

Intermediate Macroeconomics

The Great Recession and the Short-run Model

ECON 3311 – Fall 2024

UT Dallas

Overview

This Lecture: revisit GFC from the lenses of the short-run model

Focus on Risk Premium

Analysis of Policy Response

In this lecture, we will

- Introduce financial considerations—a risk premium—into our short-run model and use this framework to understand the **Great Recession**.
- Study deflation, bubbles, and the Federal Reserve's balance sheet as we deepen our understanding of the **financial crisis**.
- Consider various actions that policymakers took in response to these events.

As we did with GDP, we talked first about the Crisis in General, including how it compared across countries

And now we will revisit it but from the lenses of the models we have learned

Introduction

The Great Recession or Global Financial Crisis — an overview

Review: GFC → Crisis "financial" in nature
had global consequences (originated in the US)
Relatively long-lasting crisis (& long post-recovery period)

"Financial Tsunami":

- In late 2008, a financial tsunami struck, collapsing century-old financial institutions and causing widespread panic in global markets.
- The stock market plummeted by a third, wiping out trillions in wealth.

• **"Global Impact":**

- What began as a localized mortgage crisis rapidly expanded, leading to a **worldwide economic downturn**.
- Global GDP declined in 2009 for the first time in decades, with the US unemployment rate peaking at 10%.

Introduction

Policy Responses: Conventional → lower interest rates

↳ Insufficient: i ↓ to zero (ZLB: zero lower bound)

(More stimulus was required)

Policy Responses:

• "Federal Reserve Actions":

- The Fed lowered interest rates to zero
- But conventional policies were insufficient.
- Introduced **unconventional policies**, adding \$3.5 trillion in loans and asset purchases.

Unconventional: "Transfer-based" policies

↑ loans and Troubled Assets Purchases
(from banks)

• "Government Interventions":

- \$700 billion Troubled Asset Relief Program (TARP)
- \$787 billion fiscal stimulus under the American Recovery and Reinvestment Act of 2009.

also: fiscal transfer

• "Challenges for Policymakers":

- Lowering interest rates faced limitations due to excessive borrowing.

The **financial nature** of this crisis made it specially complex: Conventional policies were unable to stimulate the economy and due to the effect on investment the recovery was a very slow and long process

Financial Frictions

Spread between government securities and corporate bonds increased sharply

Even if the Fed tried to lower their rate and stimulate, the borrowing rates for the public rose!

Interest Rate Spread Dynamics

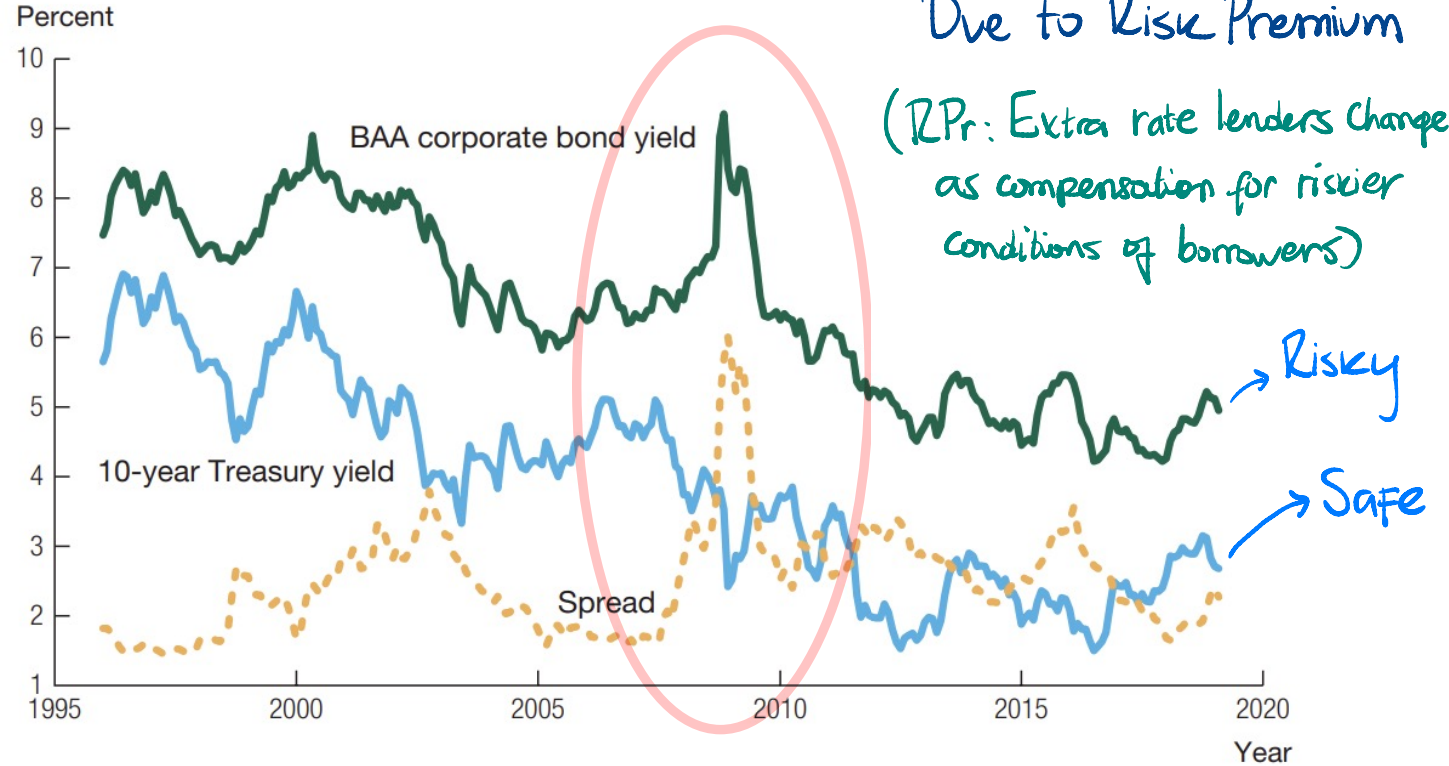
Corporate bond yields diverged from the 10-year Treasury yields, peaking at over 6 percentage points in December 2008.

Disconnect between policy rate and other rates (driven by risk) made challenging for the Fed to stabilize the economy

Intuition for a spread: Is a **premium on the usual return**, that you pay an investor to make him willing to buy a riskier asset. The higher the extra risk, the higher the spread.

↑ Risk Perceived ⇒ even with low policy rates public faced Costly Debt

The Spread between Corporate Bonds and 10-Year Treasuries



Source: The FRED database.

