return, and so money is just as good of a vehicle for saving
 - So if you print more money, people will hold it even as i stays constant at 0
 - (In the portfolio choice problem, we no longer have $C_1 = M$.)
- In other words, i cannot fall below 0 – that is its lower bound.
 - Why would anyone accept a negative return when they could hold money and get a return of 0?
 - Once i hits 0, people are willing to hold however much money is supplied – they are fine saving cash since bonds offer nothing better



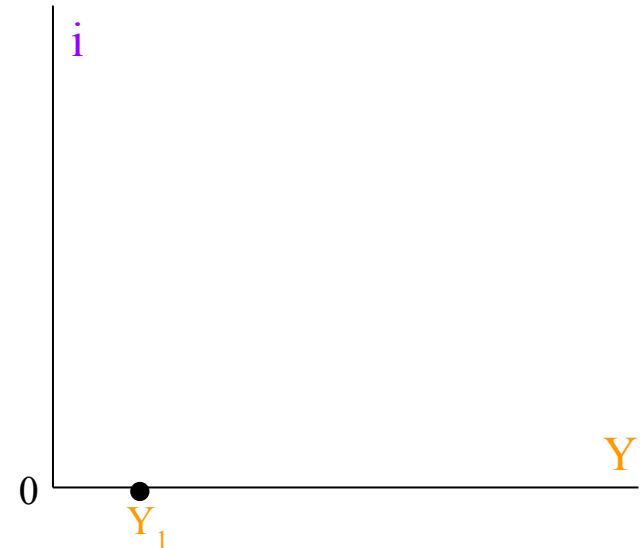
The Liquidity Trap

- The LM Curve is bounded by 0 as well.

Money Market



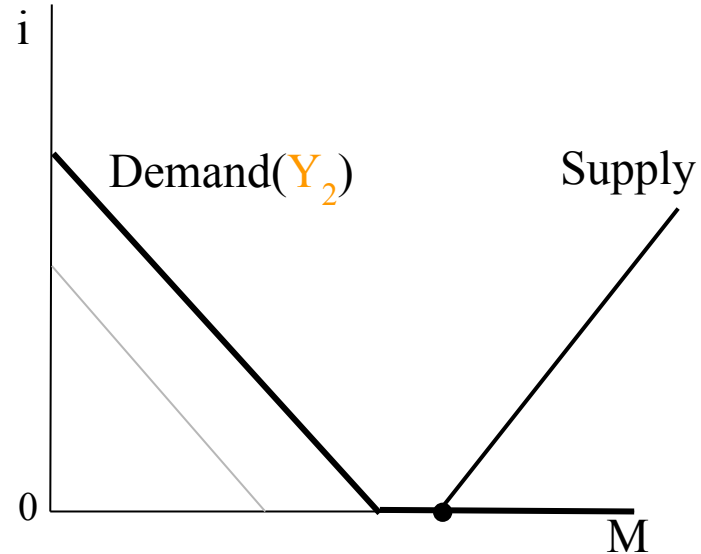
Economy



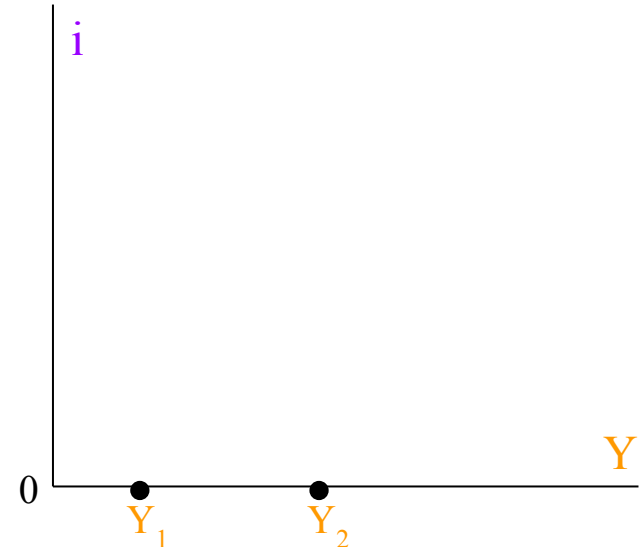
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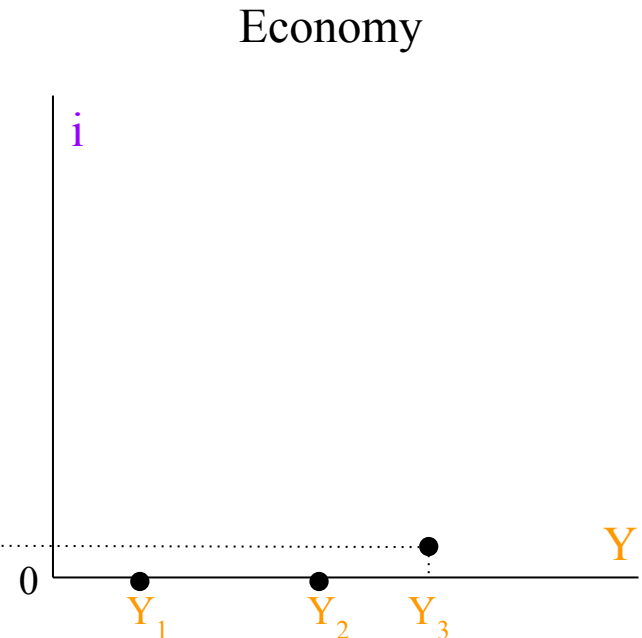
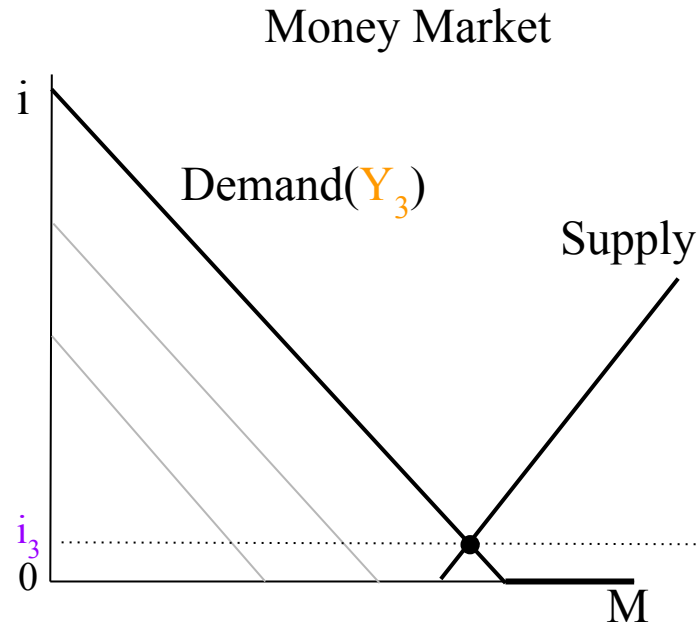


Economy



The Liquidity Trap

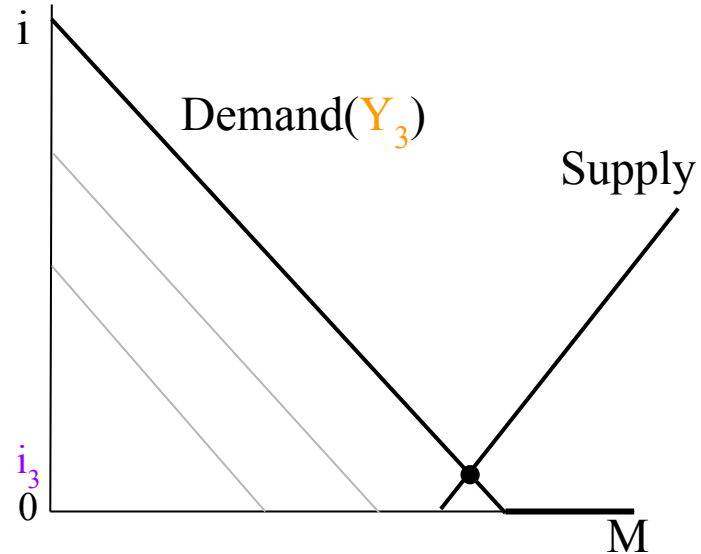
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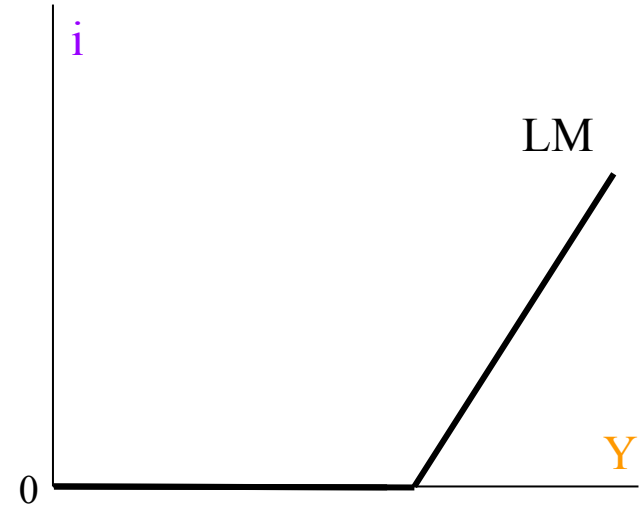
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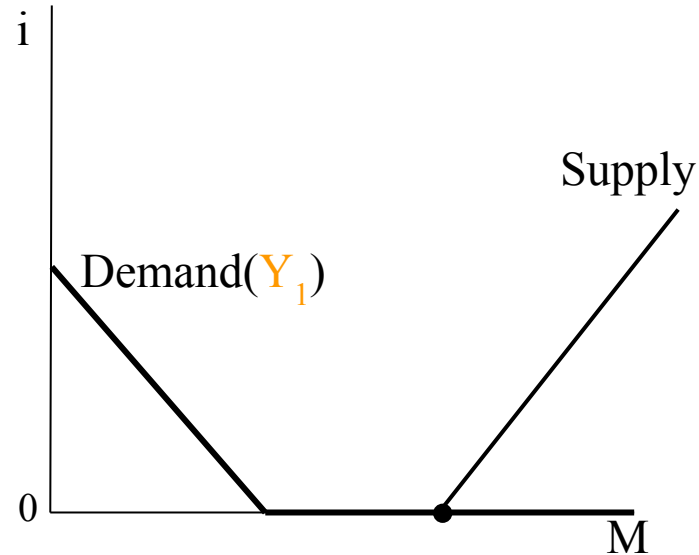
Economy



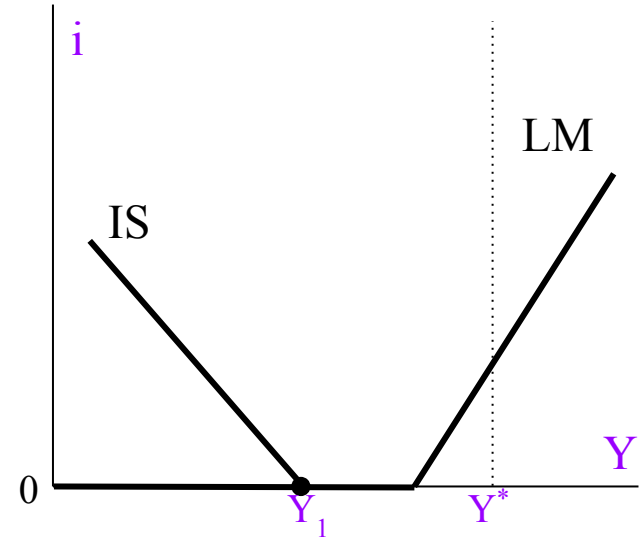
The Liquidity Trap

- The LM Curve is bounded by 0 as well.
- Increasing M may not spur spending anymore.

Money Market



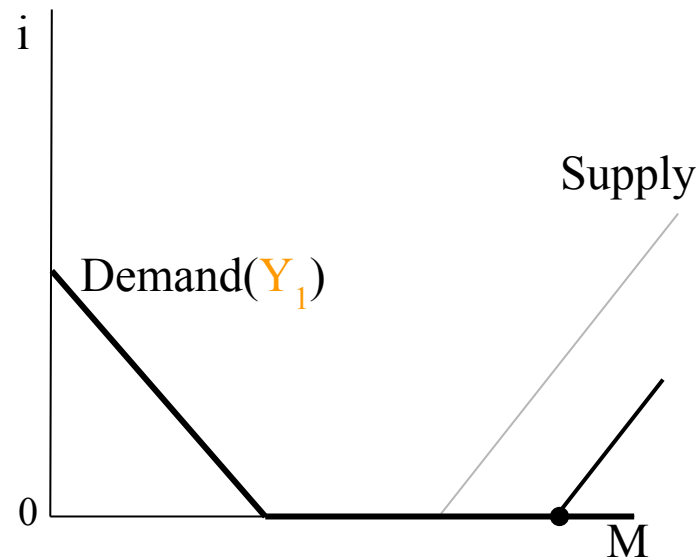
Economy



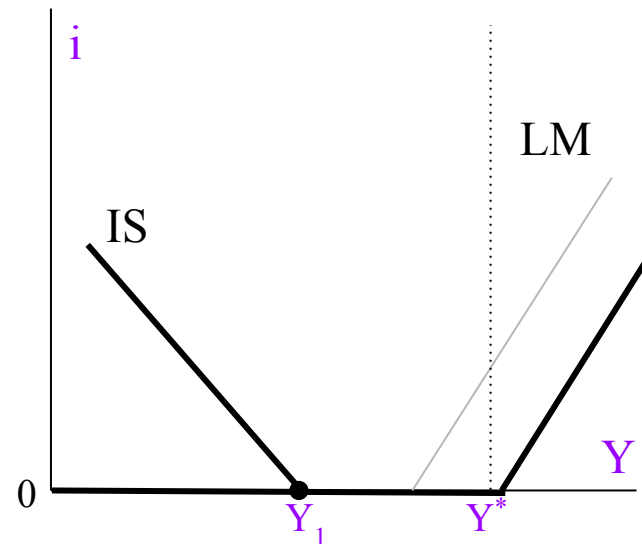
The Liquidity Trap

- The LM Curve is bounded by 0 as well.
- Increasing M may not spur spending anymore.
 - Since we can have $C_1 < M$ now, households may just hold the extra money while Y stays stuck.
- Referred to as a “liquidity trap” because even at maximal liquidity, you’re still stuck in a recession.
 - We can’t get the spending we need, even when saving offers no return
- Conventional monetary policy is useless (“pushing on a string”)

