Special Topics: ZLB, Great Recession, and COVID-19

ECON 30020: Intermediate Macroeconomics

Prof. Eric Sims

University of Notre Dame

Fall 2024

Readings

GLS Ch. 29

GLS Ch. 37

Zero Lower Bound

Until COVID-19, the most important recent development for monetary policy in the US and other developed countries is the zero lower bound (ZLB)

In simple model, nominal interest rate cannot go below zero

- Post-Financial Crisis, several central banks experimented with slightly negative policy rates
- Can justify (slightly) negative rates with some kind of cost to holding cash
- Effective lower bound (ELB)

ZLB in the New Keynesian Model

Fisher relationship:

$$r_t = i_t - \pi^e_{t+1}$$

When ZLB "binds," real interest rate is negative of expected inflation:

$$r_t = -\pi^e_{t+1}$$

This introduces horizontal component of the LM curve and a vertical component of the AD curve

At ZLB, (conventional) monetary policy is impotent and demand shocks have bigger effects

LM Curve

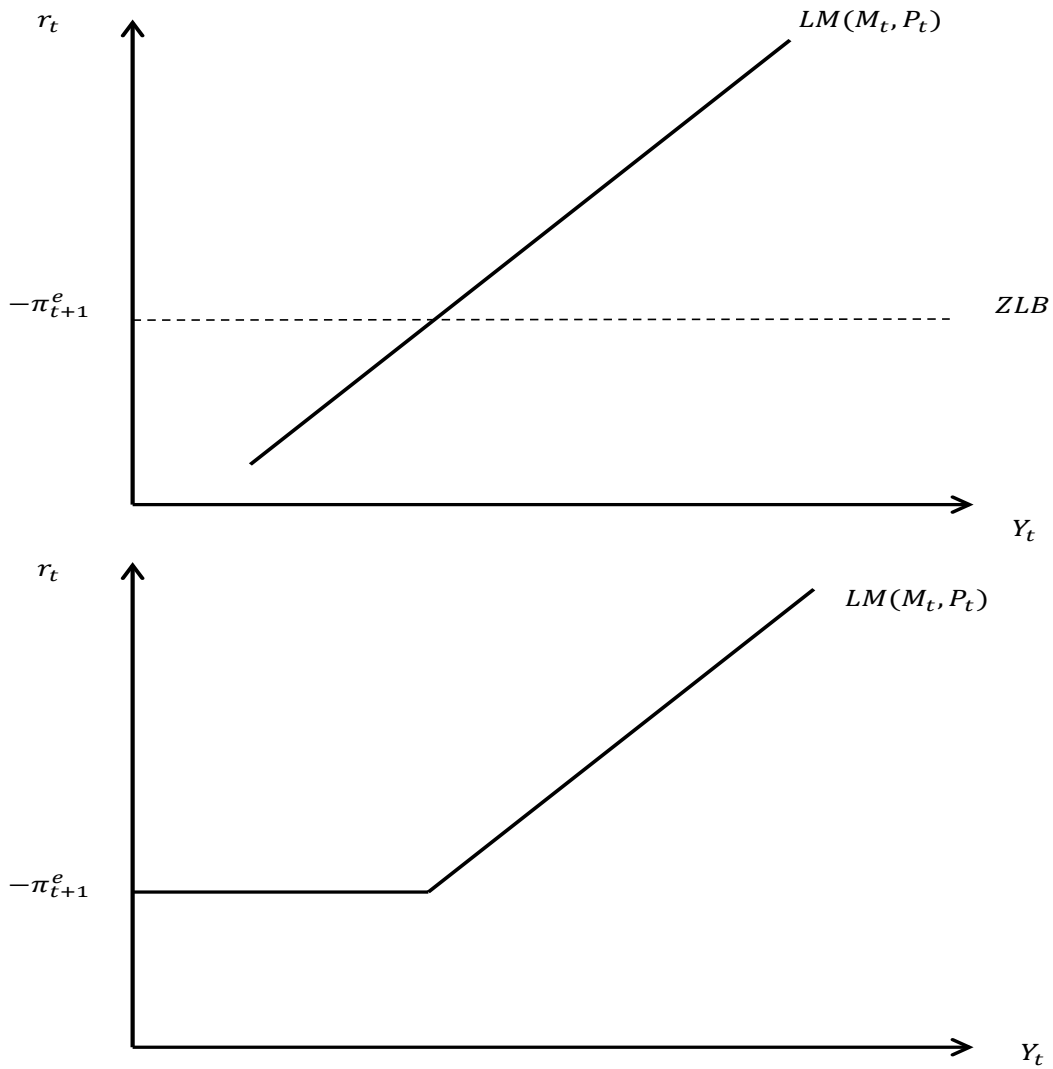
Normal times (upward-sloping):

$$\frac{M_t}{P_t} = M^d(r_t + \pi^e_{t+1}, Y_t)$$

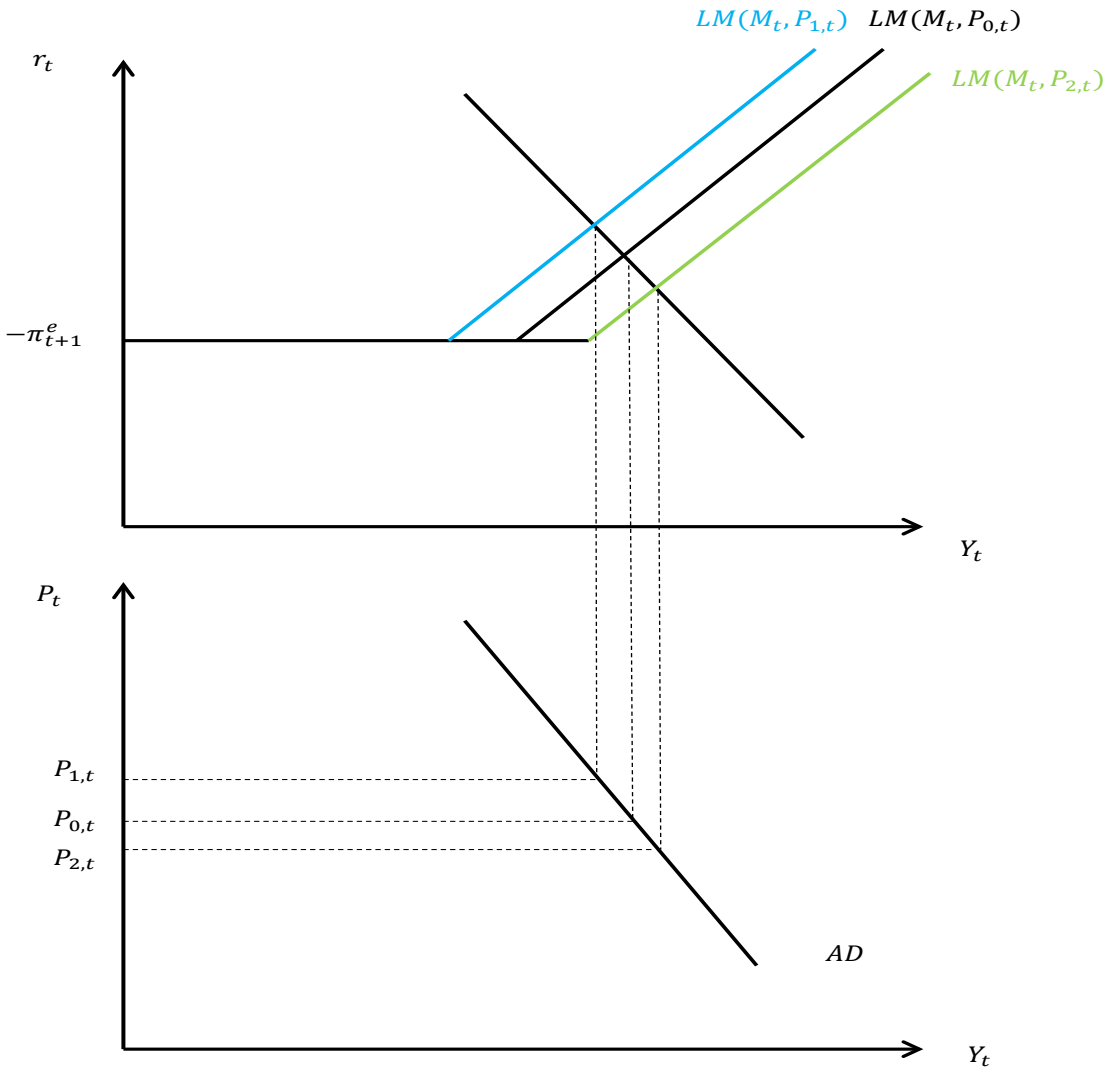
ZLB (horizontal):