Spread: Risky Assets' rate - Safe Assets' rate

Financial Frictions

Model can be adjusted to include spread

This spread is absent from our short-run model. So if we want to use the model for analyzing the Great Recession we should adjust the model

$$R = R^{ff} + \bar{f}$$

R : real interest rate
 R^{ff} : Fed's policy rate
 \bar{f} : exogenous risk premium

Safe assets rate (Policy rate)
Risk Premium (extra rate to pay for risky debt)

- More complete framework:
- Still represents \ominus relation (rates vs. \tilde{Y})
 - But now also captures that: Sometimes the actual Cost of Debt can disconnect from policy rates

With \bar{f} we are capturing the fact that there is a spread, but also that there can be a disconnect between the rate set by the central banks R^{ff} and the rate faced by the public R

Thus \bar{f} interferes with the central bank's ability to stabilize the economy

During normal times we can assume $\bar{f} = 0$ (or is very low).

Financial Frictions in the IS/MP Framework

Shock: Housing Bubble bursts

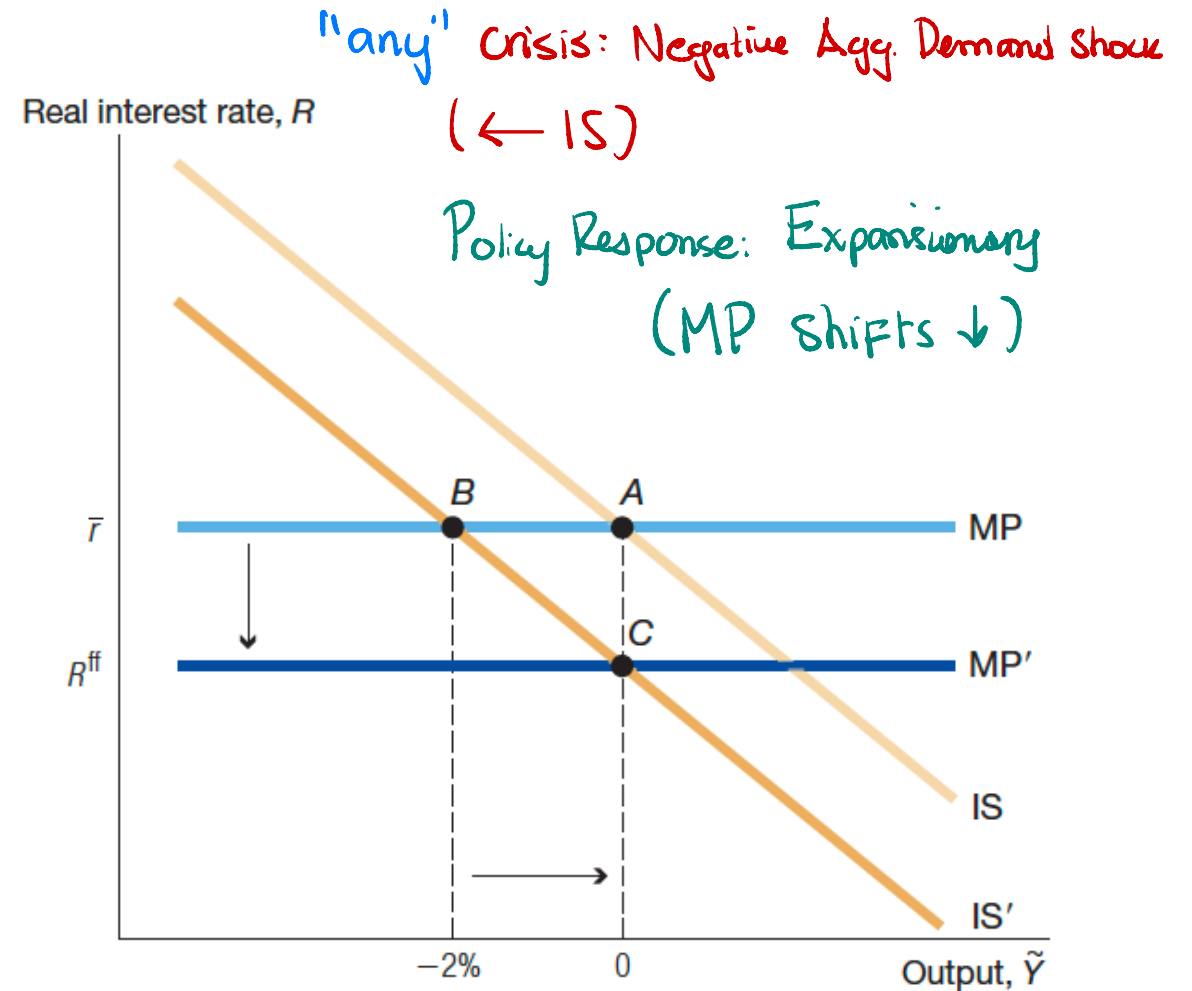
- Collapsed housing prices lead to a decrease in household wealth and a reduction in consumption.
- IS/MP: Negative demand shock, the IS curve to shift downward, leading to a mild recession.

Federal Reserve Intervention:

- **Lowers the fed funds** rate to stimulate the economy, attempting to avoid a deep recession.
- **The economy returns to its potential output**

In "Any" crisis: Spread = 0

⇒ Central Bank can stimulate
(and restore \tilde{y} to $\tilde{y} = 0$)



Financial Frictions in the IS/MP Framework

Same shock in the financial crisis:

Financial frictions increase: **Higher risk premium (\bar{f})**

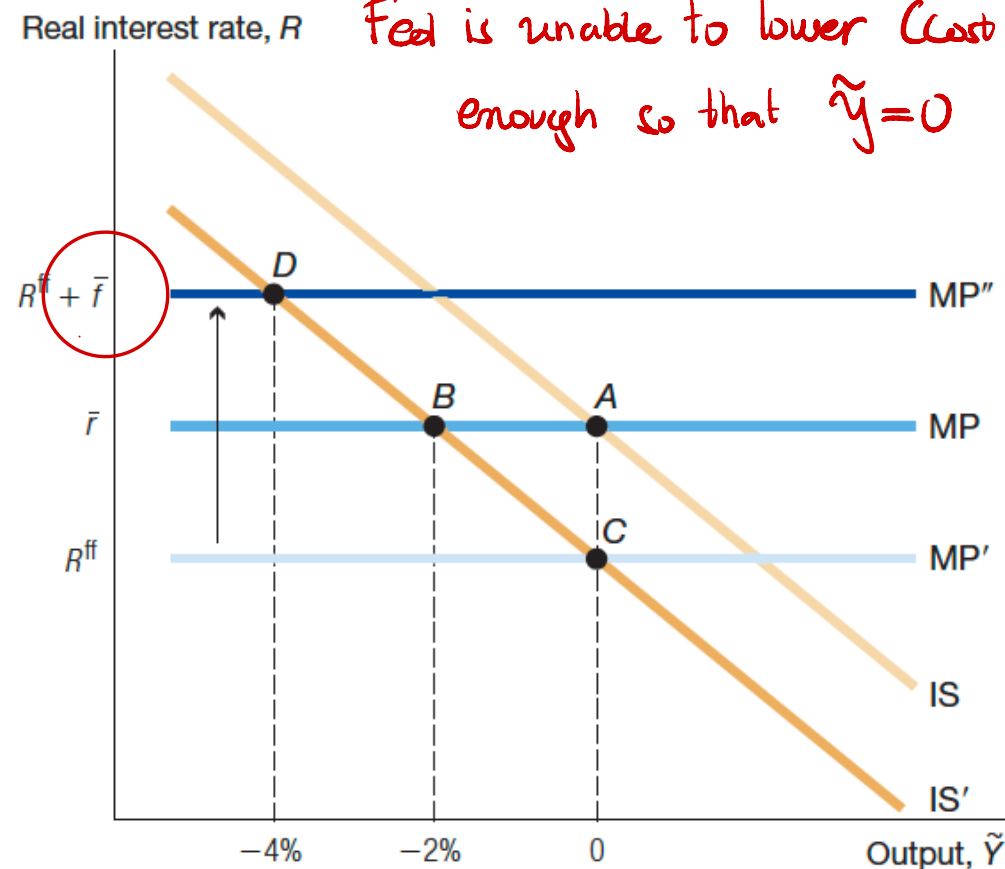
Fed's ability to control the real interest rate is limited