Money Market



Economy



The Liquidity Trap is becoming all too common again



Source: Board of Governors of the Federal Reserve System (US) via FRED®

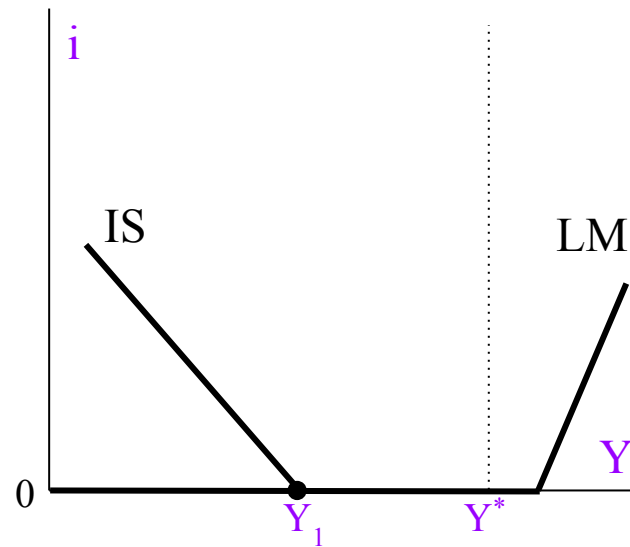
Shaded areas indicate U.S. recessions.

fred.stlouisfed.org

Fullscreen

Solutions to the Liquidity Trap

1. Fiscal policy



Solutions to the Liquidity Trap

1. Fiscal policy

- Fiscal policy has come back to life in recent recessions, because they have put us at the ZLB
- At ZLB, fiscal policy does not cause crowding out because i is stuck.
- This means that the government multiplier is larger at the ZLB than otherwise.
- This implies that contractionary fiscal policy (austerity) is particularly harmful at ZLB

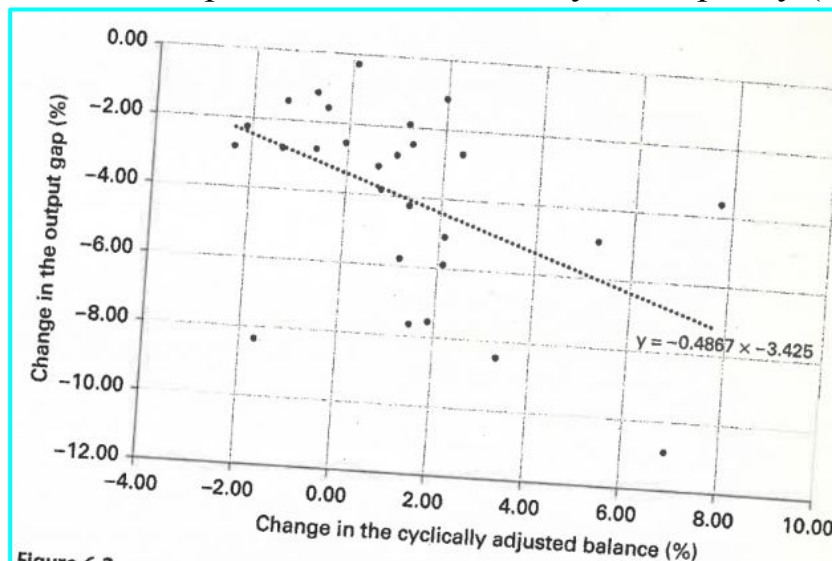
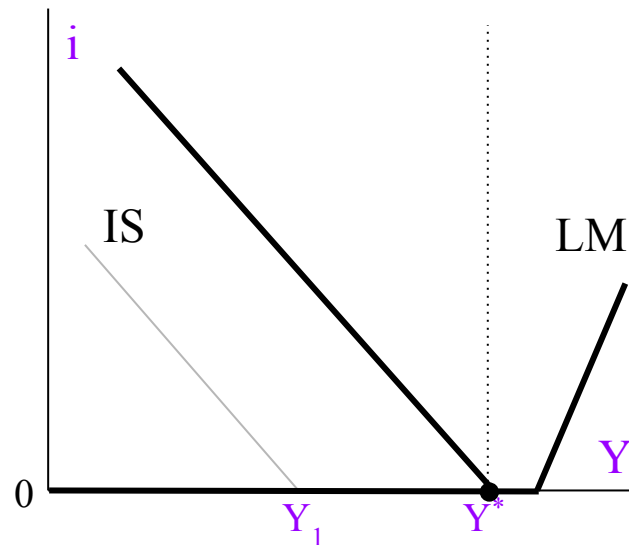


Figure 6.2

Output gap versus change in cyclically adjusted primary balance.

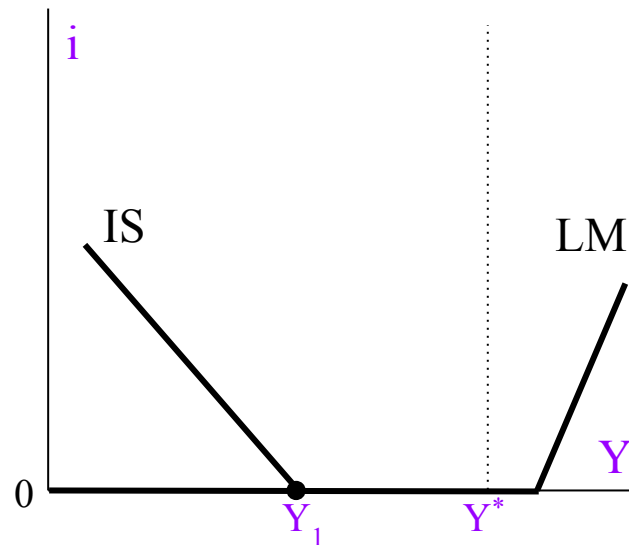
Sources: World Economic Outlook data for output gap, IMP Fiscal Monitor data for cyclically adjusted primary balance.



Solutions to the Liquidity Trap

2. Expected inflation (!)

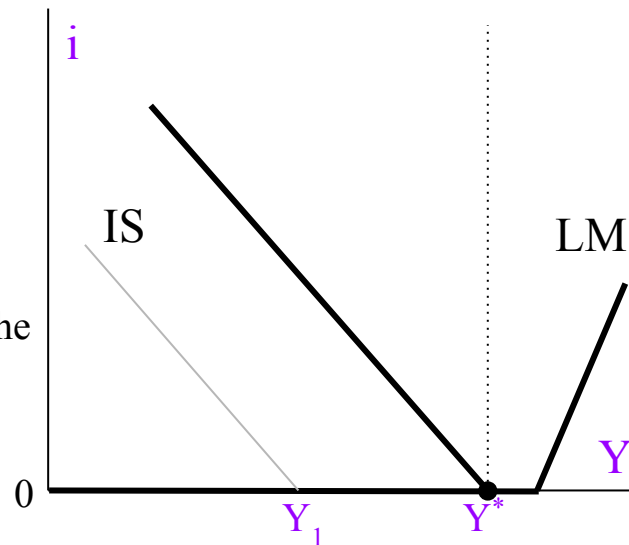
- Due to sticky prices, we've been ignoring inflation.
- That means we've been ignoring the distinction between the real interest rate (r) and the nominal interest rate (i)
 - i : Save \$1, get back $\$(1+i)$ tomorrow
 - r : Save 1 good, good $(1+r)$ goods back tomorrow
- Bonds are nominal, and so the LM Curve and ZLB refer to i
- Real decisions, like consumption, depend on r
- Fisher Equation: $r = i - \pi^e$
 - The real return from saving \$1 is the nominal return (i) minus the reduced value of that money (π)
 - So if $i = 0$ and $\pi^e = 2\%$, $r = -2\%$



Solutions to the Liquidity Trap

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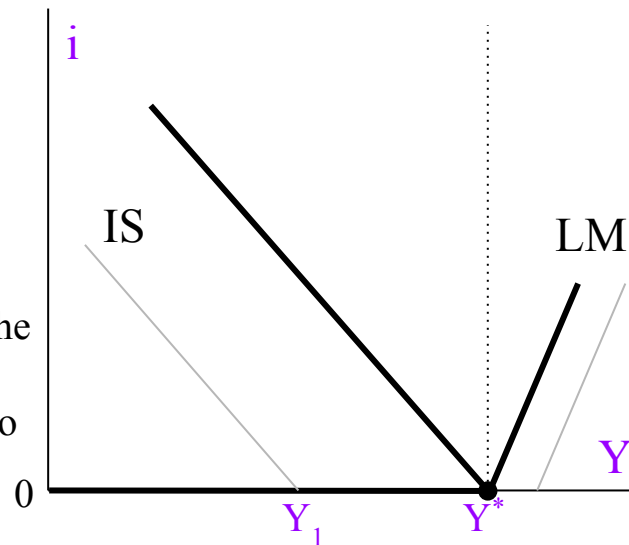
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- If you get people to expect higher inflation, r will decline and the IS curve shifts out, boosting output
 - Intuition: if people expect their money to be worthless in the future, they'll spend it now!



Solutions to the Liquidity Trap

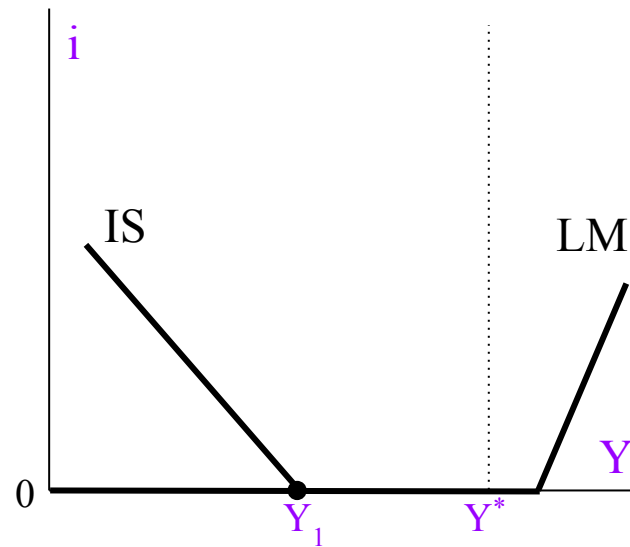
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- If you get people to expect higher inflation, r will decline and the IS curve shifts out, boosting output
 - Intuition: if people expect their money to be worthless in the future, they'll spend it now!
 - (LM shifts in, too, as people demand higher interest rates to hold bonds, but the LM curve doesn't matter much at ZLB.)



Solutions to the Liquidity Trap

- 3. Unconventional monetary policy
 - We'll discuss this later



The Great Depression

Macro Shocks

- In some recessions, the cause is readily identifiable:
 - 1953: Korean War ends, precipitating a huge drop in G
 - 1970s recessions: OPEC and Middle East instability cause oil prices to spike
 - We'll study this in-depth later
 - 2020: COVID pandemic shuts down entire industries
- The Great Depression (1930s) and the Great Recession (late 2000s) stand out
 - Deep, long recessions with weak recoveries
 - No obvious fundamental explains them.

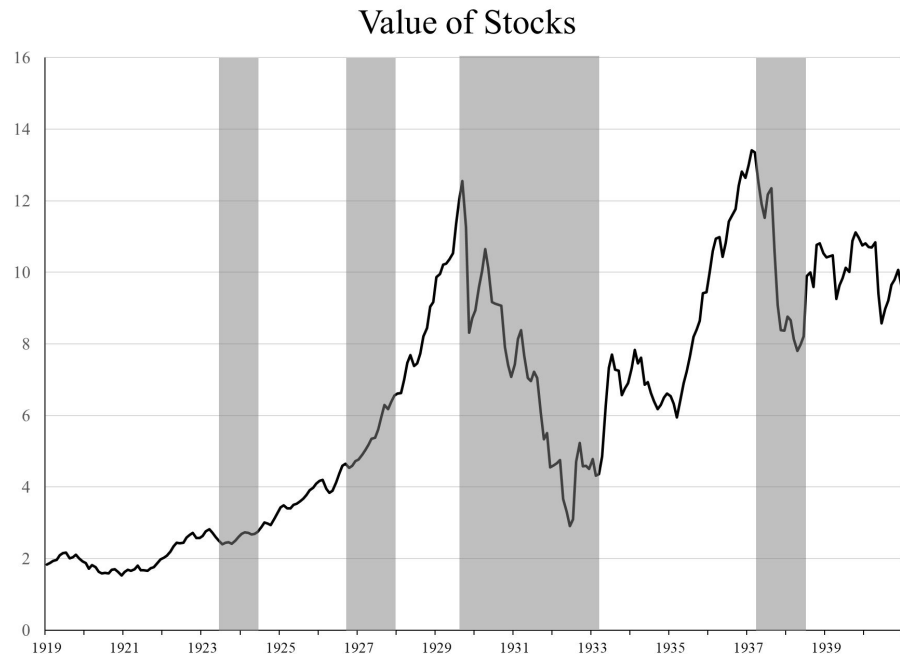
FDR, in his First Inaugural Address (1933): “[T]he only thing we have to fear is fear itself.[...] [O]ur distress comes from no failure of substance. We are stricken by no plague of locusts.”

Casy, The Grapes of Wrath (1939): “It’s not like lightning or earthquakes. We’ve got a bad thing made by men, and by God that’s something we can change.”

Obama, in his First Inaugural Address (2009): “Our workers are no less productive than when this crisis began. Our minds are no less inventive, our goods and services no less needed than they were last week, or last month, or last year. Our capacity remains undiminished.”