$$r_t = -\pi_{t+1}$$

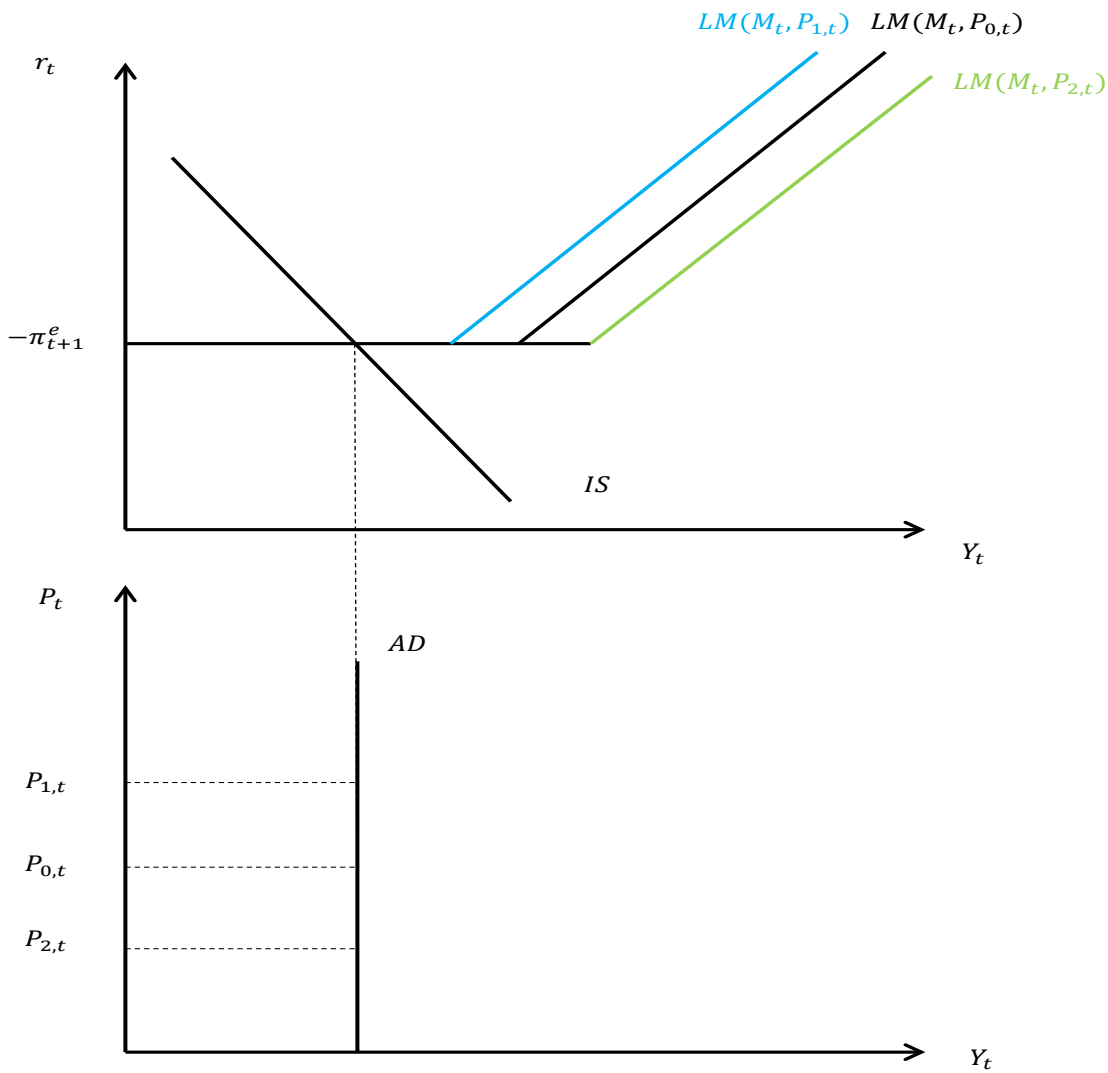
The LM Curve



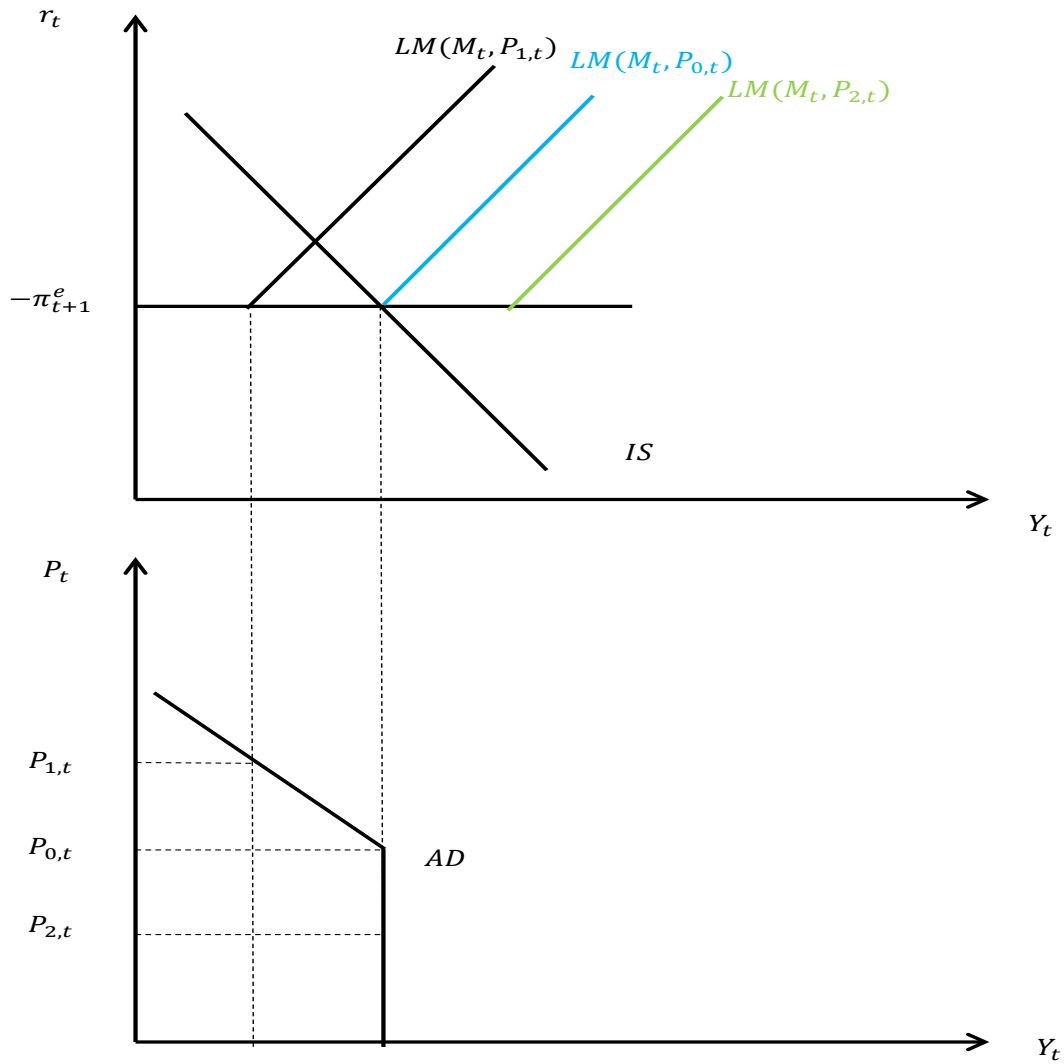
The AD Curve: Non-Binding ZLB



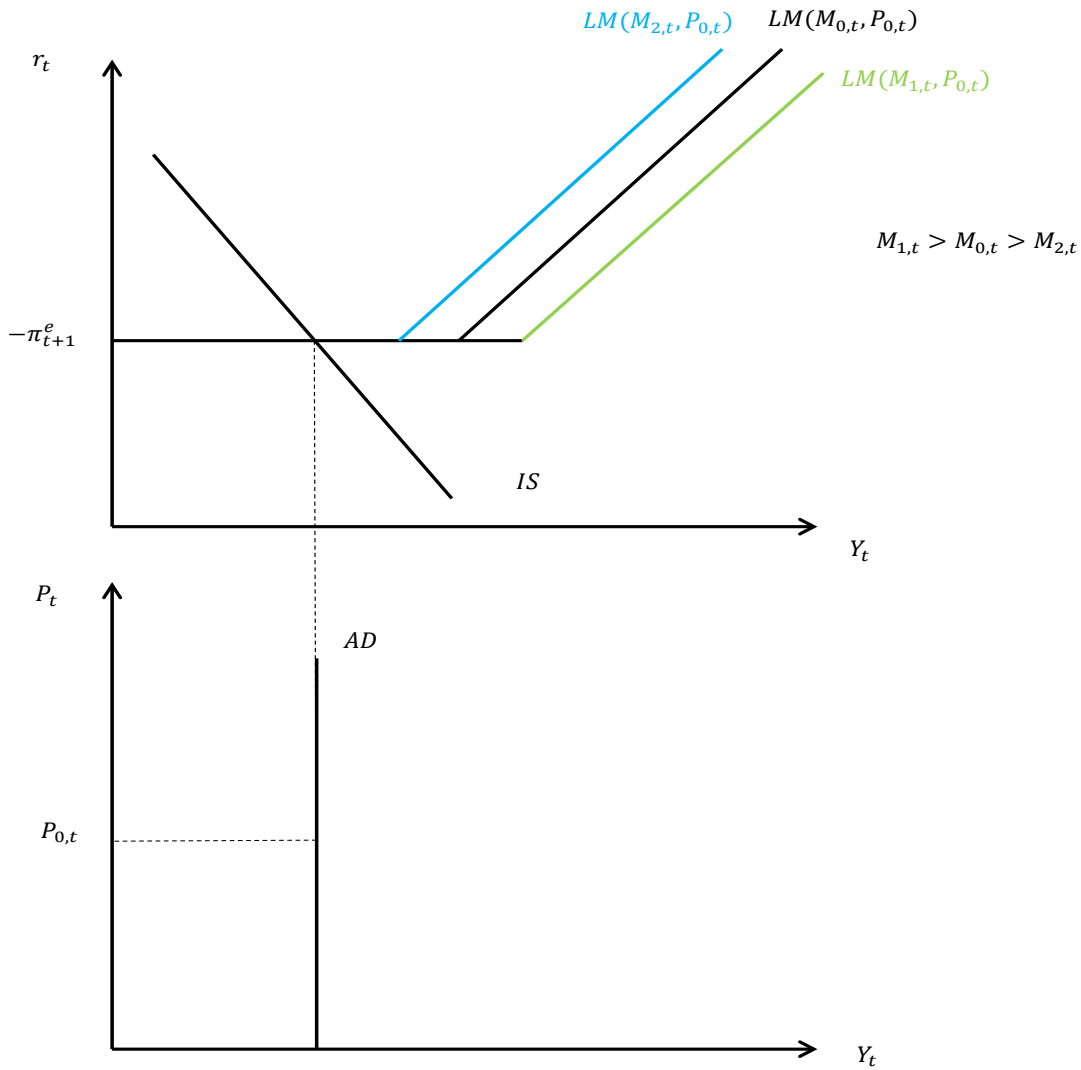
The AD Curve: Binding ZLB



The AD Curve: Binding and Non-Binding



Liquidity Trap: Monetary Policy Ineffectiveness



ZLB and Equilibrium Effects of Shocks

At the ZLB the real interest rate is effectively fixed

This changes in significant ways how the economy reacts to exogenous shocks

Amplifies output responses to *IS* shocks

Dampens output responses to supply shocks

In a sense, exacerbates role of price stickiness relative to neoclassical model

ZLB in the US


FRED
Federal Funds Effective Rate
Percent
9
8
7
6
5
4
3
2
1
0
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Shaded areas indicate U.S. recessions.
Source: Board of Governors of the Federal Reserve System (US)
fred.stlouisfed.org

Why is the ZLB Bad?