Actual rate paid by the public is higher even with lower policy rate!

A strong recession ensues

Result: The Fed's unable to bring the economy back to potential

With high Risk Premium: Actual rates are too high & Fed is unable to lower (cost of debt) enough so that $\tilde{y}=0$



Financial Frictions in the AS/AD Framework

We can also analyze this with the AS/AD model (that is based on the IS/MP, a policy rule, and Phillips curve)

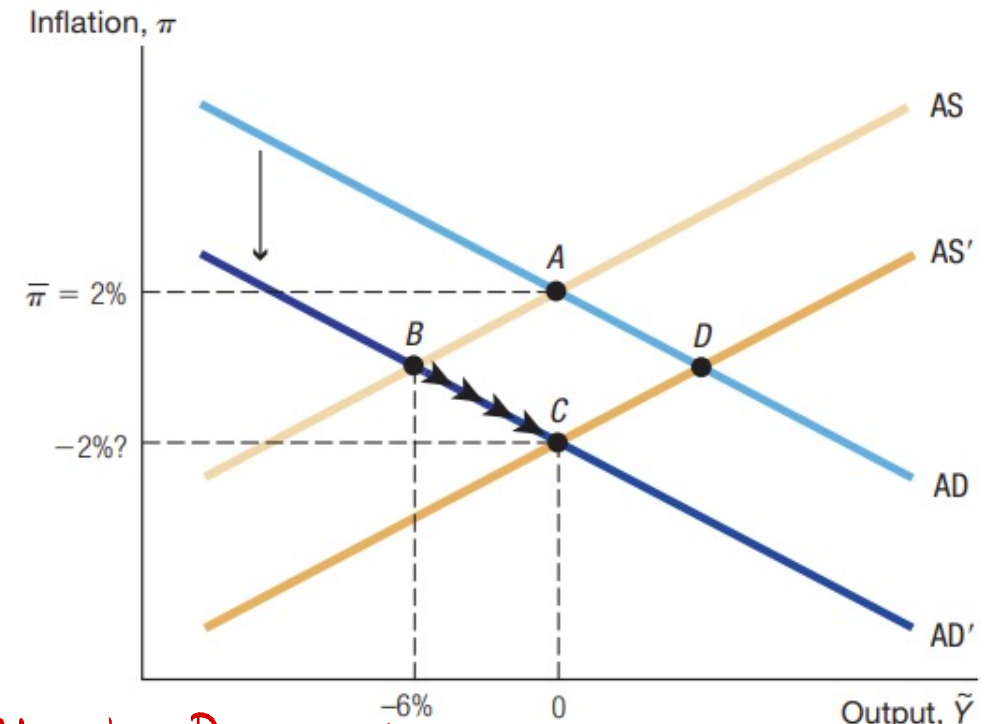
Shock: Housing bubble burst (negative AD shock)

- AS/AD: Negative aggregate demand shock, AD shifts downward.
- Deep recession: Output drops, inflation decreases

Implications for Inflation:

- During the Great Recession, inflation was already low ($\sim 2\%$). The strong downward shift in the AD curve increased the risk of deflation— inflation could become negative.
- The plot looks similar to the negative AD shock in the usual model.
- But the **severity of the crisis** can imply stronger output/inflation drops!

The Financial Crisis in the AS/AD Framework



In AS/AD: Negative Demand Shock ("large or severe" shifts)
 $\Rightarrow \pi$ lowers \rightarrow (Expect $\pi \downarrow$) \rightarrow Shift in AS (\downarrow)

Adjustments in AD: Include an expression for R with spread

Modifying the AS/AD model

A striking fact is that the plot for the shock was the same as without adjusting the model

Let's see how the AD in the model changes:

IS Curve:
$$\tilde{Y}_t = \bar{a} + \bar{b}(R_t - \bar{r})$$

Monetary rule:
$$R_t^{ff} - \bar{r} = \bar{m}(\pi_t - \bar{\pi})$$

Financial friction:
$$R_t = R_t^{ff} + \bar{f}$$

$$\bar{f} > 0 \text{ (Financial Friction)}$$

Combine the friction and monetary rule:

$$R_t - \bar{r} = \bar{f} + \bar{m}(\pi_t - \bar{\pi})$$

New AD curve: Substitute into the IS curve to get the AD

$$\tilde{Y}_t = \bar{a} - \bar{b}\bar{f} + \bar{b}(R_t - \bar{r})$$

New AD looks very similar to the previous one, say if we now call the shock: $\bar{e} = \bar{a} - \bar{b}\bar{f}$

What changes: \bar{f} is going to affect the AD shock (higher \bar{f} implies a negative AD shock)

Thus we should expect the plot to look the same but the severity of the crisis to differ

New Part:
replace both on IS

Now AD shock is $e = \bar{a} - \bar{b}\bar{f}$
 $\Rightarrow \uparrow \text{Spread } (\uparrow \bar{f}) \Rightarrow \text{Stronger } \ominus \text{ AD shock}$

The Dangers of Deflation

$\pi < 0$ Deflation: Very troublesome
highly recessionary: lowers incentives
to consume & invest
($\pi < 0$)
} Implies
} $\uparrow R$

Deflation: Decrease in the general price level of goods and services decreases.

It leads to a **rise in the real rate** (think of the Fisher equation)

$$\text{Nominal rate: } i_t = R_t + \pi_t$$

$$\text{Real rate: } R_t = i_t - \pi_t$$

Impact on the Economy:

- Deflation raises the real rate and increases credit burden on borrowers, discourages investment
- Thereby pushing the economy into recessions

Intuition: If you think prices will lower, you would postpone any Consumption and Investment plans

Past Experiences:

- Great Depression: Deflation magnified the severity and duration of the economic downturn

Liquidity Trap:

- It also lowers the nominal rate and it could hit zero (Zero Lower Bound)
- At that point the central banks are unable to stimulate the economy: They cannot lower the rates!