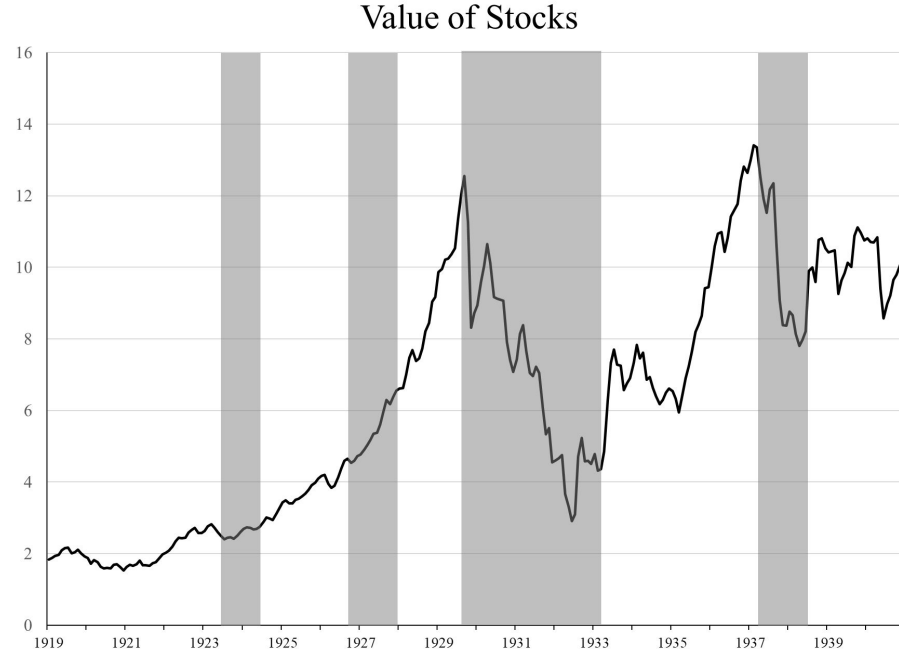
The Stock Market Crash of 1929

- Most accounts of GD start with “Black Thursday” and the stock market collapse
 - From 1929 peak, repeated collapses brought it down by over 75% to 1932 trough
- So what? Why does the price at which people at the NYSE sell paper to each other matter for the economy?



The Stock Market Crash of 1929

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 - From 1929 peak, repeated collapses brought it down by over 75% to 1932 trough
- So what? Why does the price at which people at the NYSE sell paper to each other matter for the economy?
 1. Wealth effect. If you were planning to finance future consumption with your stock portfolio, this is devastating. (Like Y_2 falling in our rigorous consumption model; like c_0 falling in our simple one.)
 2. Pessimism, “animal spirits” (c_0 , i_0 fall)
 - Think back to game on first day of class...



Financial Crisis

- Time and again, the thing that takes ordinary downturns and creates economic catastrophes are financial crises
 - This refers to an evaporation of credit. A drop – even a collapse – in the stock market is not itself a financial crisis! (Though it can spark one.)
- Credit is the lifeblood of modern economies. We've seen how banking institutions can spur spending by creating money. When they collapse, so does money creation and spending. And it takes a long time for these lending relationships to be repaired.

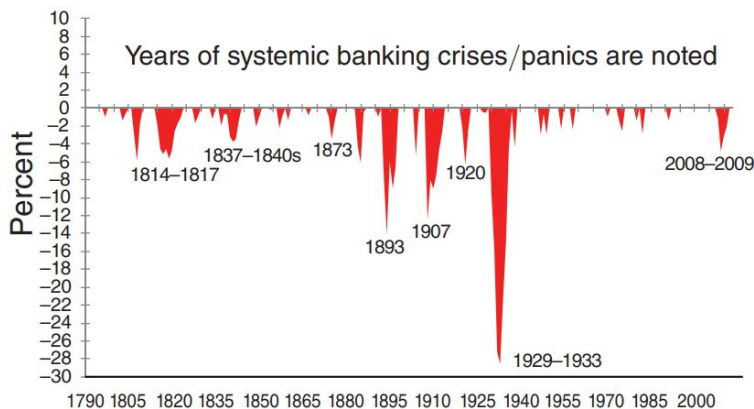
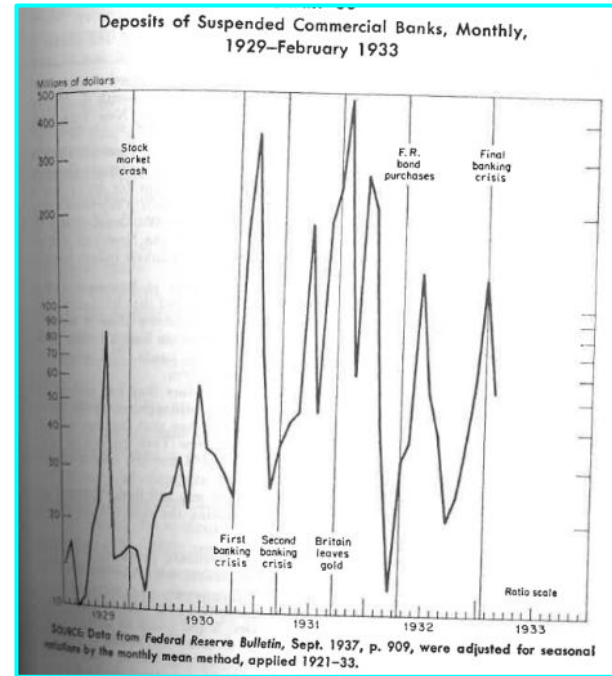
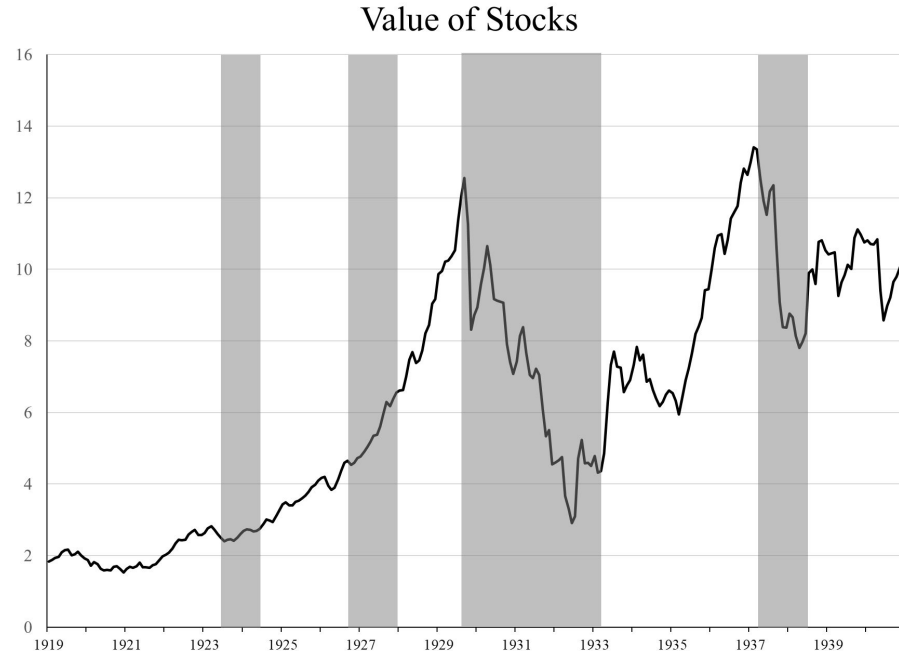


FIGURE 2. DEVIATION OF REAL PER CAPITA GDP FROM ITS PREVIOUS PEAK, UNITED STATES 1790–2013
(Deviation as a percent of previous peak level)



The Stock Market Crash of 1929

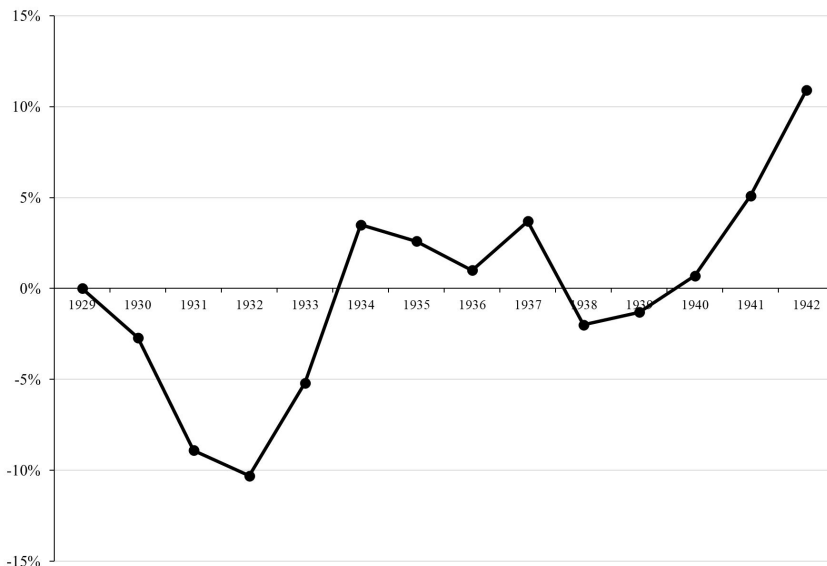
- Most accounts of GD start with “Black Thursday” and the stock market collapse
 - From 1929 peak, repeated collapses brought it down by over 75% to 1932 trough
- So what? Why does the price at which people at the NYSE sell paper to each other matter for the economy?
 1. Wealth effect. If you were planning to finance future consumption with your stock portfolio, this is devastating. (Like Y_2 , falling in our rigorous consumption model; like c_0 falling in our simple one.)
 2. Pessimism, “animal spirits” (c_0 , i_0 fall)
 3. Banks had speculated on stocks and accepted them as collateral for loans
 - So stock market crash and financial crisis are indeed linked.



Deflation

- Collapse in activity led to steep decline in prices (deflation)
 - No, we haven't modeled this yet, but you can imagine...
- This only encourages people to hold onto their money further (pushes up r even as i falls).
- Also generates phenomenon of “debt deflation”
 - Real value of debt increases, depressing spending of debtors (farmers, homeowners, business owners...)
- We may not like inflation, but deflation can be very scary, too.

Inflation



Sources: Federal Reserve Bank of Minneapolis and Romer (1992)

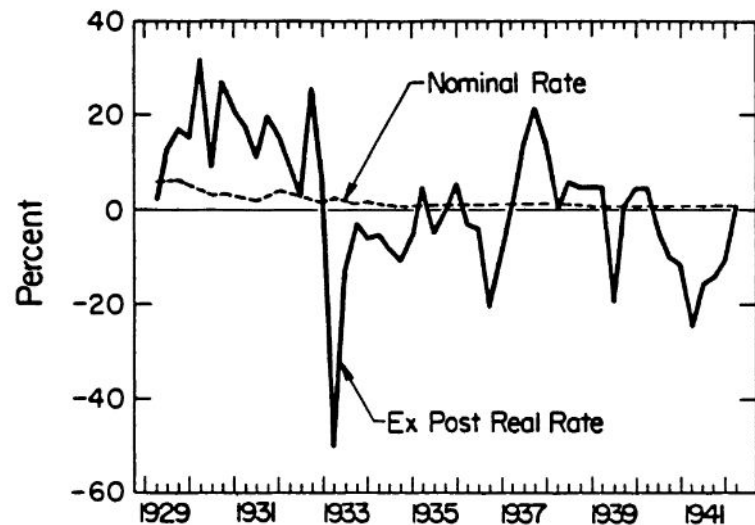
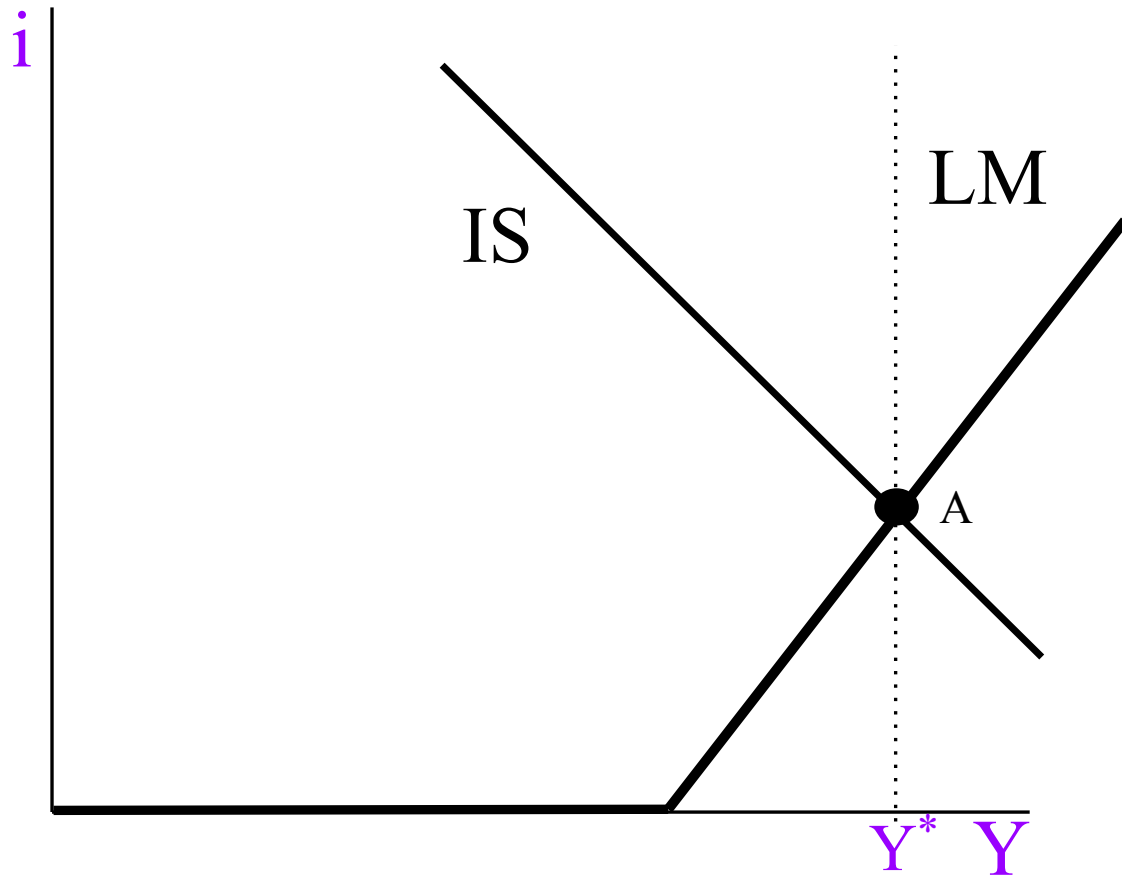