In standard models, ignoring the ZLB it is optimal to have a low nominal interest rate (the Friedman Rule)

But central bankers are afraid of the ZLB. Why?

1. Economy highly susceptible to negative demand shocks
2. Normal stabilization policy is not available
3. Things won't get better on their own. AS shifts won't eliminate output gaps

Great Recession

Great Recession

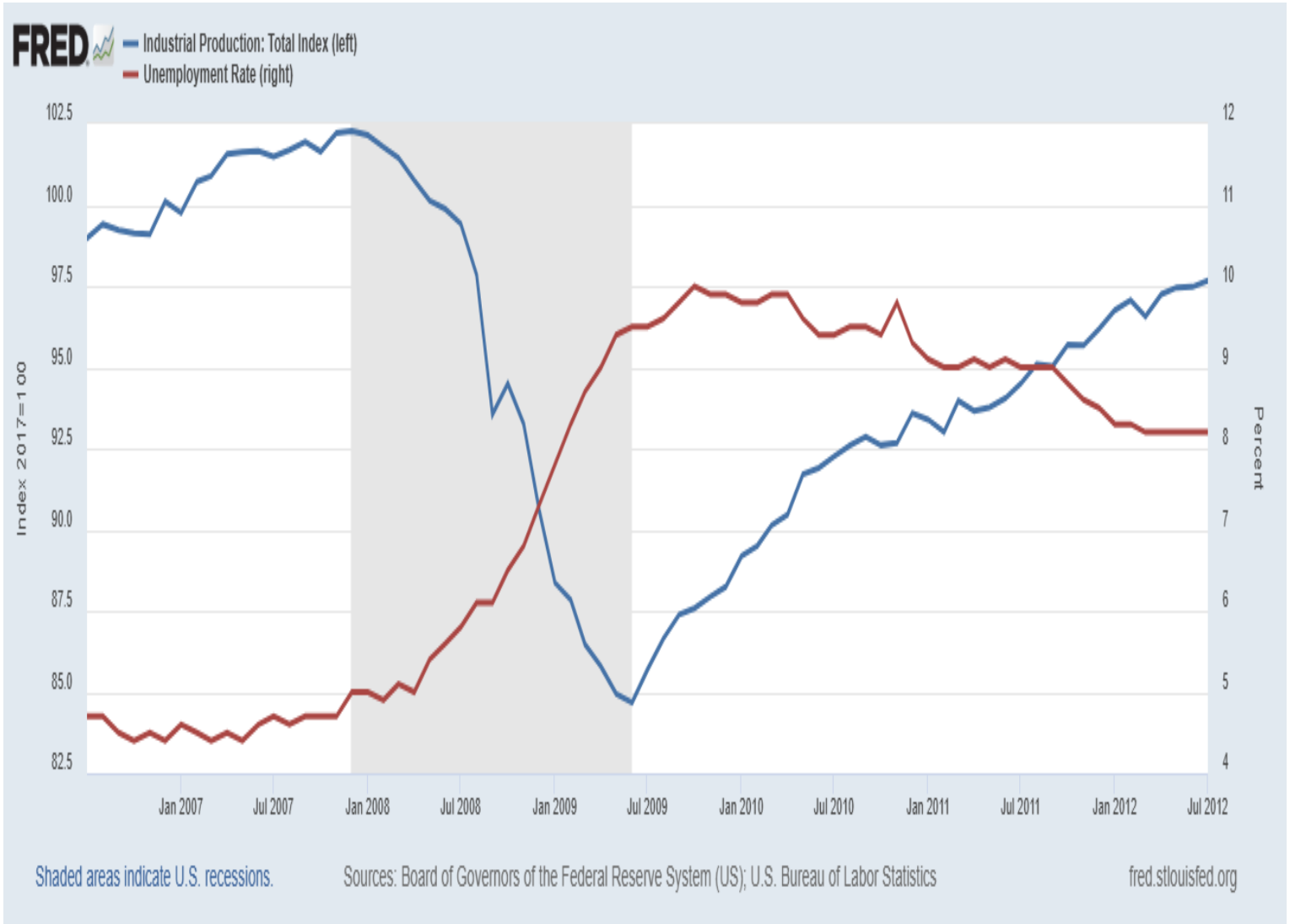
Officially, the US was in recession from December 2007 through June 2009

Arguably the worst economic contraction post-Great Depression

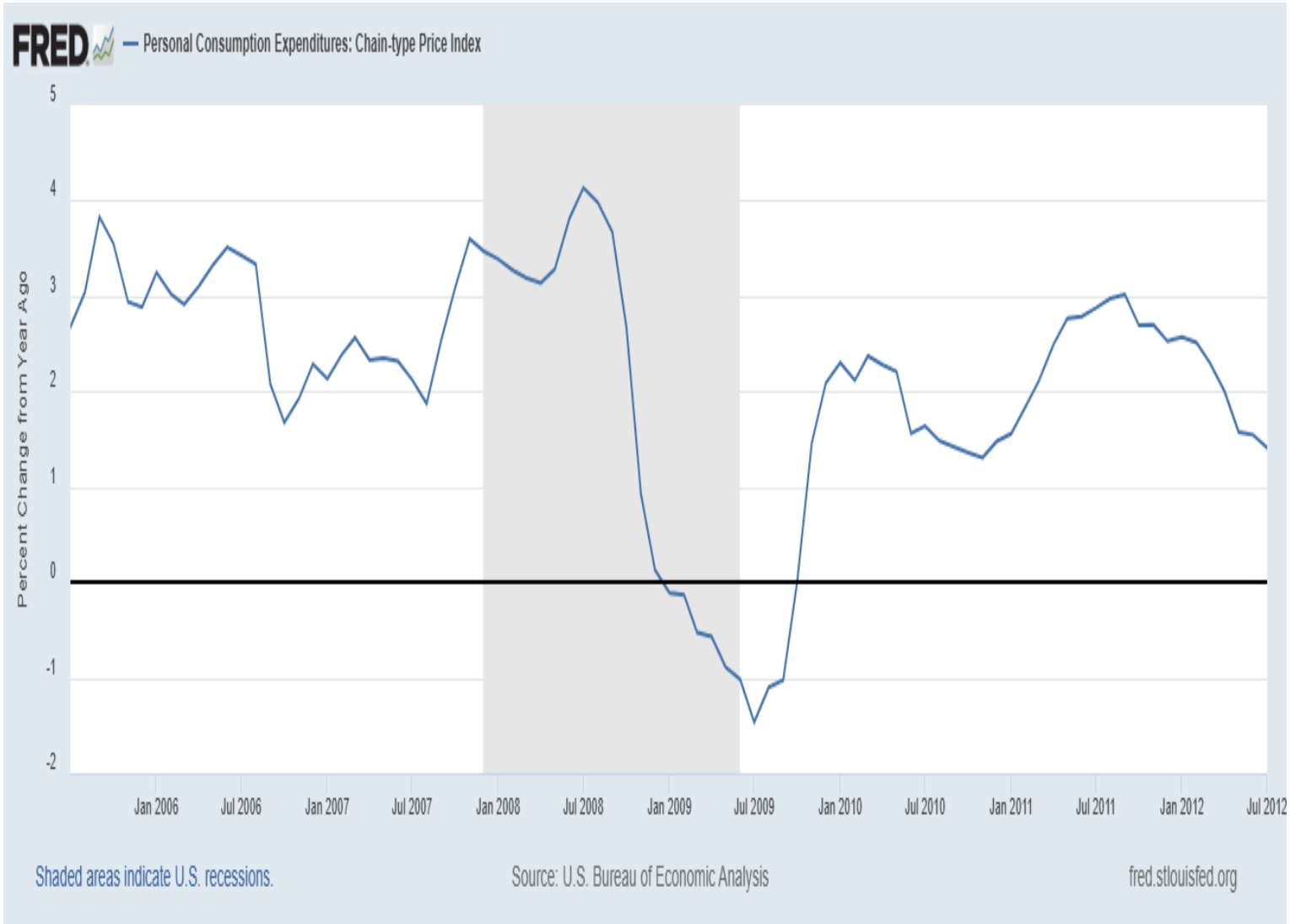
Economy hit the ZLB towards the end of 2008 and there were numerous "unconventional" policy reactions

Also called the Great Financial Crisis (GFC) because the recession had its origins in the financial sector

Economic Activity



Inflation


FRED
Personal Consumption Expenditures: Chain-type Price Index
Percent Change from Year Ago
5
4
3
2
1
0
-1
-2
Jan 2006
Jul 2006
Jan 2007
Jul 2007
Jan 2008
Jul 2008
Jan 2009
Jul 2009
Jan 2010
Jul 2010
Jan 2011
Jul 2011
Jan 2012
Jul 2012
Shaded areas indicate U.S. recessions.
Source: U.S. Bureau of Economic Analysis
fred.stlouisfed.org