The Dangers of Deflation

Solution: Policy Stimulus (expansionary)
But what if $i=0$ (ZLB)?

⇒ Role for Unconventional Stimuli

Monetary Policy Limitations:

- Zero Lower Bound: If nominal interests reach zero monetary policy is rendered ineffective

The solution to prevent adverse deflationary episodes is to still **stimulate the economy**, by how?

Unconventional Policies:

- Central banks may use alternative unconventional policy interventions to stimulate the economy
- Example: Quantitative easing (buying long-term securities) which injects economy directly across the economy (rather than waiting for lower rates to incentivize borrowing and investment).
 - In addition to extra liquidity it increases asset's prices creating a wealth effect (stimulus)

Fiscal Stimulus:

- When monetary policy is constrained, fiscal stimulus (government spending) can be used to boost demand and counteract deflationary pressures.

Fiscal Policies can help (to leave "liquidity" trap)

To note: Unconventional monetary policies (e.g. QE) are basically a type of Fiscal Policy (stimulus) but the only difference is that it is done by the central bank.

The Taylor Rule and Monetary Policy

} More complete policy rule

Taylor rule: Slightly more complex rule for setting the nominal rate that depends on the output gap too

$$i_t = 1 + 1.5\pi_t + 0.5\tilde{Y}_t$$

The rule suggests a target interest rate that central banks should follow to stabilize the economy.

As before we can see how well this rule fares relative to how the rate behaved during the crisis.

Policy During the Crisis:

The actual fed funds rate was often below the rate suggested by the Taylor Rule: Expansionary policy.

But as we saw, the financial frictions prevented this stimulus from translating into:

Shows better how pre-crisis rates were "too low"

- Lower debt costs, higher borrowing and higher GDP
- Zero lower bound: Interest rate could not drop further to stimulate as needed.

Pre-Crisis Policy Concerns:

(Contributing to bubble build up)

- Fed funds rate was kept lower than the rule's prescription, which may have contributed to the bubble.
 - This can be known as having a small policy space
 - For example, if your rate is 5% you have more space to stimulate (lower rates) than if it is 2%

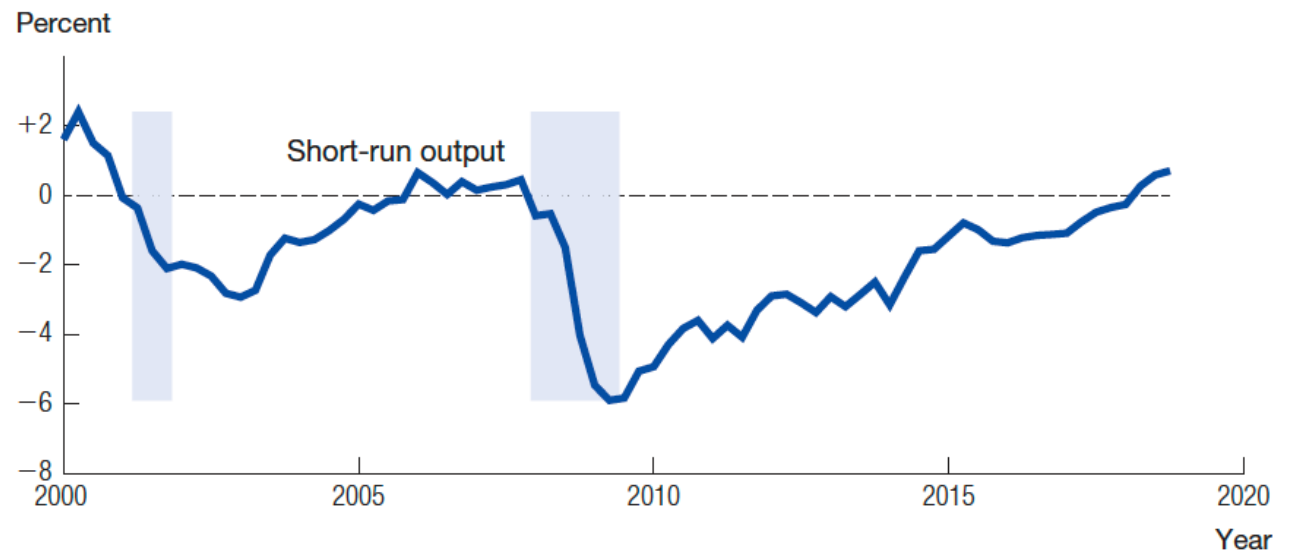
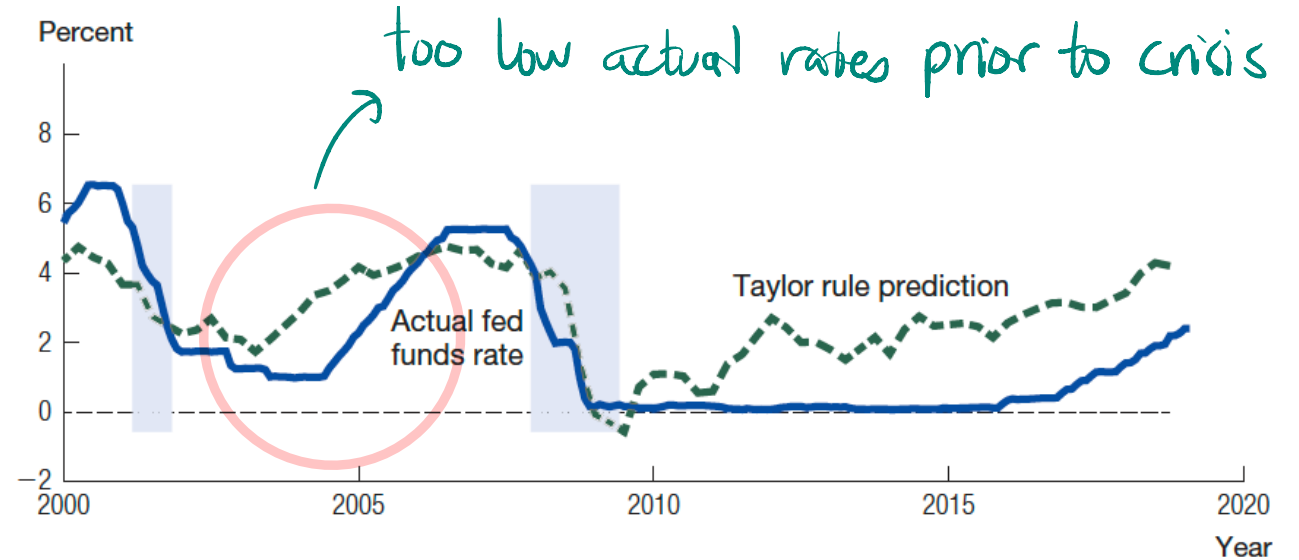
The Taylor Rule and Monetary Policy