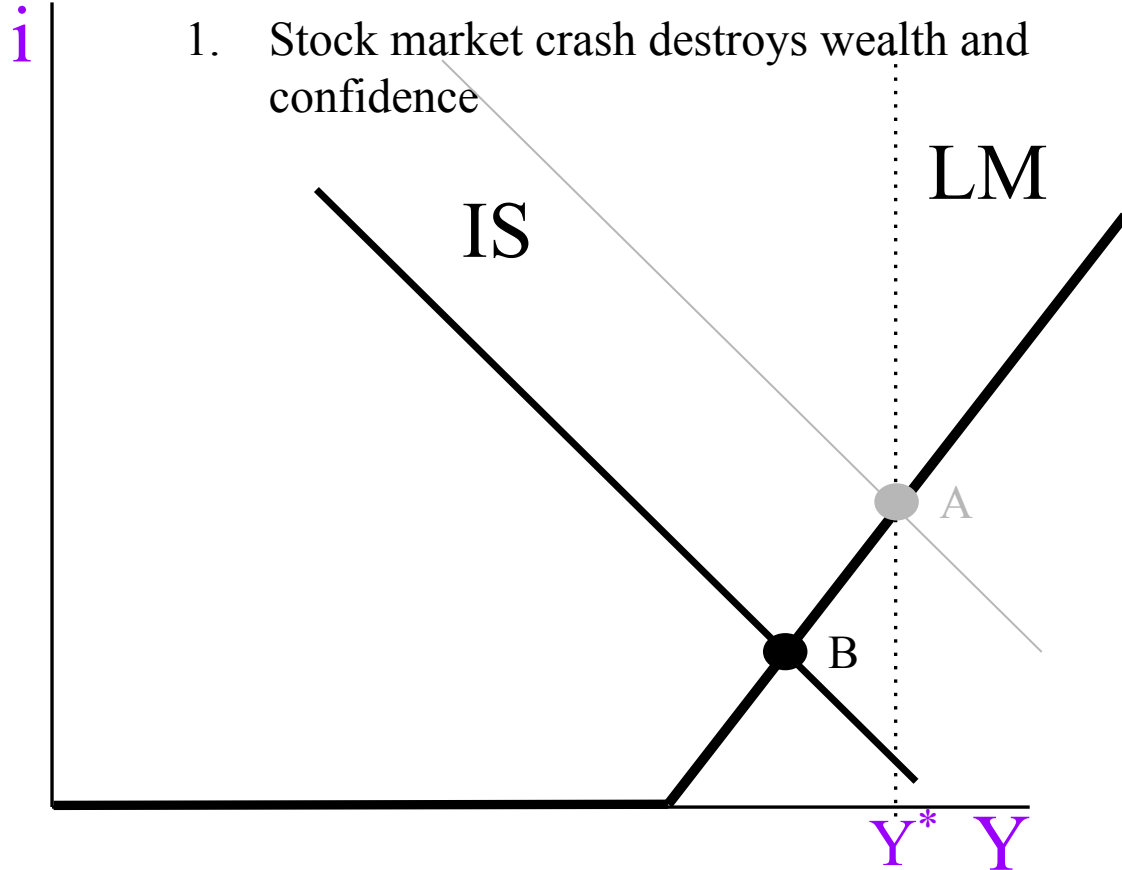
FIGURE 7

NOMINAL AND EX POST REAL COMMERCIAL PAPER RATES, 1929–1942

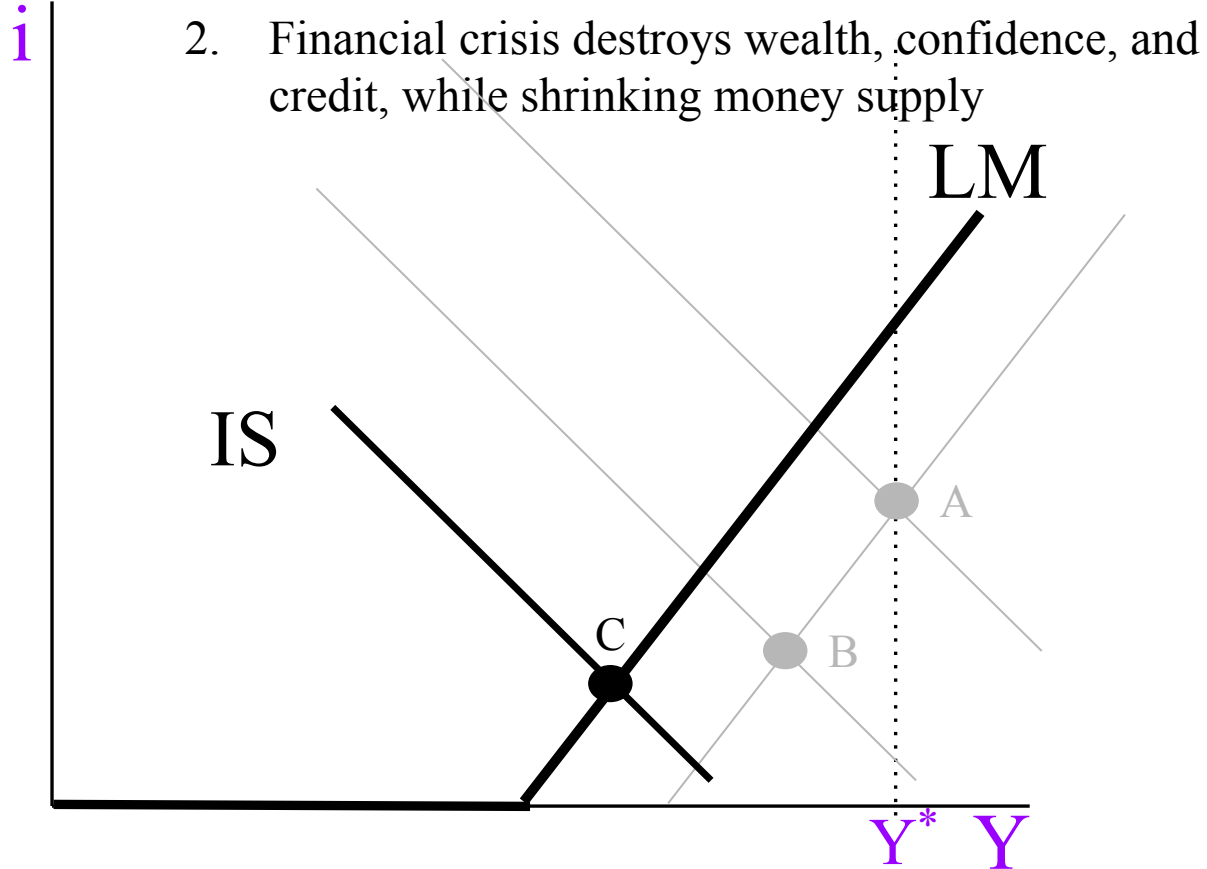
Recipe for the Great Depression



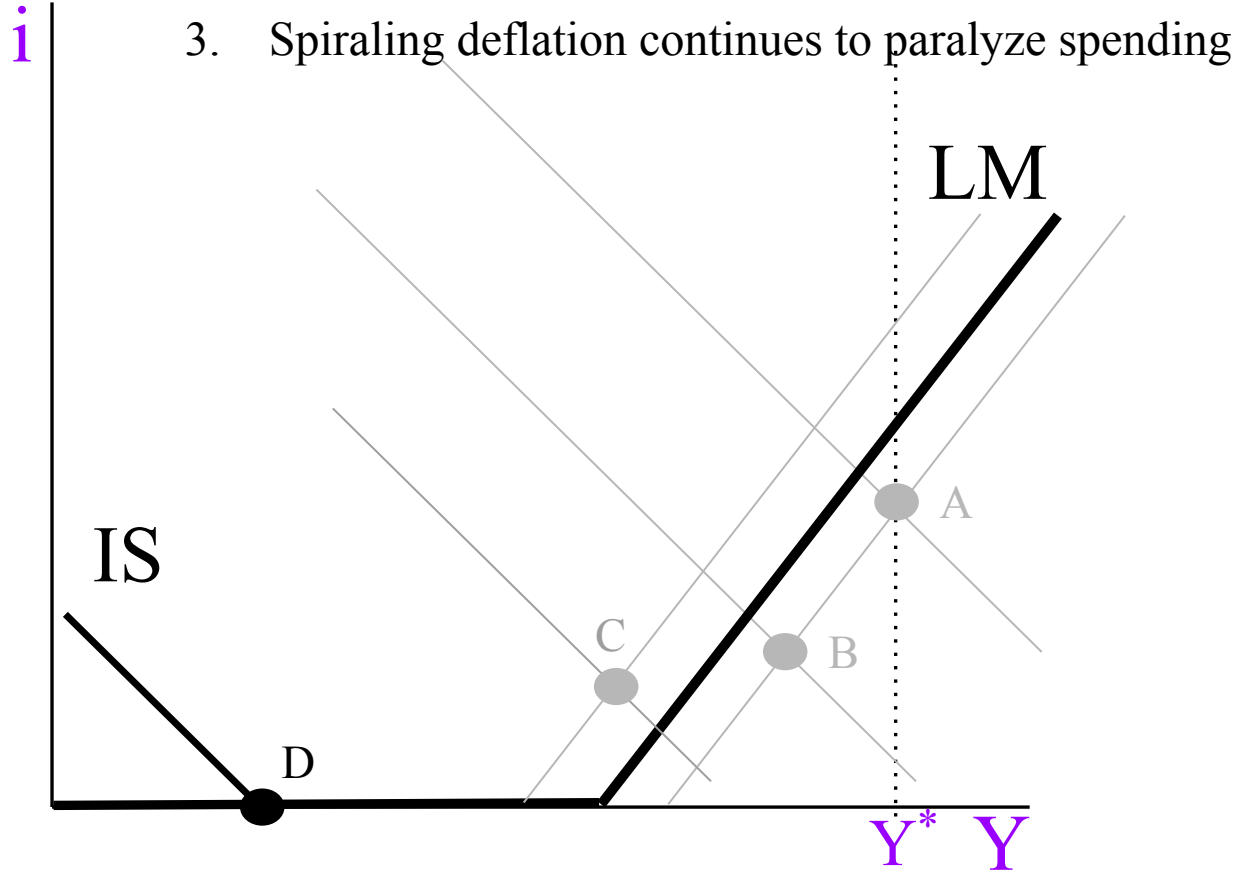
Recipe for the Great Depression



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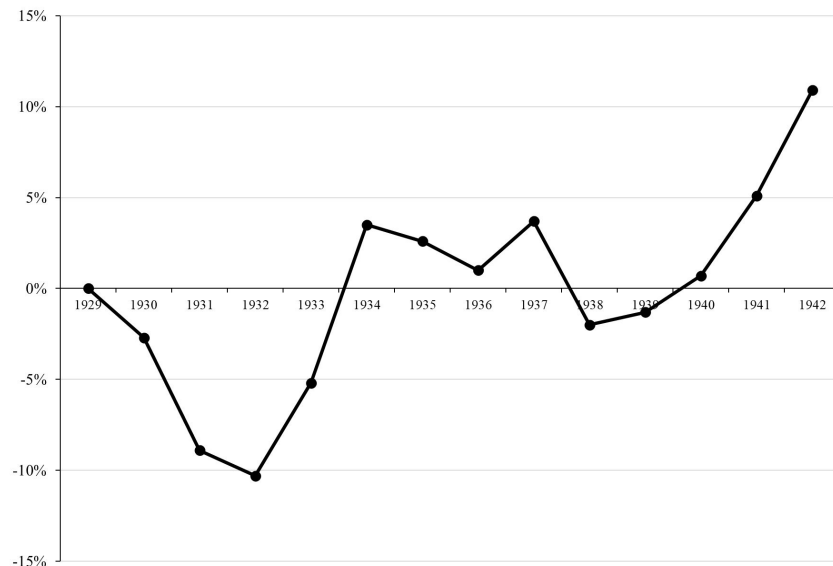
Recipe for the Great Depression



Ending the Depression

1. Devalued dollar against gold, creating inflation and lowering r .

Inflation



Sources: Federal Reserve Bank of Minneapolis and Romer (1992)