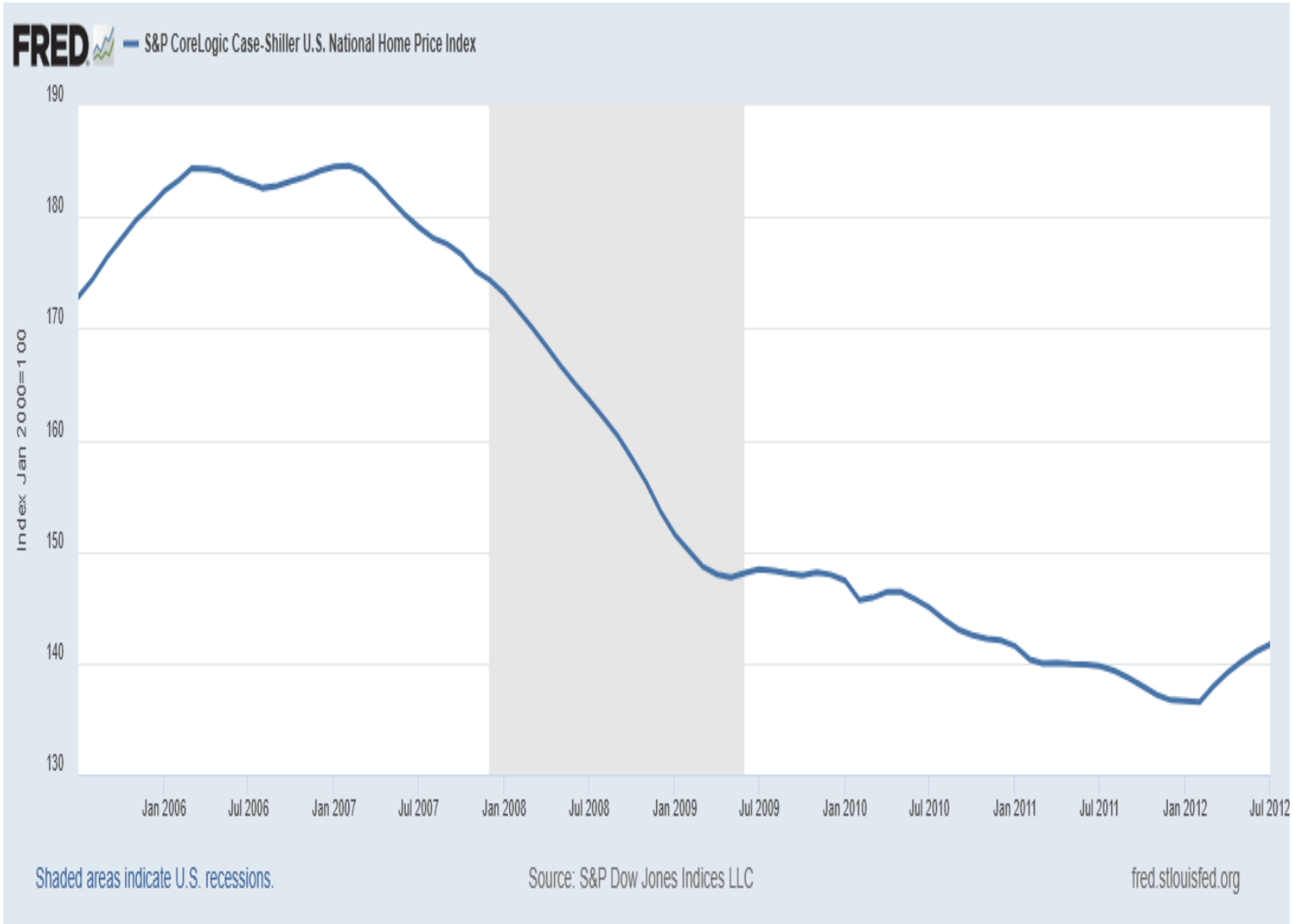
Background: Housing Prices

Traditional story is that the GFC had its origins in the housing market

House prices in US fell substantially starting in late-2006

This might have had some small adverse demand effects (via wealth effect on consumption), but shouldn't have caused a major blow up

House Prices



House Prices and the Financial System

The reason things blew up is because housing was the collateral behind new short-term financing agreements (e.g., repurchase agreements) between large institutional investors

When house prices declined, particularly given the nature of many mortgages from the early-2000s, this made the value of the backing collateral questionable

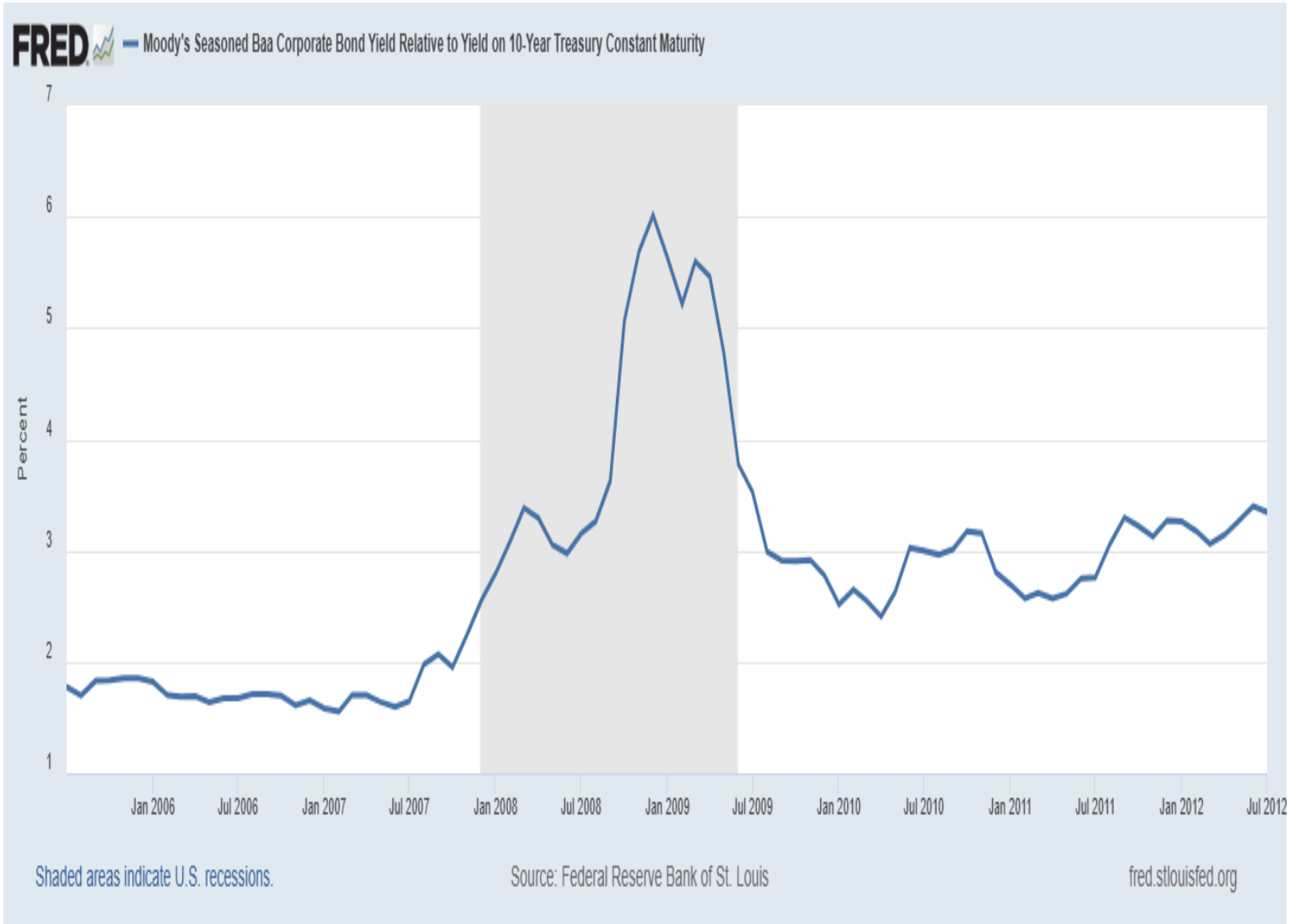
Further, given the bundling of mortgage debt into securities, it was hard to know where the "bad" stuff was

As a result, short-term financing markets dried up – firms stopped lending to one another

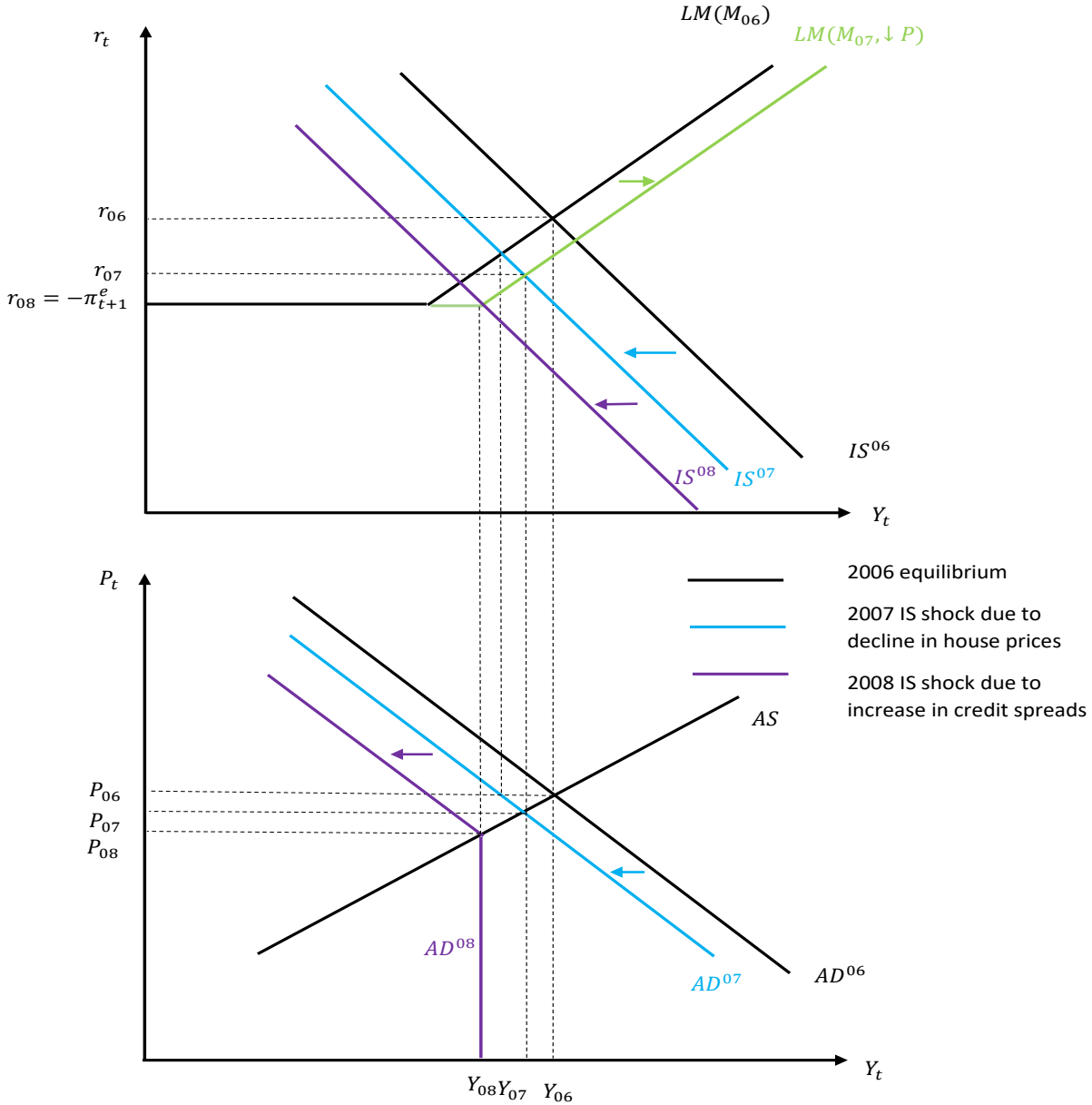
This led to a massive increase in credit spreads (f_t in our model)