We can see that the **actual rate** was way **below the rule suggested value**

This means the stimulus was much higher than suggested by the rule

And yet the short run output (as deviation of its long run) remained negative

Similarly, there were strong deflationary pressures (not shown)



The output gap during the Crisis

⊖ Effect was too long-lasting
⇒ Even estimates of \bar{Y} lowered

Output gap: Difference between actual GDP and potential GDP (what we called short run output or \tilde{Y})

Post-crisis period: The output gap closed

- But not because actual GDP grew rapidly
- Instead, because the estimates of potential Output lowered
- Congressional Budget Office (CBO): By 2018, actual GDP was more than 10% below the potential GDP projected in 2007

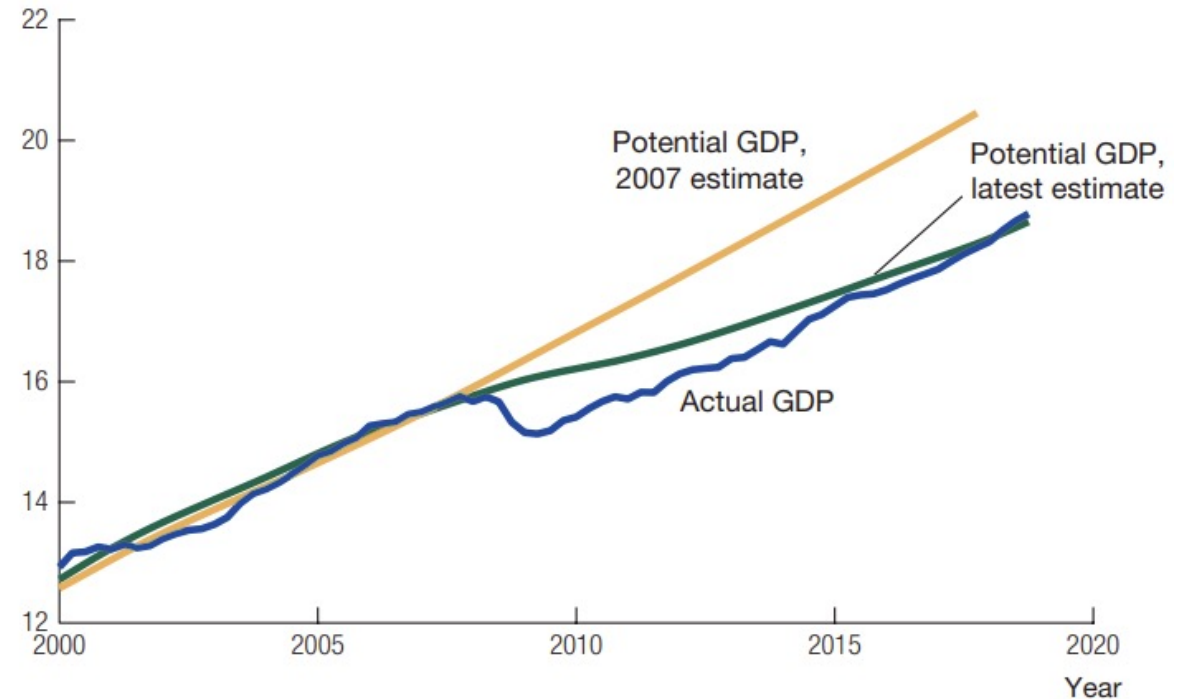
Policy implications:

- Think of the Taylor Rule. Different Output Gaps can led to drastically different policies

To note: This kind of result has opened the discussion in macroeconomics about whether the long-run growth has been affected by a short-run crisis episode.

What Happened to Potential GDP?

Trillions of 2012 dollars



Source: FRED.

The Money Supply

Historical Context:

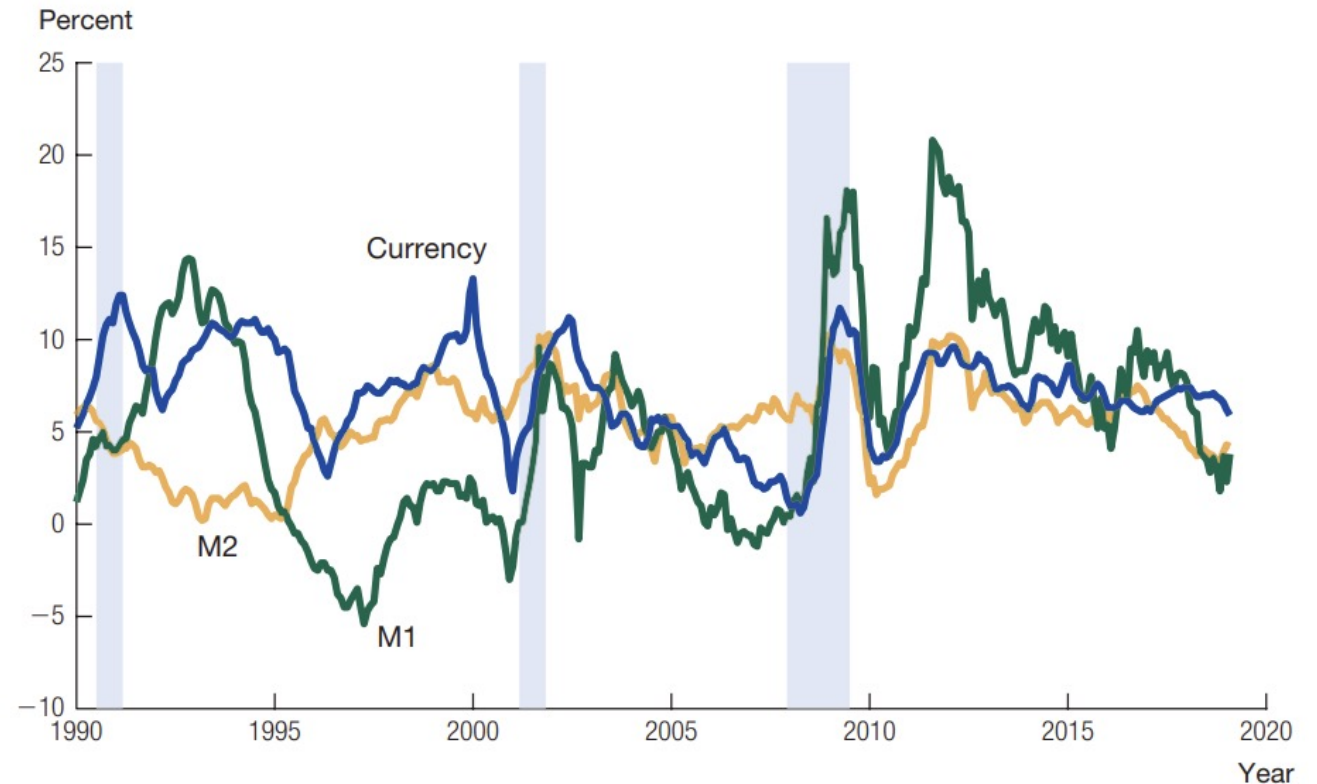
- Milton Friedman and Anna Schwartz: Great Depression ensued due to overly tight monetary policy and deflation.
- Sharp decline in the money supply 1929-33: critical factor in worsening the Depression.