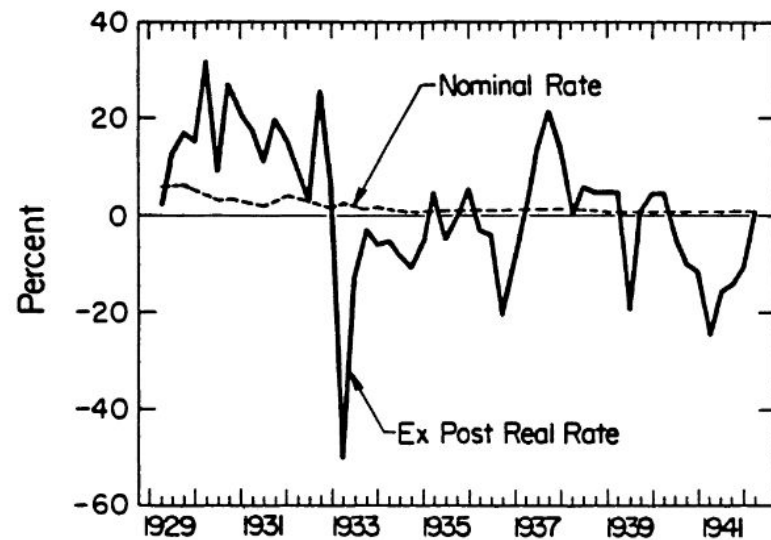
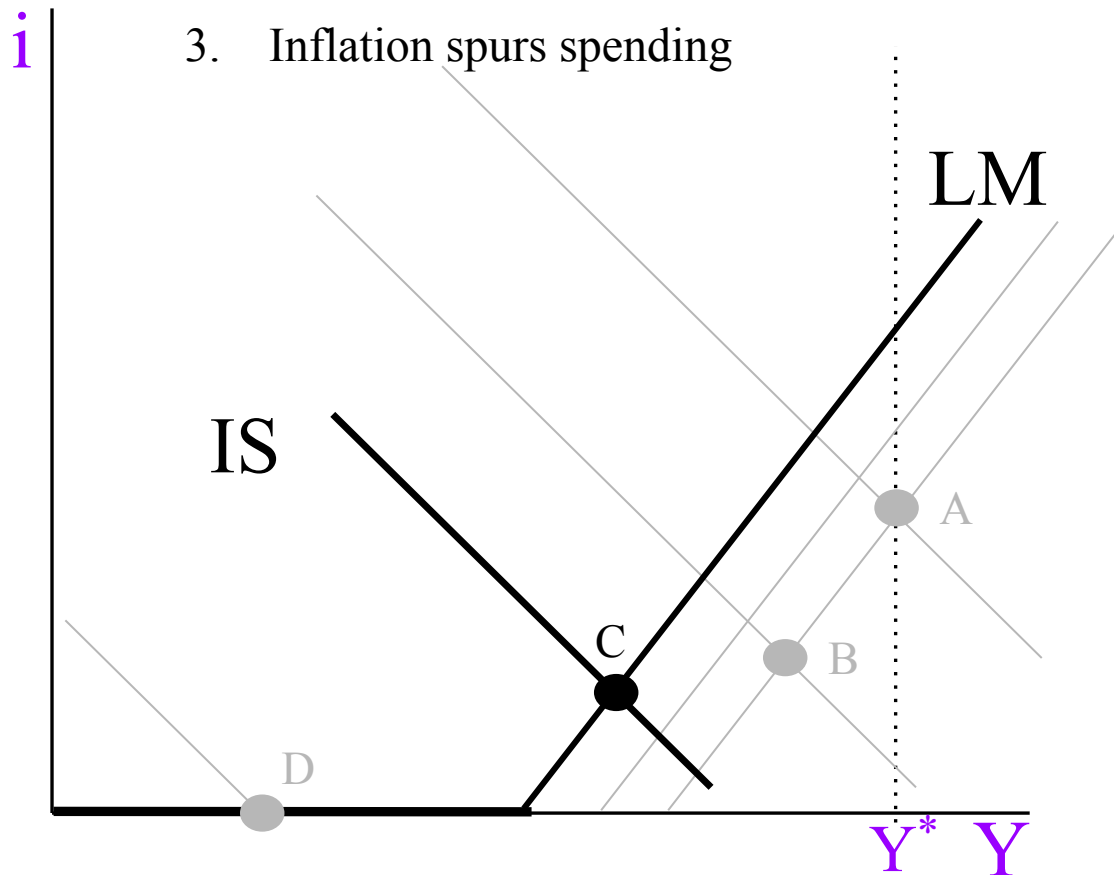


FIGURE 7

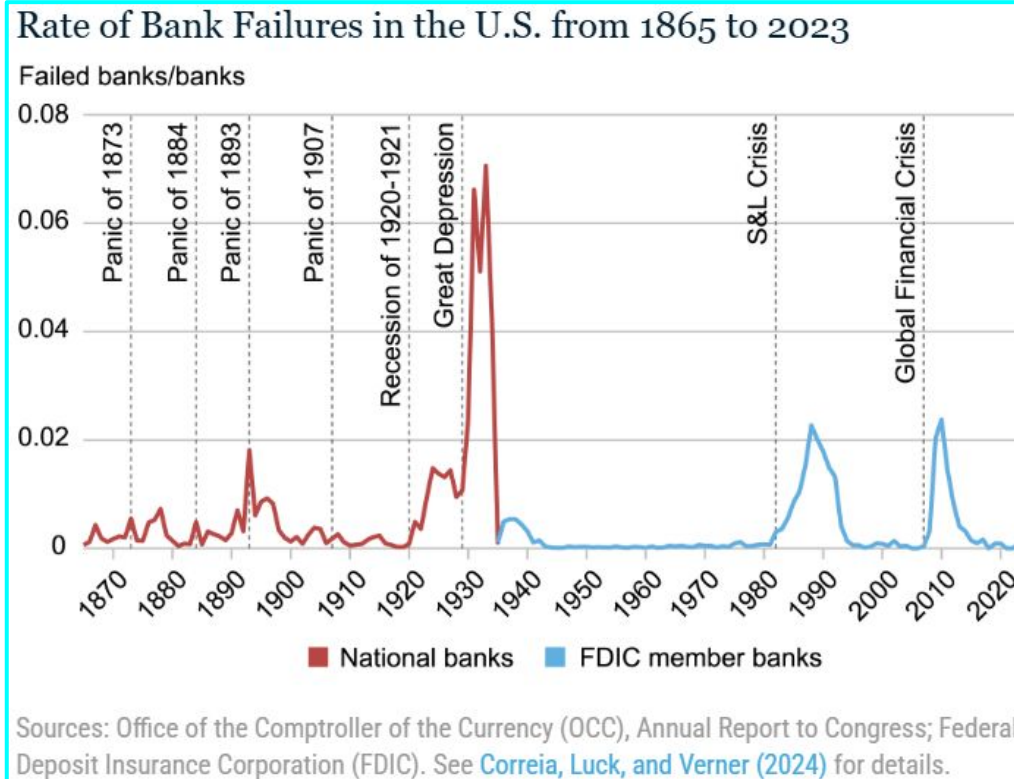
NOMINAL AND EX POST REAL COMMERCIAL PAPER RATES, 1929-1942

Recipe for Ending the Great Depression

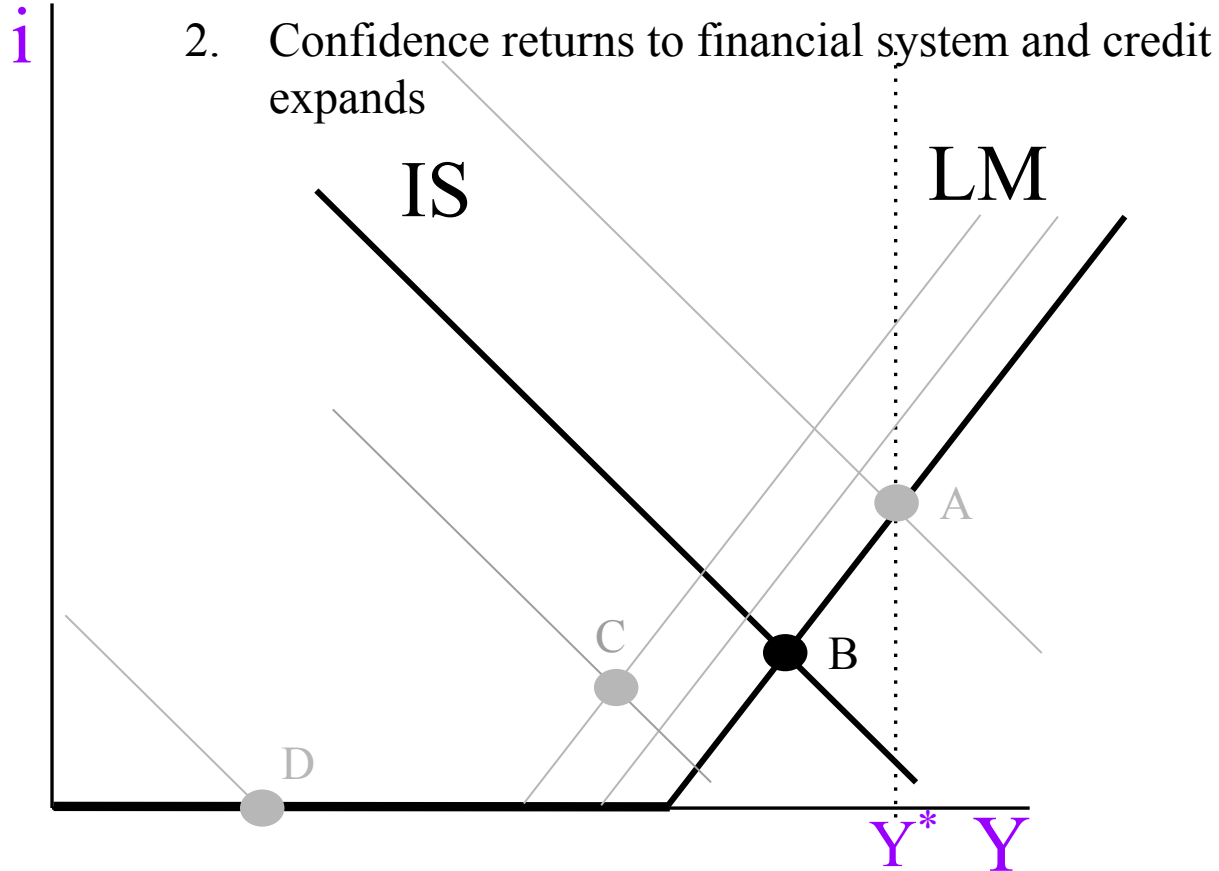


Ending Ending the Depression

1. Devalued dollar against gold, creating inflation and lowering r .
2. Banking reform, most notably deposit insurance
 - Glass-Steagall Act also prevents banks from speculating on assets like stocks. More on this later.



Recipe for Ending the Great Depression



Ending the Depression

1. Devalued dollar against gold, creating inflation and lowering r .
2. Banking reform, most notably deposit insurance
3. Boost in G from WW2

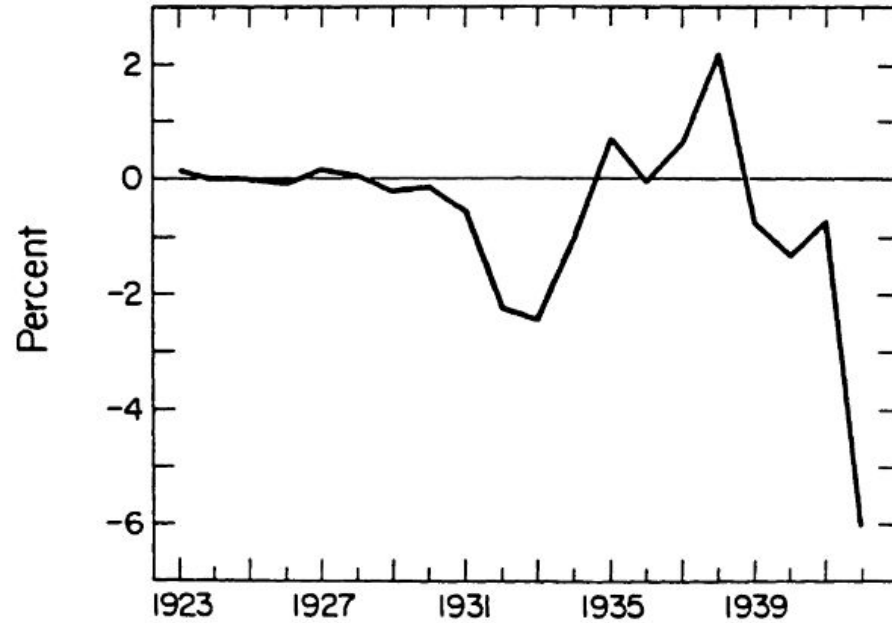
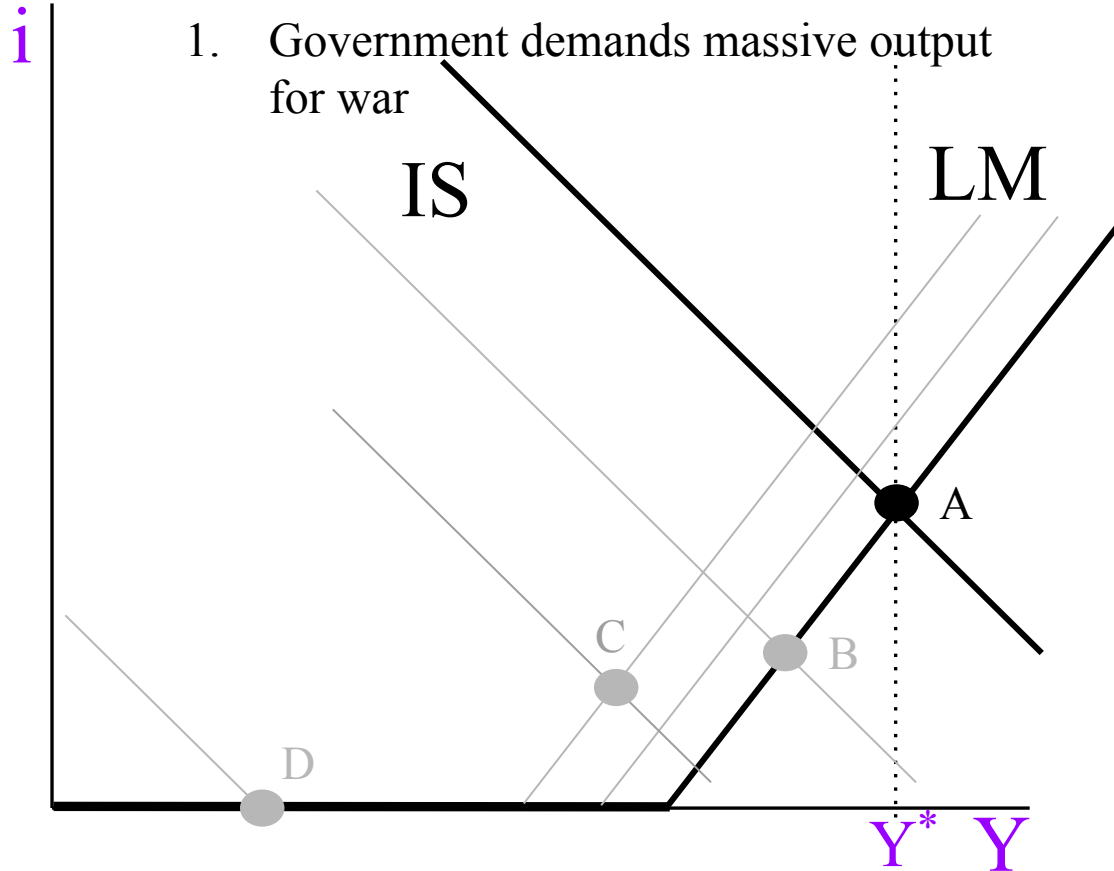