Increased credit spreads are a tell-tale sign of financial market dysfunction

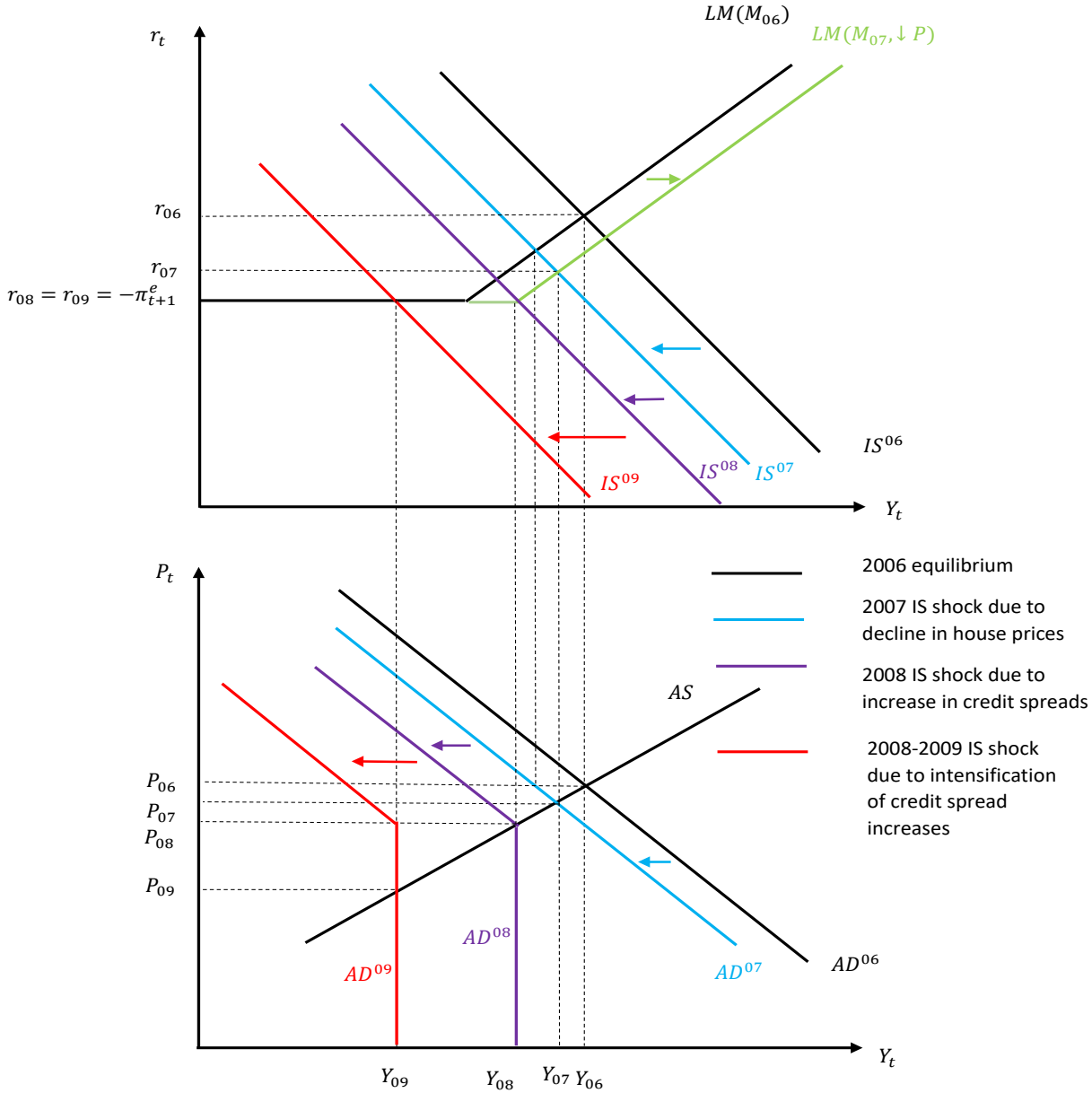
Credit Spreads



Early Stages of Financial Crisis



Intensification of Financial Crisis in 2008-09 and the ZLB



Policy Responses

The Fed, in conjunction with Treasury and Congress, responded to the crisis with a number of unusual policy actions

Though unusual, they all made some sense in the context of the NK AD-AS model

1. Emergency lending (lender of last resort)
2. Fiscal stimulus
3. Unconventional monetary policy

Lender of Last Resort

The Great Depression (1929-1933) featured a run on demand deposits, leading to financial market collapse and credit markets that didn't function

Fed largely failed in serving its original function as a "lender of last resort" (Friedman and Schwartz, 1963) The GFC also featured run,

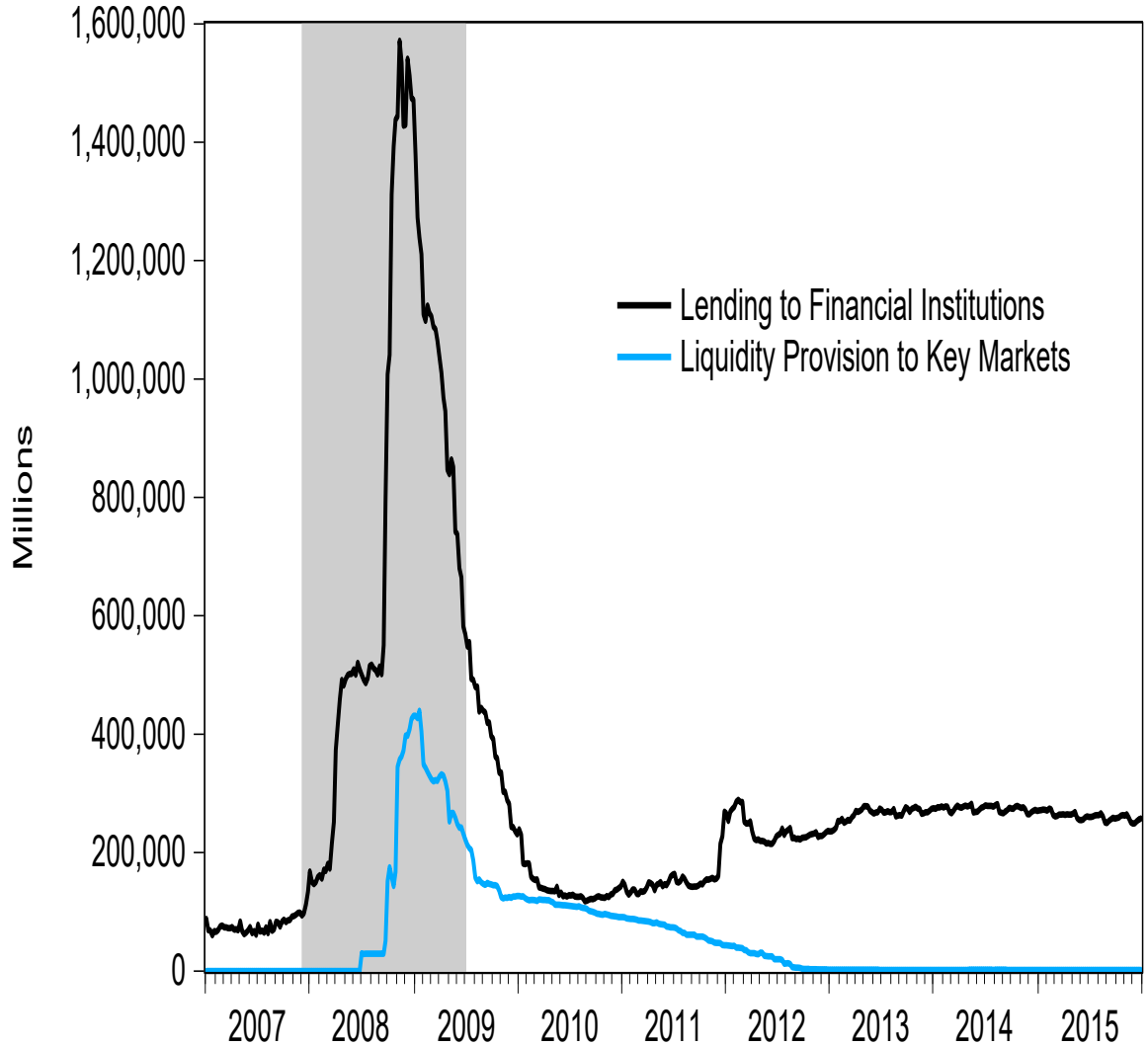
but this time on short-term financing (repurchase agreements, commercial paper), and not be households, but by institutions