Federal Reserve's Response 2009-2010:

- ZLB and risk of deflation
- Fed focused on increasing money supply by any means
- Money supply: Rapid growth 2008-2009
- Indicative of Fed's commitment to prevent past mistakes
 - Note how the early policy action was unprecedented (and unconventional)

even with ZLB: Fed ↑ Money Supply promptly and substantially (↑ Liquidity) } Key for Preventing a worse crisis

The Growth Rate of Various Money Supply Measures



Source: The FRED database. Percentage changes over the preceding 12 months.

Unconventional Policies for Unconventional times: Expansion of the Fed Balance Sheet

We can see how the unconventional measures reflect on the actual balance sheet of the Fed.

The Fed's total assets grew from \$906 billion in 2007 to \$4 trillion in 2019

Major changes in asset composition: Increase in Mortgage-Backed Securities (MBS) and rise in Treasuries.

The Federal Reserve's Balance Sheet (billions of dollars)

	Assets		Liabilities	
	May 2007	March 2019	May 2007	March 2019
U.S. Treasuries	790	2,180	Currency	814
Mortgage-backed securities	0	1,590	Reserves	7
Other	116	230	Other	85
<i>Total assets</i>	906	4,000	<i>Total liabilities</i>	906

Source: Federal Reserve Release H.4.1. See also James Hamilton's "Econbrowser" blog entry "Managing the Fed's Balance Sheet," December 27, 2015.

Drastic increase in assets & Changes balance sheet composition (Quantitative easing)

The Balance Sheet over time

The balance sheet expansion can also be looked at over time

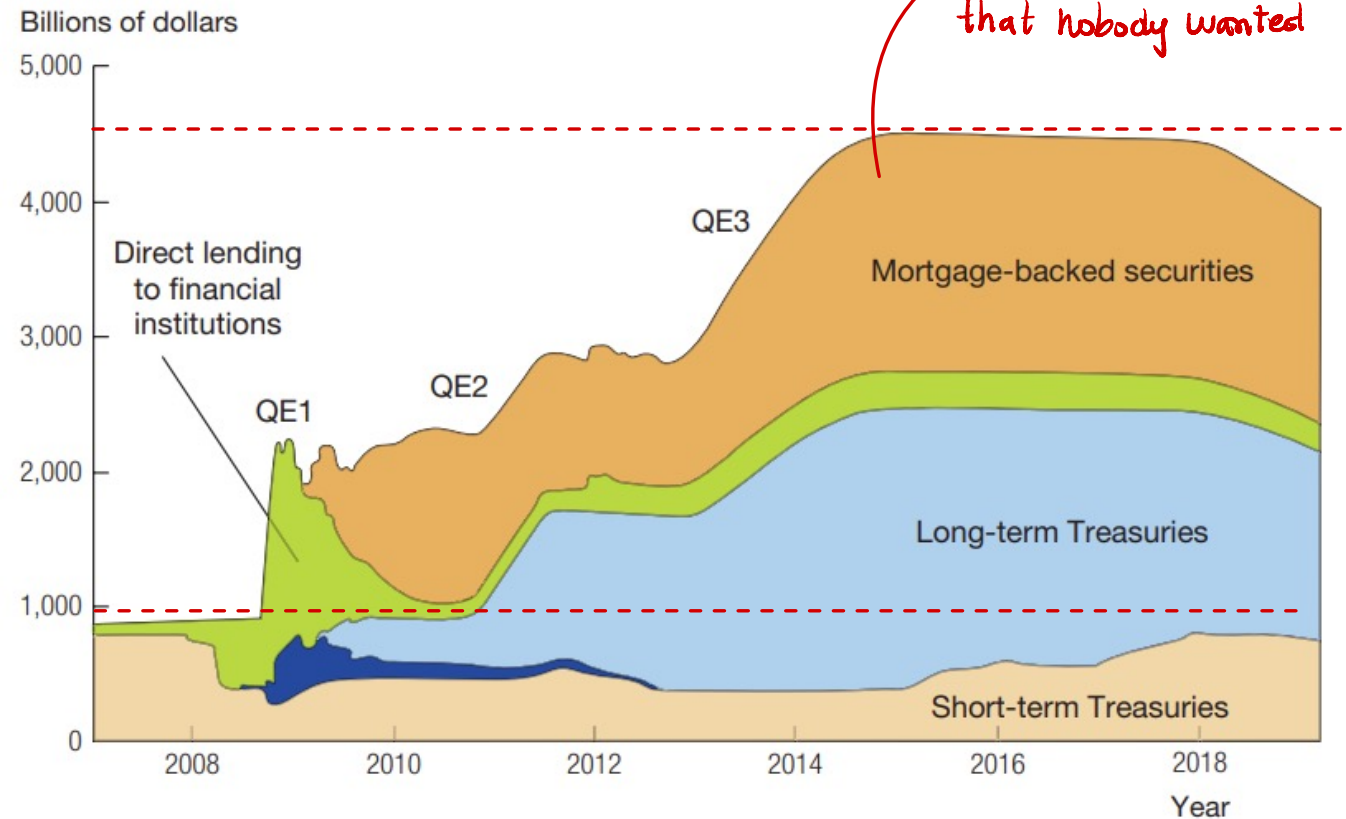
Here we see more easily the **scale of expansion**

The main asset purchases:

Mortgage-backed securities

Long-term assets

Financial Assets of the Federal Reserve



Source: Credit Easing. Federal Reserve Bank of Cleveland. Accessed on 09/27/2019. <https://www.clevelandfed.org/en/our-research/indicators-and-data/credit-easing.aspx>. Reprinted with permission.

Effects in the Stock Market

How did the stock market behaved during the crisis?

We can look at the Price/Earnings ratio, a key financial indicator

P/E ratios reflect the relationship between stock prices and corporate earnings

P/E ratio tends to soar during bubbles.