FIGURE 4

CHANGES IN SURPLUS-TO-GROSS NATIONAL PRODUCT RATIO, 1923-1942

Recipe for Ending the Great Depression



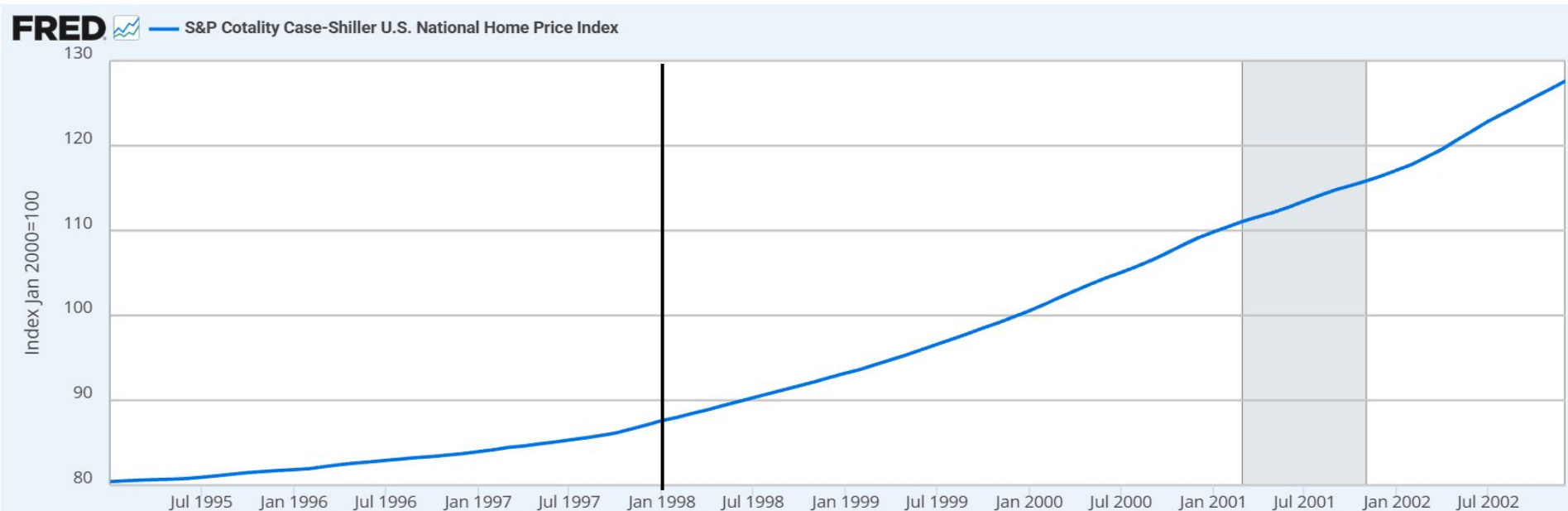
The Great Recession

Overview

- The Great Recession paralleled the Great Depression in a number of important ways
 1. Asset bubble collapse
 2. Financial crisis
 3. Protracted recession
- Main difference: far less disastrous!
 - Policy lessons learned from Great Depression were put to good use
 - Luckily, policymakers at the time included Ben Bernanke and Christina Romer, academic economists who had studied the Great Depression in-depth

The Housing Bubble

- Spurred by the global savings glut (see first slide deck), low interest rates and abundant credit spurred the housing market
- Expectations got “bubbly” – strong price growth spurred (probably unrealistic) expectations of future price growth, further spurring activity in a frenetic cycle

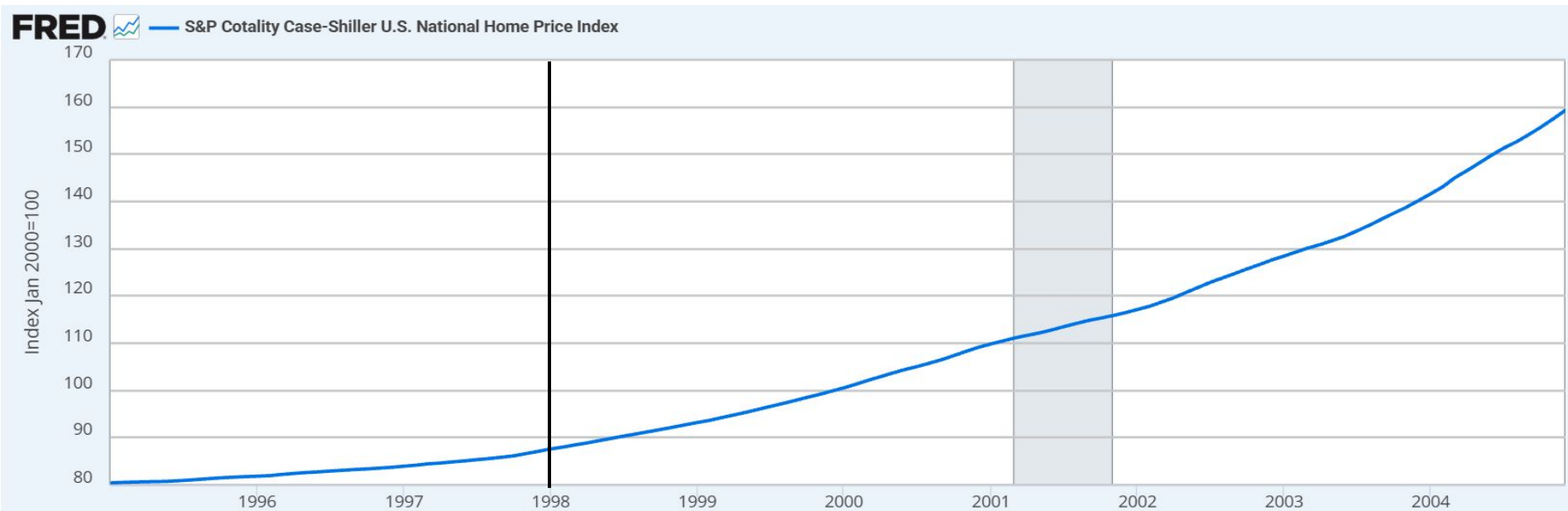


Source: S&P Dow Jones Indices LLC via FRED®

Shaded areas indicate U.S. recessions.

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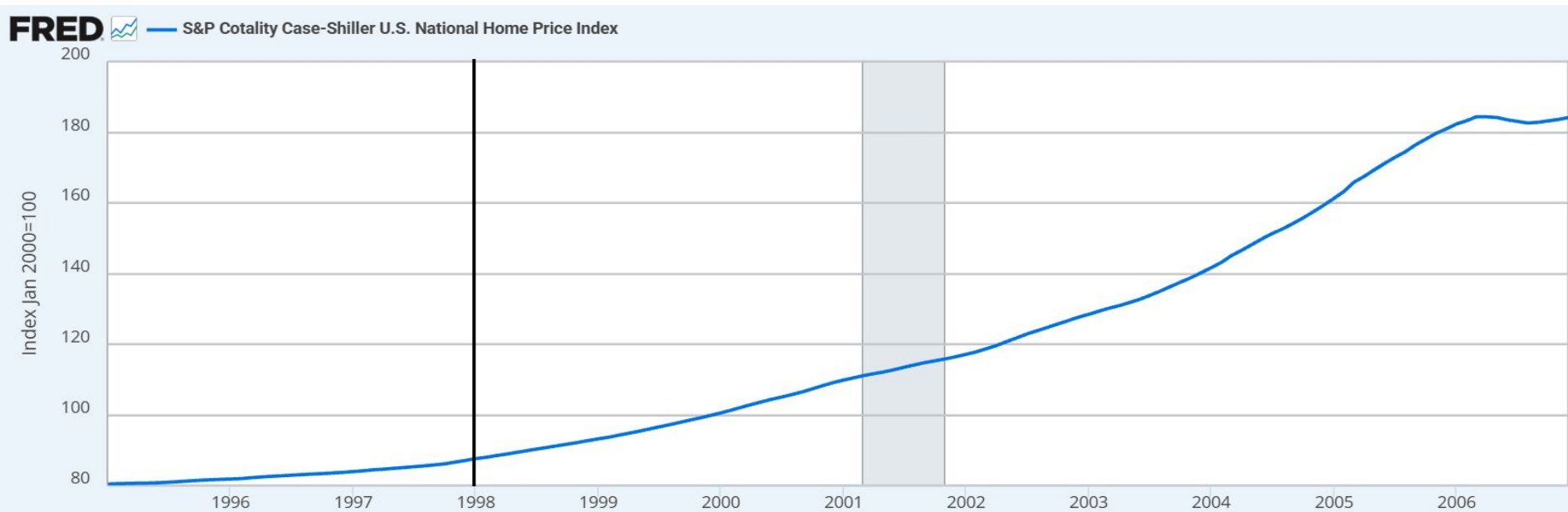


Source: S&P Dow Jones Indices LLC via FRED®

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The Housing Bubble

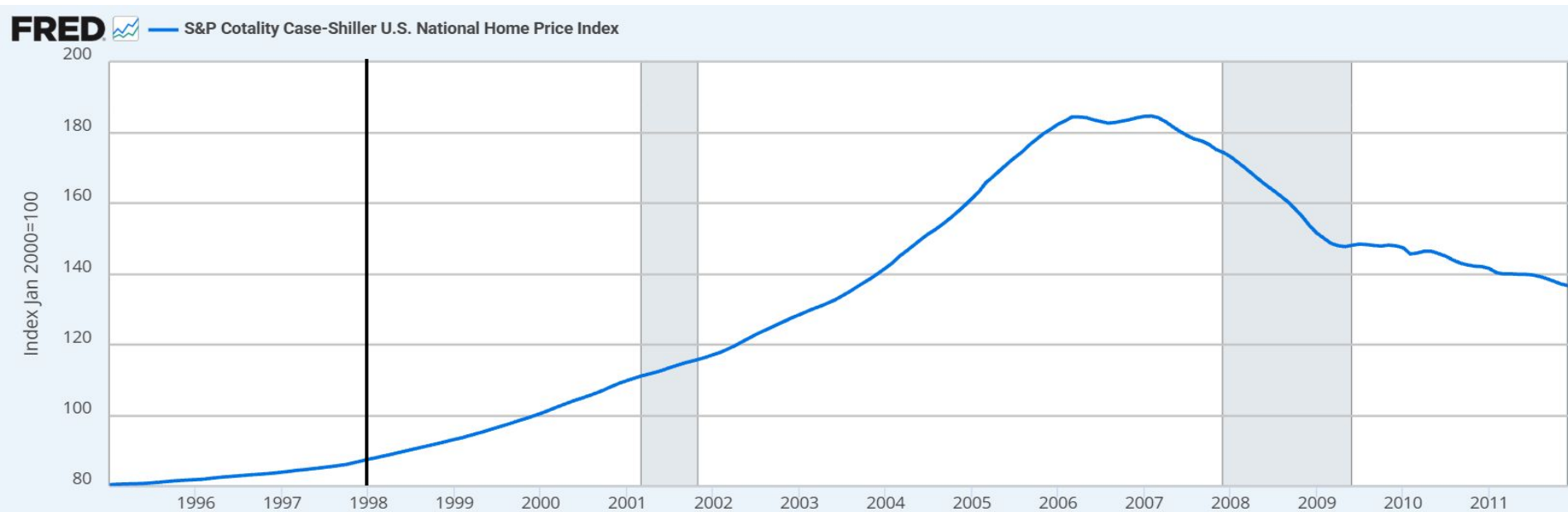
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Source: S&P Dow Jones Indices LLC via FRED®

Shaded areas indicate U.S. recessions.

The Housing Crash



Source: S&P Dow Jones Indices LLC via FRED®

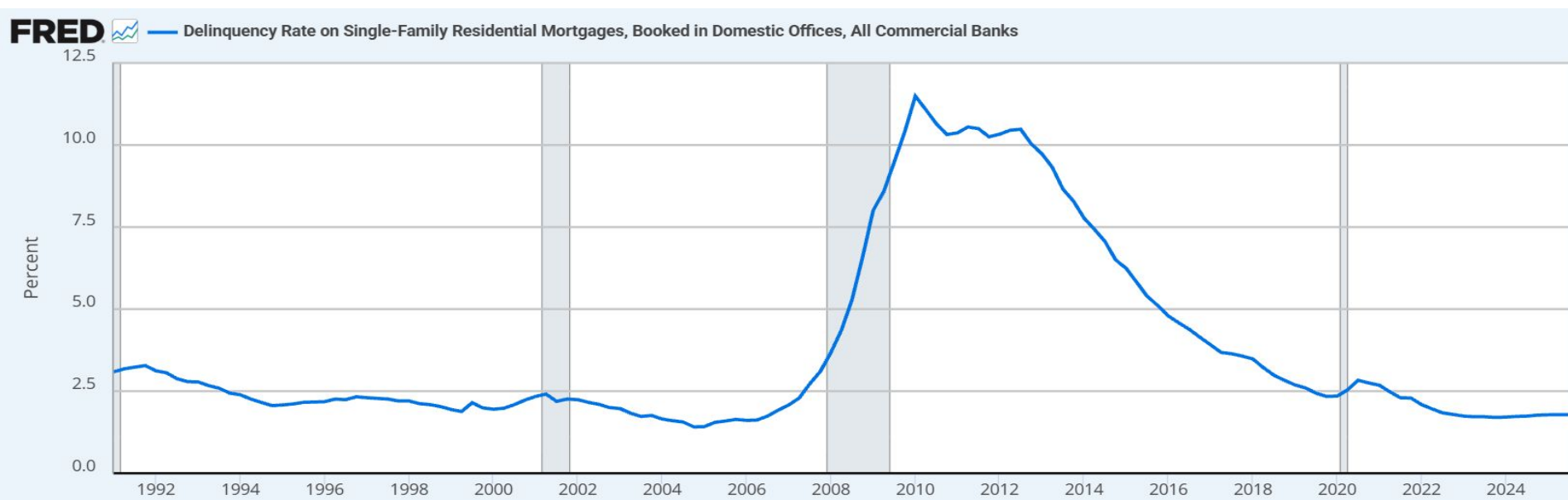
Shaded areas indicate U.S. recessions.