Complication: the run didn't involve traditional banks, which the Fed has power to lend to, but non-bank financial firms

Fed came up with very creative ways to lend to non-bank financial firms in GFC

In terms of AD-AS, emergency lending trying to lower f_t

Emergency Fed Lending



Fiscal Stimulus

Nearly $1 trillion in fiscal stimulus (combination of spending and tax cuts / increased transfers) in early 2009

Fiscal stimulus is a response to most recessionary episodes

Makes particular sense when the ZLB is binding: because interest rate is fixed, no crowding out, meaning a bigger fiscal multiplier

Unconventional Monetary Policy

Conventional monetary policy: manage short-term interest rates

In reality, there are lots of interest rates, all "priced off" short-term riskless rates. Interest rates vary according to:

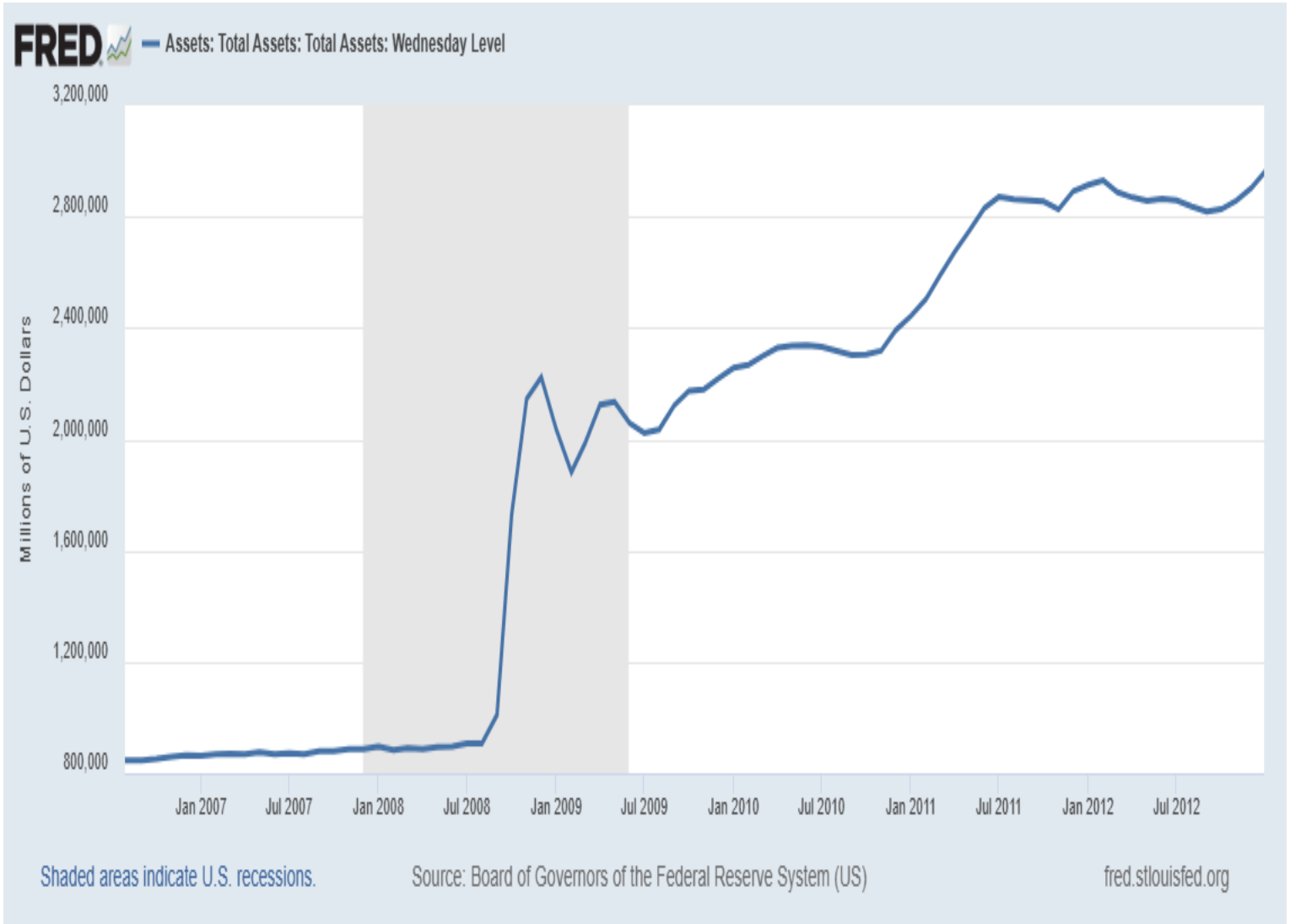
- Risk
- Time to maturity

With short-term rates at zero, Fed resorted to "unconventional" policies to try to more directly affect economically relevant interest rates

Quantitative Easing (QE) or Large-Scale Asset Purchases (LSAP): create reserves to buy up lots of longer-maturity debt, with the hope of pushing up prices and lowering yields (interest rates)

Think of QE as also trying to lower f_t

Federal Reserve Balance Sheet



Reprise

Did these policy actions work?

Hard to say – we don't know the counterfactual

Things didn't seem to get as bad as people feared in late-fall of 2008

Economy began to recover in 2009, although recovery was slow and inflation remained below target (and the ZLB remained in place) for several years

Some argued we weren't aggressive enough

COVID-19

COVID-19 Recession

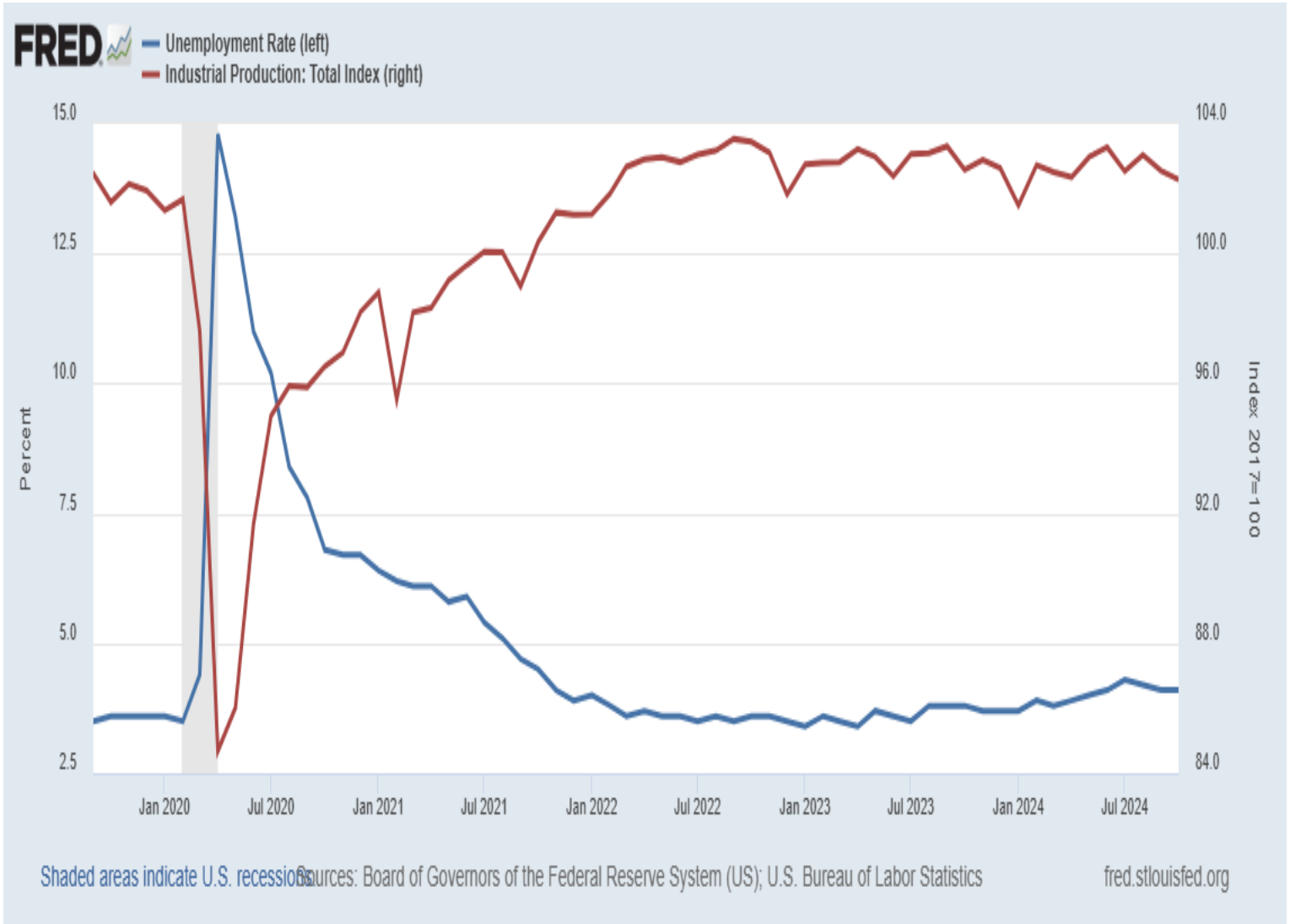
There was a short but sharp economic contraction associated with the COVID-19 pandemic