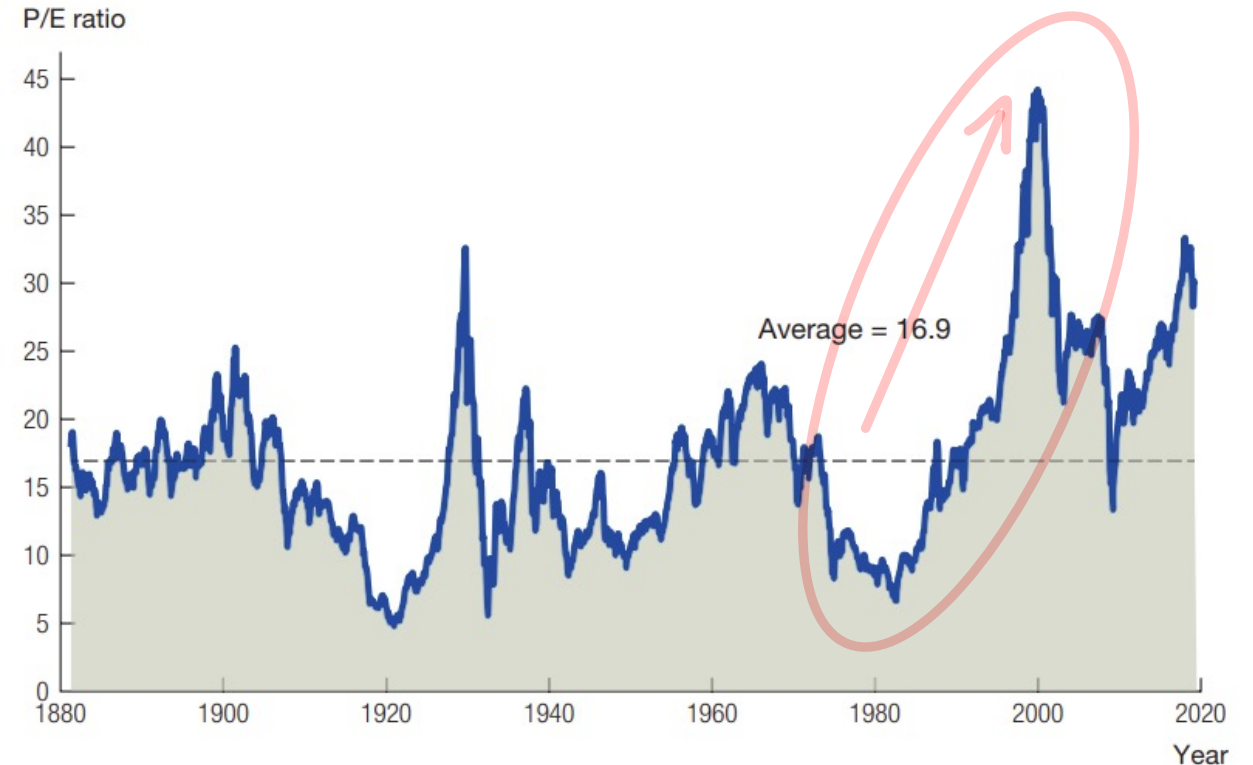
Historical peaks in 1929 and 2000: Reflect **market overvaluation**.

Problem with peaks: **Usually recessions follow**

Volatility in P/E ratios can serve as a **warning signal** for market bubbles and potential crashes.

P/E ratio also indicated a bubble
(excessive valuation)

The Price-Earnings Ratio in the Stock Market



Source: Robert Shiller, www.econ.yale.edu/~shiller/data.htm.

Policy packages used to deal with the crisis

① Stimulus to banks
Purchasing Troubled Assets
& bail outs

Troubled Asset Relief Program (TARP):

- Launched during the 2008 financial crisis to stabilize the financial system.
- \$700 billion used to purchase and insure assets held by financial institutions (boosting liquidity)
- Used to purchase equity in troubled banks, guarantee loans and bail out companies (automakers).
- By 2012, about 97% of the disbursed funds were repaid to the Treasury

② Stimulus to households

Fiscal Stimulus (ARRA):Background:

- Signed into law in 2009 under the American Recovery and Reinvestment Act (ARRA).
- \$787 billion plan, including \$250 billion in tax cuts and over \$500 billion in government spending.
- **Stimulated aggregate demand** through increased government spending and tax cuts.

The European Debt Crisis

Rest of World

Financial crisis too leading to Sovereign Debt Crisis

Unustainable Public Debt

The global financial crisis evolved into a sovereign debt crisis in Europe.

Similar issues as in the U.S., including severe banking sector problems and high unemployment rates.

Impact on European Governments:

Debt Issues emerged in weaker economies (or those with worse fiscal Policies)

Government debts of Greece, Ireland, Italy, and Spain were heavily impacted.

Interest rates on these debts surged to as high as 7%.

But impact to financial Markets leaved to the rest of the EU due to high interlinkages within the monetary region.

Linkages among economies and Exchange Rates:

Maintaining the stability and managing value of the currency of the region became difficult.

Typically a heavily hit country would devalue its currency but here it was not an option.

A big difference for these countries, relative to the US, is that they belong to a monetary union.

Thus, troubles in Greece can more easily translate into issues in Germany.

with all of this: Crisis & Post-recovery lasted even longer than in the US

Financial Reform

Consensus: Too lenient/flexible financial regulations explained the crisis & made it worse.

One lesson from the crisis is that financial regulation was too lenient and its oversight rather weak

Why to reform the financial regulations:

- To minimize the likelihood of another financial crisis.
- To ensure minimal damage if another crisis occurs.

Moral Hazard issue:

- Financial institutions' risky bets due to the expectation of bailouts.
- Government bailouts during the crisis may have increased this problem.

• Underestimation of Risk
• Little to no measures to prevent Contagion of a crisis
• Potential Moral Hazard
(incentives for repeated misbehavior by banks)

Some proposed reforms:

- Enhance Capital Requirements: Increase the percentage of assets (to equity) by banks
- Tighten other regulatory requirements: Lower leverage ratios, higher reserve requirements, etc.
- Require financial firms to have concrete plans in the case of failures

Aftermath of the Great Recession

Very slow recovery

Reason: Debt conditions needed to normalize before (credit) investment could grow