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Fullscreen 

The Housing Crash

- As home prices plummeted and economy slowed, borrowers started missing mortgage payments in droves
- Double whammy for financial institutions:
 1. Not receiving expected payments
 2. Collateral for the mortgages – the houses themselves – are losing value



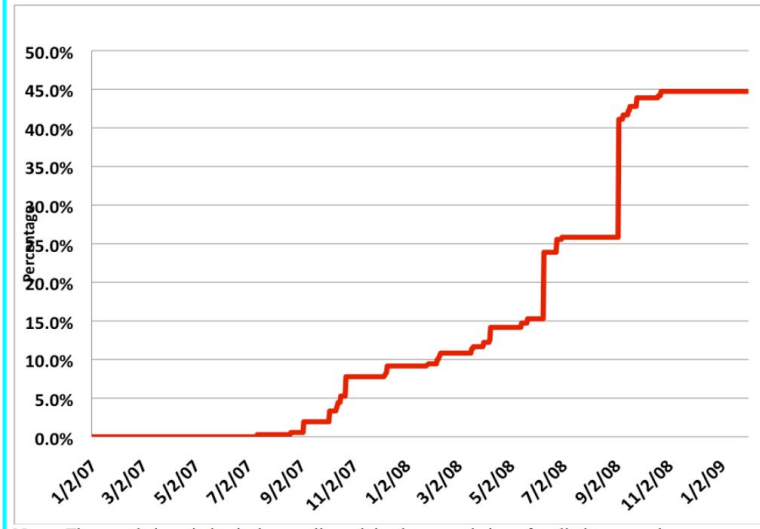
Source: Board of Governors of the Federal Reserve System (US) via FRED®

Shaded areas indicate U.S. recessions.

Shadow Banks

- Regulation of commercial banks since the Great Depression meant they weathered the storm okay
 1. Not allowed to speculate on asset markets
 2. Deposit insurance
- But “shadow banks” – investment banks like Bear Stearns and Lehman Brothers – had grown in importance and were extremely exposed
- Shadow banks act like banks but do not take deposits and so are not regulated in the same way
 - Instead of taking deposits, they take out short-term loans (liquid) to invest in long-term assets (illiquid)
 - Very similar idea to banks
 - A “run” on shadow banks involves refusal of lenders to “roll over” the short-term loans – or charge a very high interest rate for doing so
 - This can cause a shadow bank to contract and fail

Figure 4: The Repo-Haircut Index

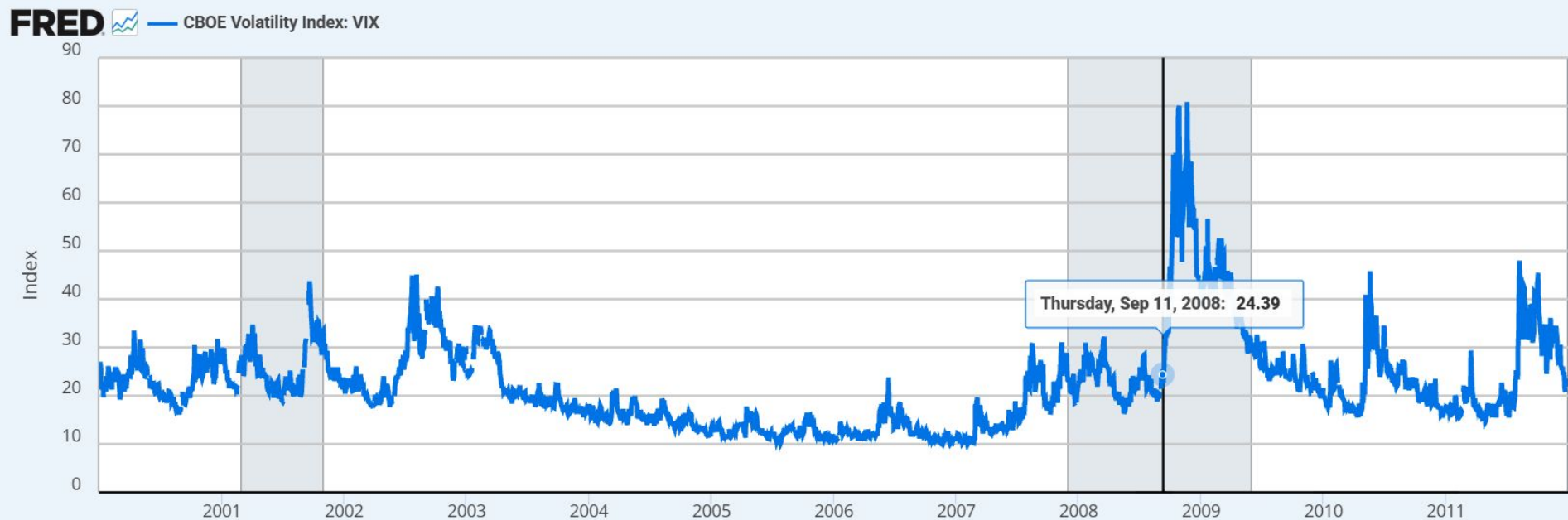


The Financial Accelerator in Action

Value of Stocks



The Financial Accelerator in Action



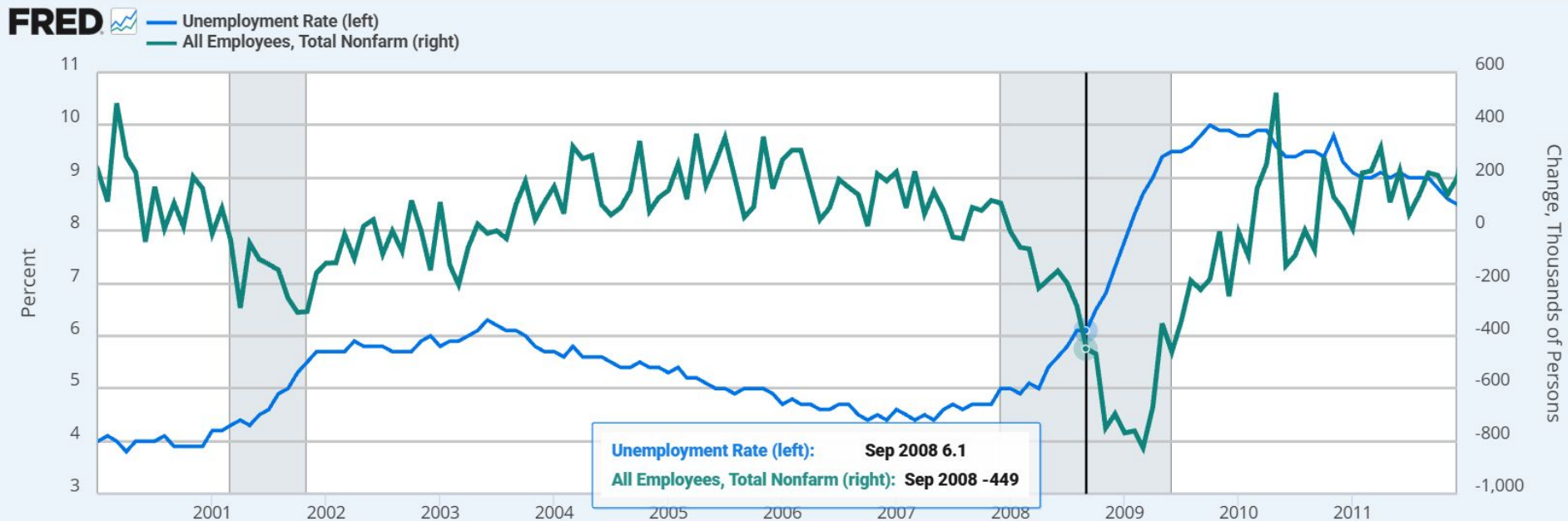
Source: Chicago Board Options Exchange via FRED®

Shaded areas indicate U.S. recessions.

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The Financial Accelerator in Action



Source: U.S. Bureau of Labor Statistics via FRED®

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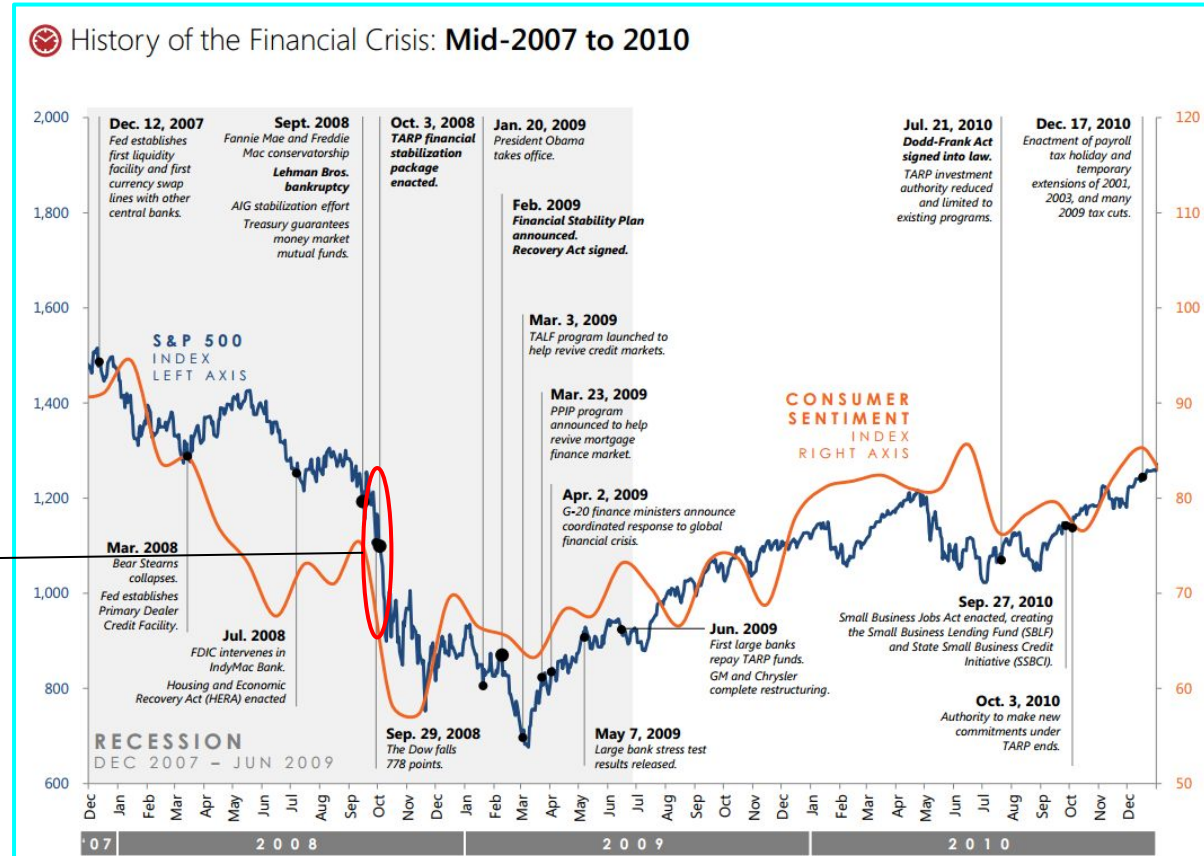
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Policy Responses

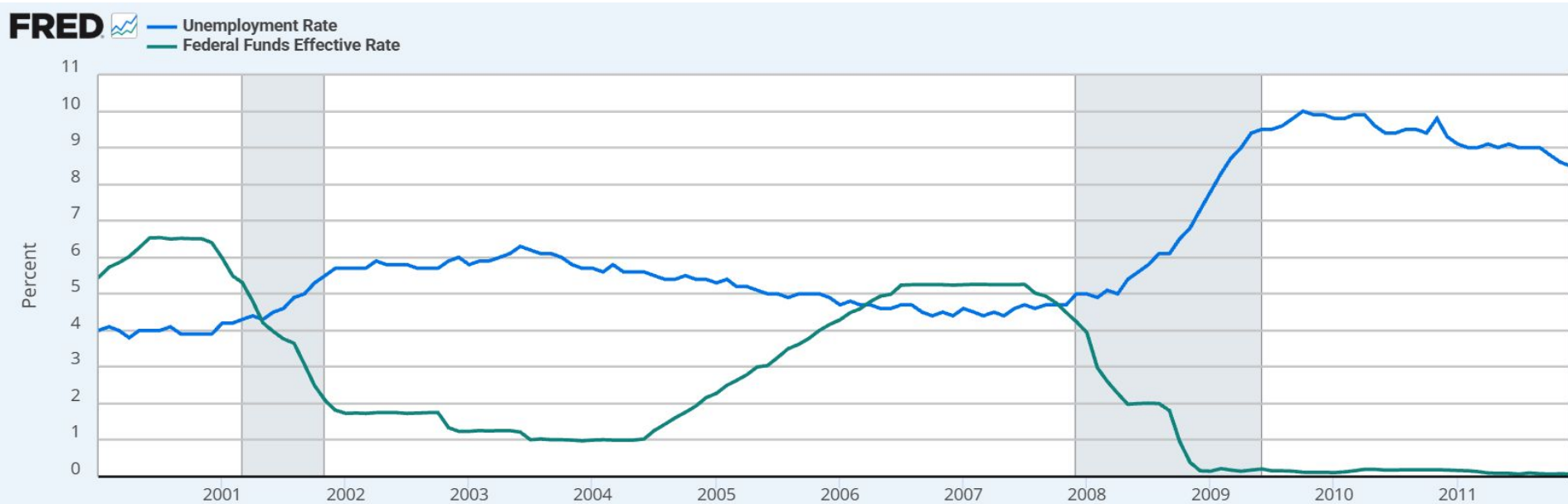
1. Bail out the financial sector (Fed facilities, TARP): incredibly unpopular but probably the most important tool

This plummet occurred when the TARP package initially failed to pass Congress



Policy Responses

1. Bail out the financial sector (Fed facilities, TARP): incredibly unpopular but probably the most important tool
2. Conventional monetary policy, but this ran into the ZLB pretty quickly

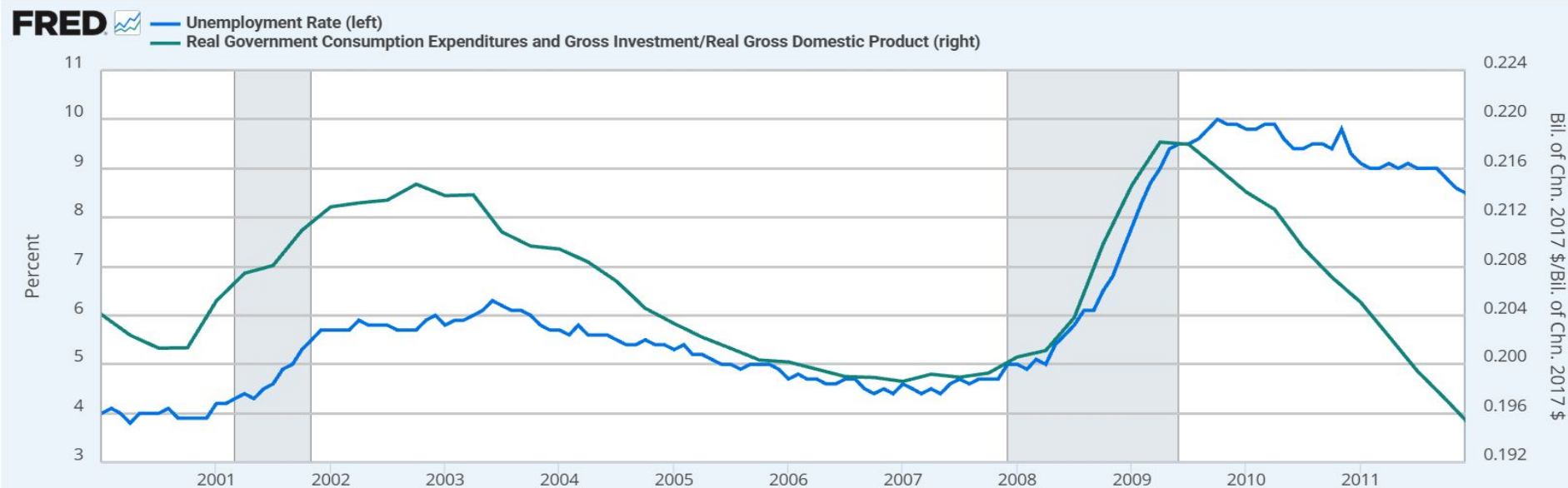


Sources: Board of Governors of the Federal Reserve System (US); U.S. Bureau of Labor Statistics via FRED®

Shaded areas indicate U.S. recessions.

Policy Responses

1. Bail out the financial sector (Fed facilities, TARP): incredibly unpopular but probably the most important tool
2. Conventional monetary policy, but this ran into the ZLB pretty quickly
3. Fiscal policy (Obama stimulus), but this ran into a political roadblock pretty quickly



Sources: U.S. Bureau of Economic Analysis; U.S. Bureau of Labor Statistics via FRED®

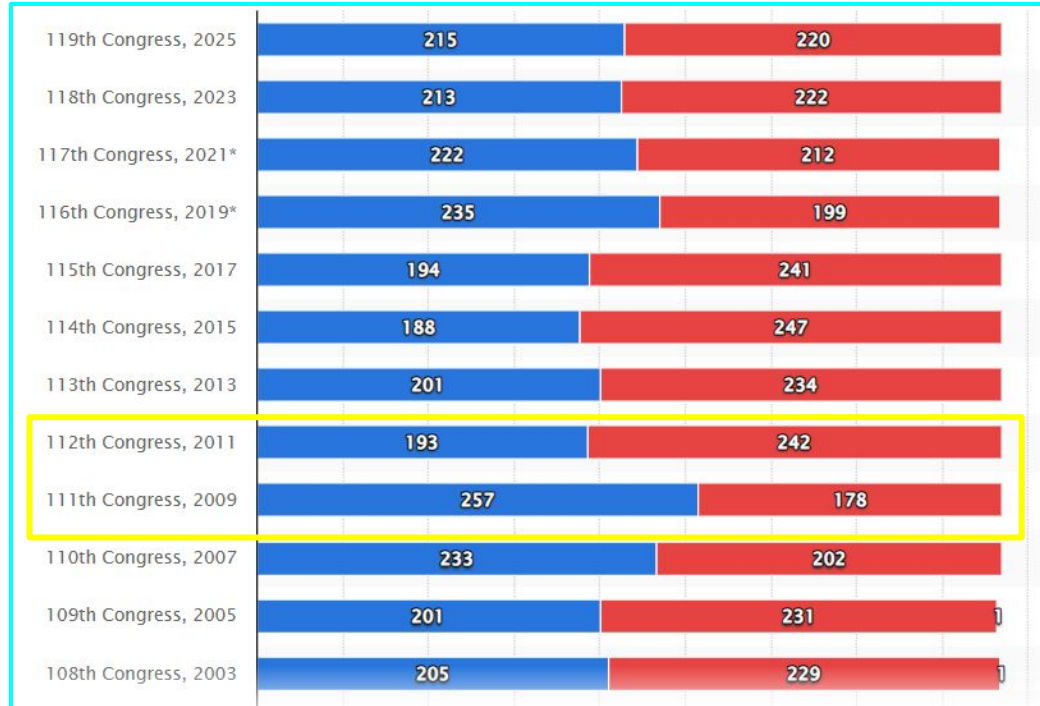
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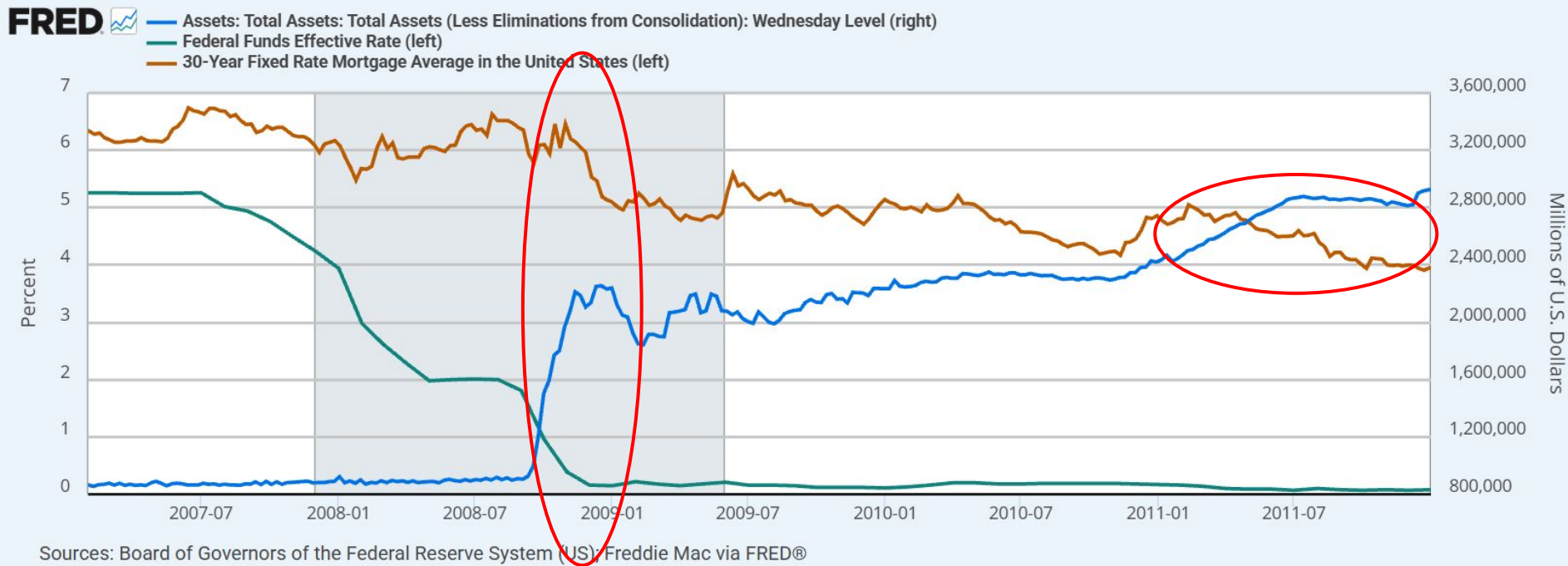


Policy Responses

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2. Conventional monetary policy, but this ran into the ZLB pretty quickly
3. Fiscal policy (Obama stimulus), but this ran into a political roadblock pretty quickly
4. Unconventional monetary policy...

Quantitative Easing (QE)

- Even when FFR is at ZLB, other markets still have positive interest rates, so borrowing costs in those markets can be brought down via direct intervention
- Fed bought tons of consumer debt, which helped push down borrowing costs



Sources: Board of Governors of the Federal Reserve System (US); Freddie Mac via FRED®

Shaded areas indicate U.S. recessions.

Forward Guidance

- The Fed started giving very lengthy descriptions of future policy, basically saying interest rates would be low for a long time.
- This can push down long-term interest rates, which are typically higher than short-term interest rates but also important for spending (e.g. mortgages)
- It can also help create expected inflation
- Difficulty: credibility. You'd love to convince people you will keep FFR at 0 longer than you "should" – that will really push down long-term rates. But will they believe you?

Policy Statement Before Crisis

Federal Reserve Release



Press Release

Release Date: February 2, 2000

For immediate release

The Federal Open Market Committee voted today to raise its target for the federal funds rate by 25 basis points to 5-3/4 percent. In a related action, the Board of Governors approved a 25 basis point increase in the discount rate to 5-1/4 percent.

The Committee remains concerned that over time increases in demand will continue to exceed the growth in potential supply, even after taking account of the pronounced rise in productivity growth. Such trends could foster inflationary imbalances that would undermine the economy's record economic expansion.

Against the background of its long-run goals of price stability and sustainable economic growth and of the information currently available, the Committee believes the risks are weighted mainly toward conditions that may generate heightened inflation pressures in the foreseeable future.

In taking the discount rate action, the Federal Reserve Board approved requests submitted by the Boards of Directors of the Federal Reserve Banks of Boston, New York, Philadelphia, Cleveland, Richmond, Atlanta, Chicago, St. Louis, Kansas City and San Francisco. The discount rate is the rate charged depository institutions when they borrow short-term adjustment credit from their district Federal Reserve Banks.

Policy Statement After Crisis

January 27, 2010

FOMC statement

For immediate release

Share 

Information received since the Federal Open Market Committee met in December suggests that economic activity has continued to strengthen and that the deterioration in the labor market is abating. Household spending is expanding at a moderate rate but remains constrained by a weak labor market, modest income growth, lower housing wealth, and tight credit. Business spending on equipment and software appears to be picking up, but investment in structures is still contracting and employers remain reluctant to add to payrolls. Firms have brought inventory stocks into better alignment with sales. While bank lending continues to contract, financial market conditions remain supportive of economic growth. Although the pace of economic recovery is likely to be moderate for a time, the Committee anticipates a gradual return to higher levels of resource utilization in a context of price stability.

With substantial resource slack continuing to restrain cost pressures and with longer-term inflation expectations stable, inflation is likely to be subdued for some time.

The Committee will maintain the target range for the federal funds rate at 0 to 1/4 percent and continues to anticipate that economic conditions, including low rates of resource utilization, subdued inflation trends, and stable inflation expectations, are likely to warrant exceptionally low levels of the federal funds rate for an extended period. To provide support to mortgage lending and housing markets and to improve overall conditions in private credit markets, the Federal Reserve is in the process of purchasing \$1.25 trillion of agency mortgage-backed securities and about \$175 billion of agency debt. In order to promote a smooth transition in markets, the Committee is gradually slowing the pace of these purchases, and it anticipates

that these transactions will be executed by the end of the first quarter. The Committee will continue to evaluate its purchases of securities in light of the evolving economic outlook and conditions in financial markets.

In light of improved functioning of financial markets, the Federal Reserve will be closing the Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility, the Commercial Paper Funding Facility, the Primary Dealer Credit Facility, and the Term Securities Lending Facility on February 1, as previously announced. In addition, the temporary liquidity swap arrangements between the Federal Reserve and other central banks will expire on February 1. The Federal Reserve is in the process of winding down its Term Auction Facility: \$50 billion in 28-day credit will be offered on February 8 and \$25 billion in 28-day credit will be offered at the final auction on March 8. The anticipated expiration dates for the Term Asset-Backed Securities Loan Facility remain set at June 30 for loans backed by new-issue commercial mortgage-backed securities and March 31 for loans backed by all other types of collateral. The Federal Reserve is prepared to modify these plans if necessary to support financial stability and economic growth.

Voting for the FOMC monetary policy action were: Ben S. Bernanke, Chairman; William C. Dudley, Vice Chairman; James Bullard; Elizabeth A. Duke; Donald L. Kohn; Sandra Pianalto; Eric S. Rosengren; Daniel K. Tarullo; and Kevin M. Warsh. Voting against the policy action was Thomas M. Hoenig, who believed that economic and financial conditions had changed sufficiently that the expectation of exceptionally low levels of the federal funds rate for an extended period was no longer warranted.

Taking Stock

- The Great Recession was easily the worst recession since the Great Depression in the United States
- However, it was also easily better than the Great Depression
- This is in no small part due to far superior economic policymaking
 1. Financial sector was bailed out aggressively
 2. Unconventional monetary policy provided stimulus even at ZLB
 3. Fiscal policy still played a backup role, but at least it was not contractionary (not the case in Europe)
- Despite immense carnage in the financial sector, nothing like the wholesale collapse of the banking system occurred, as in the 1930s
 - Thank you, FDIC!
- No deflationary spiral occurred. Inflation was remarkably well-anchored at 2%
- We will now turn to models with inflation.

There was no deflationary spiral in the Great Recession, though 2009 looks a bit scary