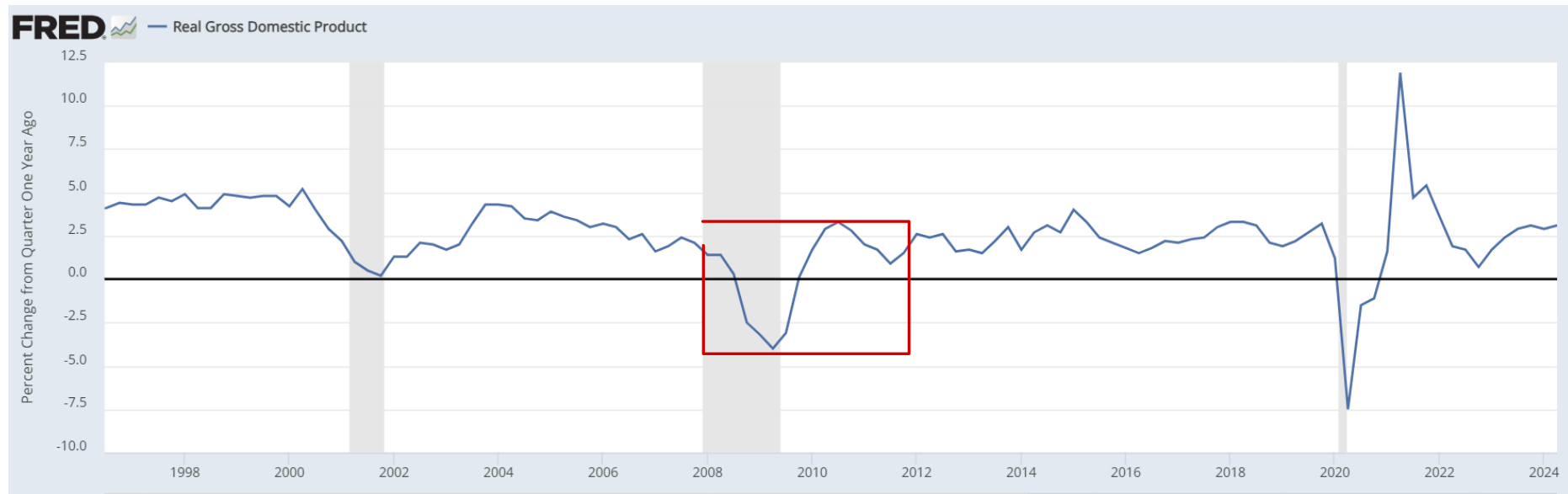
Recovery Post-Recession:

- Slow recovery path—this is related to the deleveraging that follows a financial crisis which generates a longer than normal recovery of investment: Growth rate is still below pre-crisis levels

Secular Stagnation:

Recovery: Slower than in any other crisis.

- Long period of low economic growth, low inflation, and negative real interest rates.
- Phenomenon seen in Japan since the early 90s. It may also be affecting the United States and Europe.
- Reasoning includes a global savings glut combined with a decreased demand for investment



A Productivity Slowdown?

Alternative (or complementary) explanation for slow recovery

Anemic productivity (TFP) growth since 2004, with an average growth of only 0.5% in private sector and a decline of -0.3% in manufacturing.

Unclear Causes:

Reasons for slowdown are not fully understood.

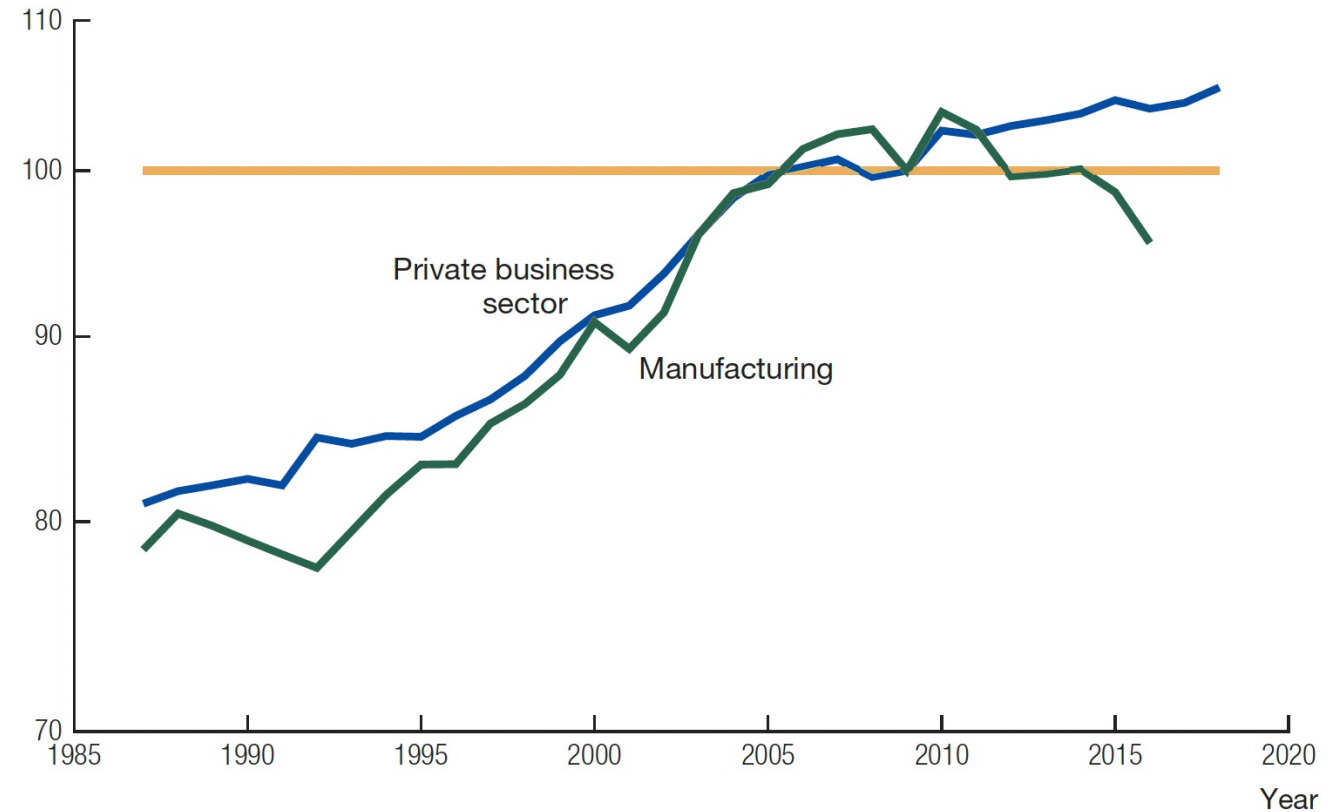
Possible factors include

- decreased R&D spending
- misallocation of resources due to financial crisis

Example: Firms postponing investment plans due to turbulent financial conditions.

U.S. Total Factor Productivity

TFP (2009 = 100, ratio scale)



Source: Bureau of Labor Statistics multifactor productivity database.

Conclusion

1) Financial crises can be more severe
- too long crisis, too slow recovery

- Spread to other sectors

The Global Financial Crisis (GFC) or Great Recession is the largest since the Great Depression.

The Nature of the Great Recession: - Affected Strongly Investment

Unlike previous recessions: **Not intentionally induced (or policy driven)** by the Fed to control inflation.

Instead, it had a financial nature which **increased its severity**

A balance-sheet crisis originating in the US but with an eventual global scale

Long-Term Impact:

2) a long crisis can be worse than a strong but short crisis.

Most crises have a temporary economic effect only despite their severity

However, whether that's the case is still subject to study due to the very slow recovery

GFC vs COVID 19

It's not only its severity but it's nature and slow recovery: For example a stronger crisis, the COVID lockdown was much more temporary

Role of Policy

3) Role of Policy can be key to mitigate effects of the crisis.

A big difference with other crises: Prompt policy actions that committed to stimulate the economy

It is believed that policy helped tremendously to prevent the crisis from having even larger consequences