Average length of post-WWII contraction: 10.3 months

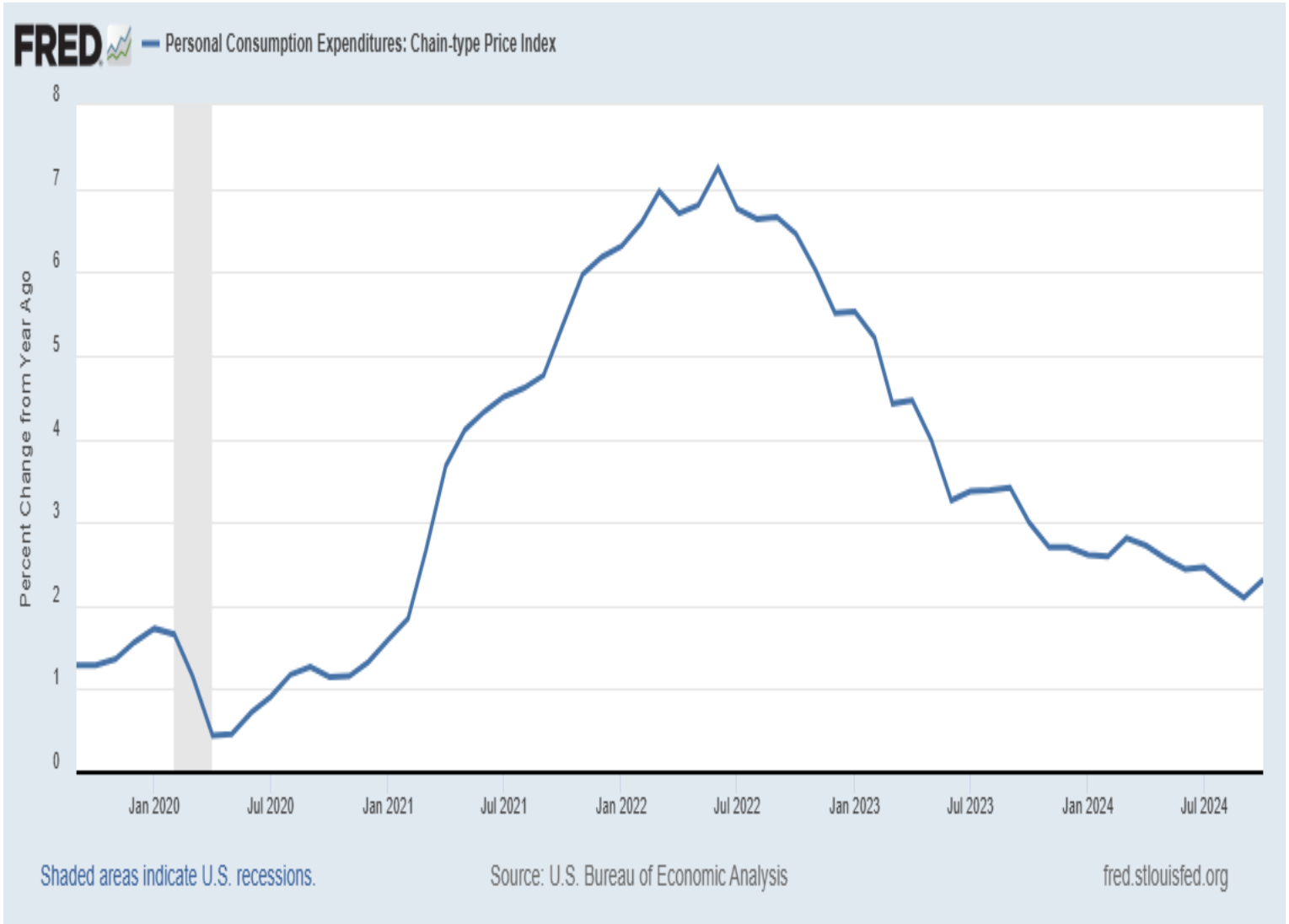
NBER dates COVID-19 contraction as just two months (shortest on record)

Following contraction, high and persistent inflation

Economic Activity



Inflation

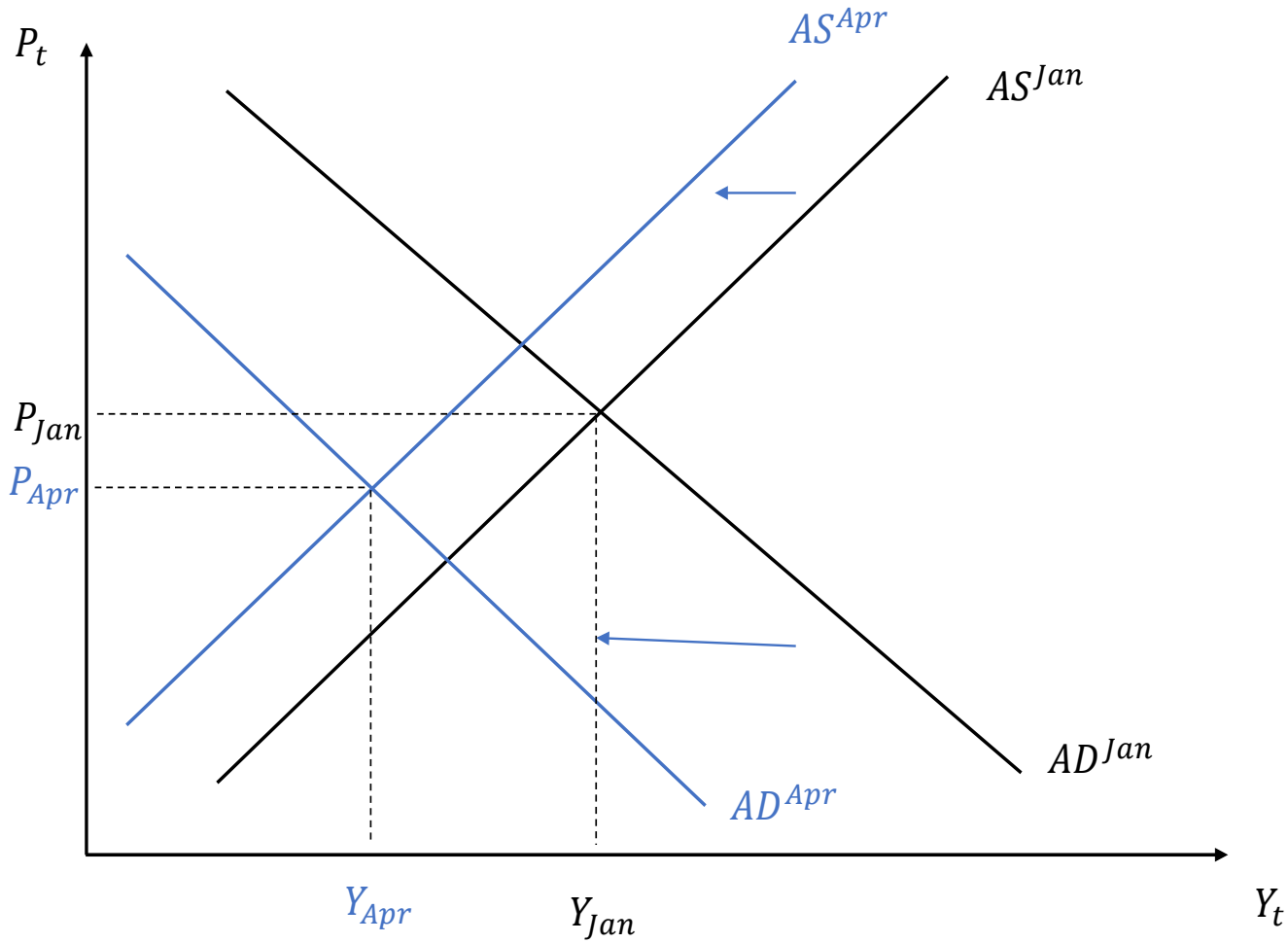

FRED
Personal Consumption Expenditures: Chain-type Price Index
Percent Change from Year Ago
8
7
6
5
4
3
2
1
0
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Jul 2022
Jan 2023
Jul 2023
Jan 2024
Jul 2024
Shaded areas indicate U.S. recessions.
Source: U.S. Bureau of Economic Analysis
fred.stlouisfed.org

How to Model COVID-19?

Initially, a combo negative supply shock (e.g., increase in θ_t) and adverse demand shock (e.g., reduction in Y_{t+1}, increase in f_t, increase in uncertainty)

Net effect was large reduction in output and a reduction in prices/inflation

AD-AS: Initial Phase



Policy Responses

Policy response was large and swift

Federal Reserve resuscitated many of its Great Recession tools:

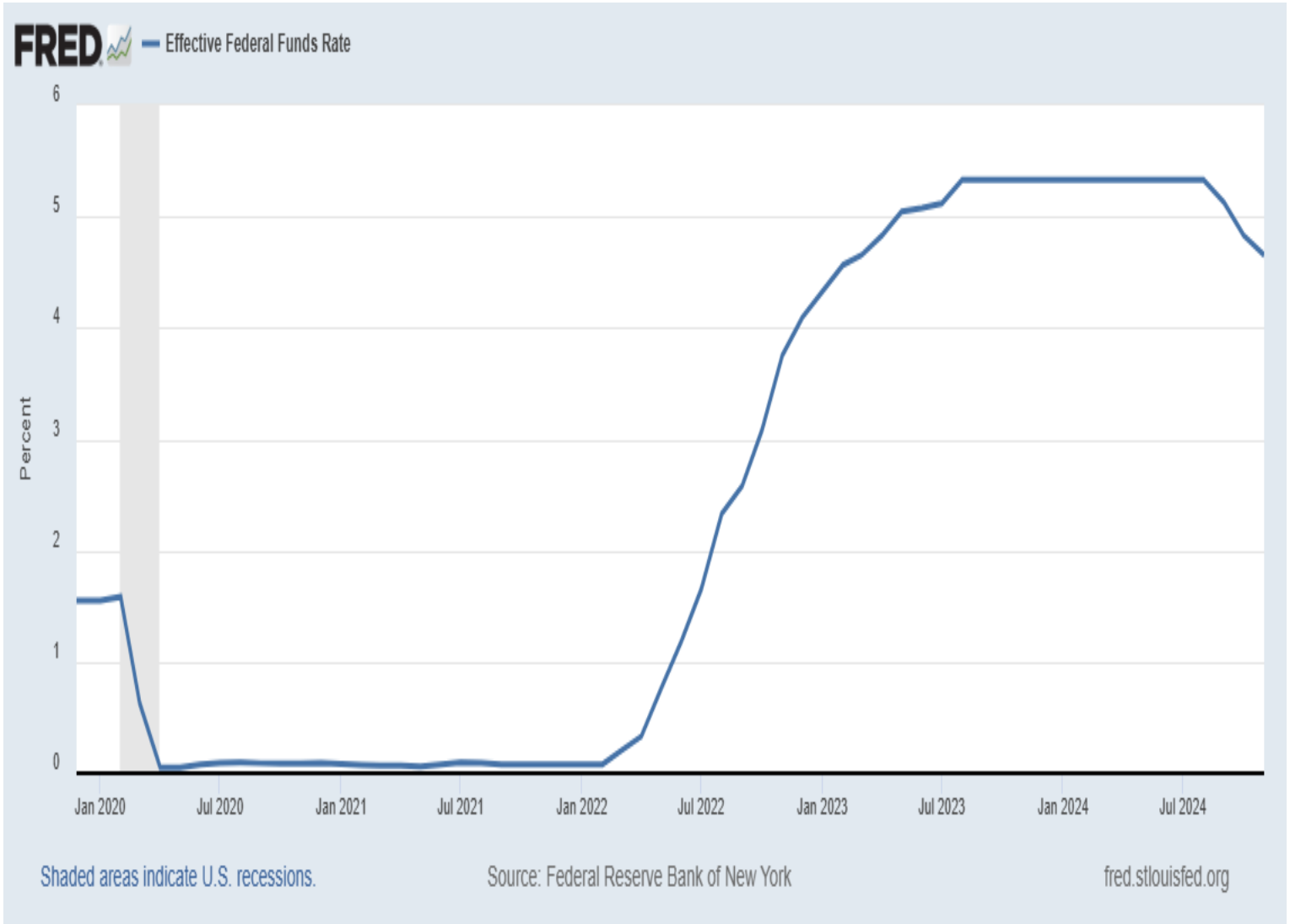
- Lowered policy rate to zero (ZLB)
- Massive quantitative easing policy

Massive fiscal expansion, too

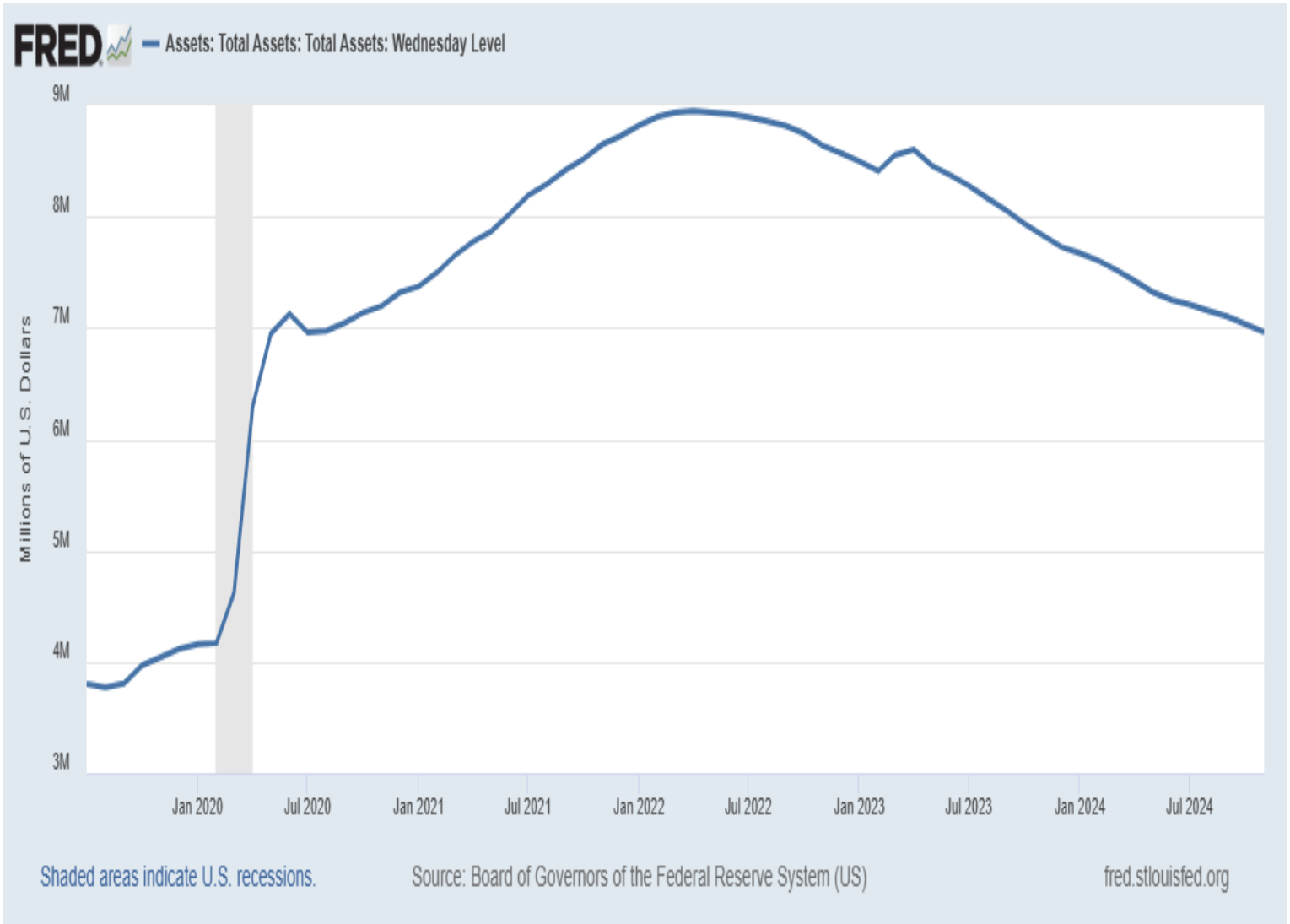
- CARES Act, etc. in 2020
- American Rescue Plan in 2021

Both monetary and fiscal responses were larger than in the GFC

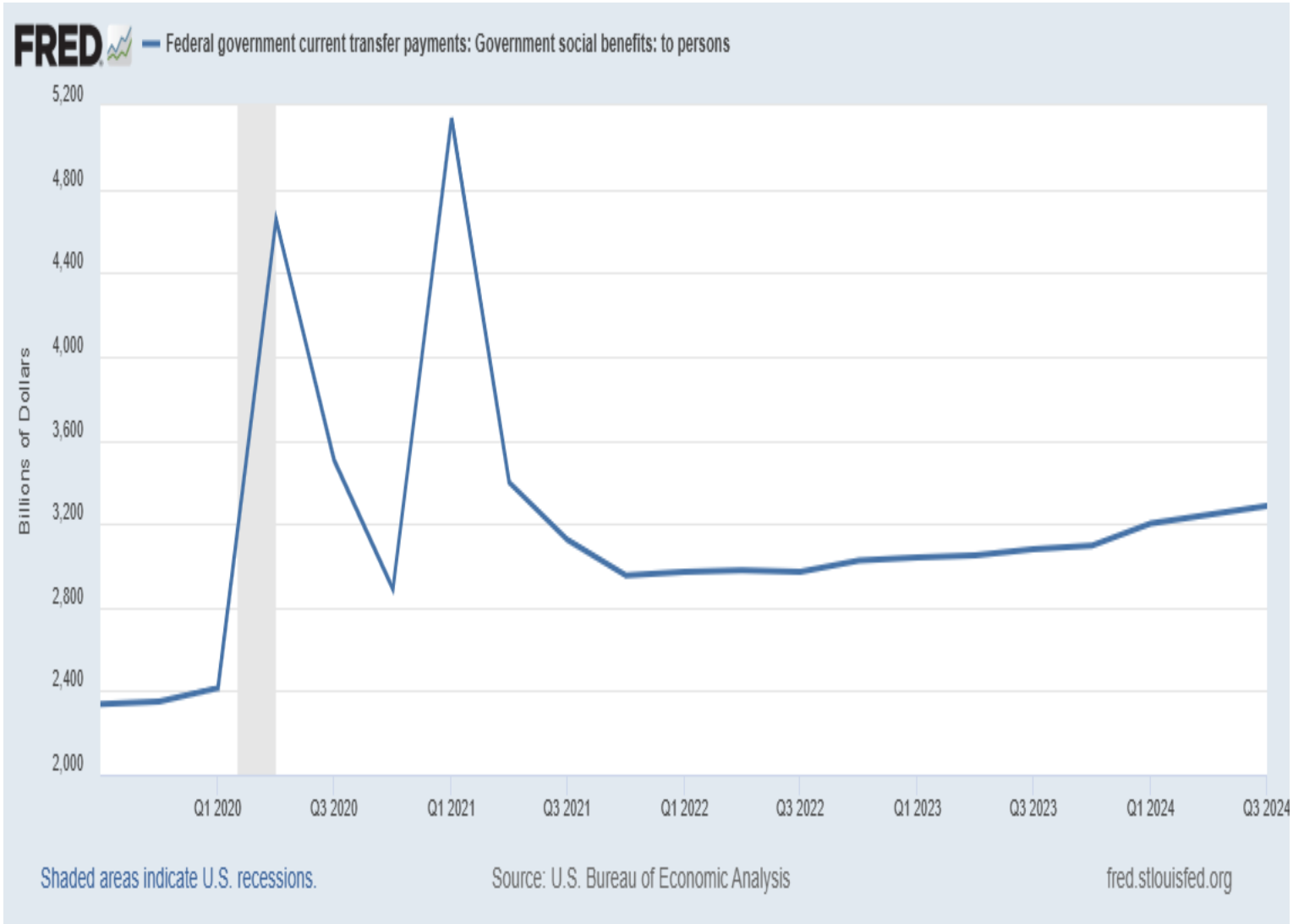
Federal Funds Rate



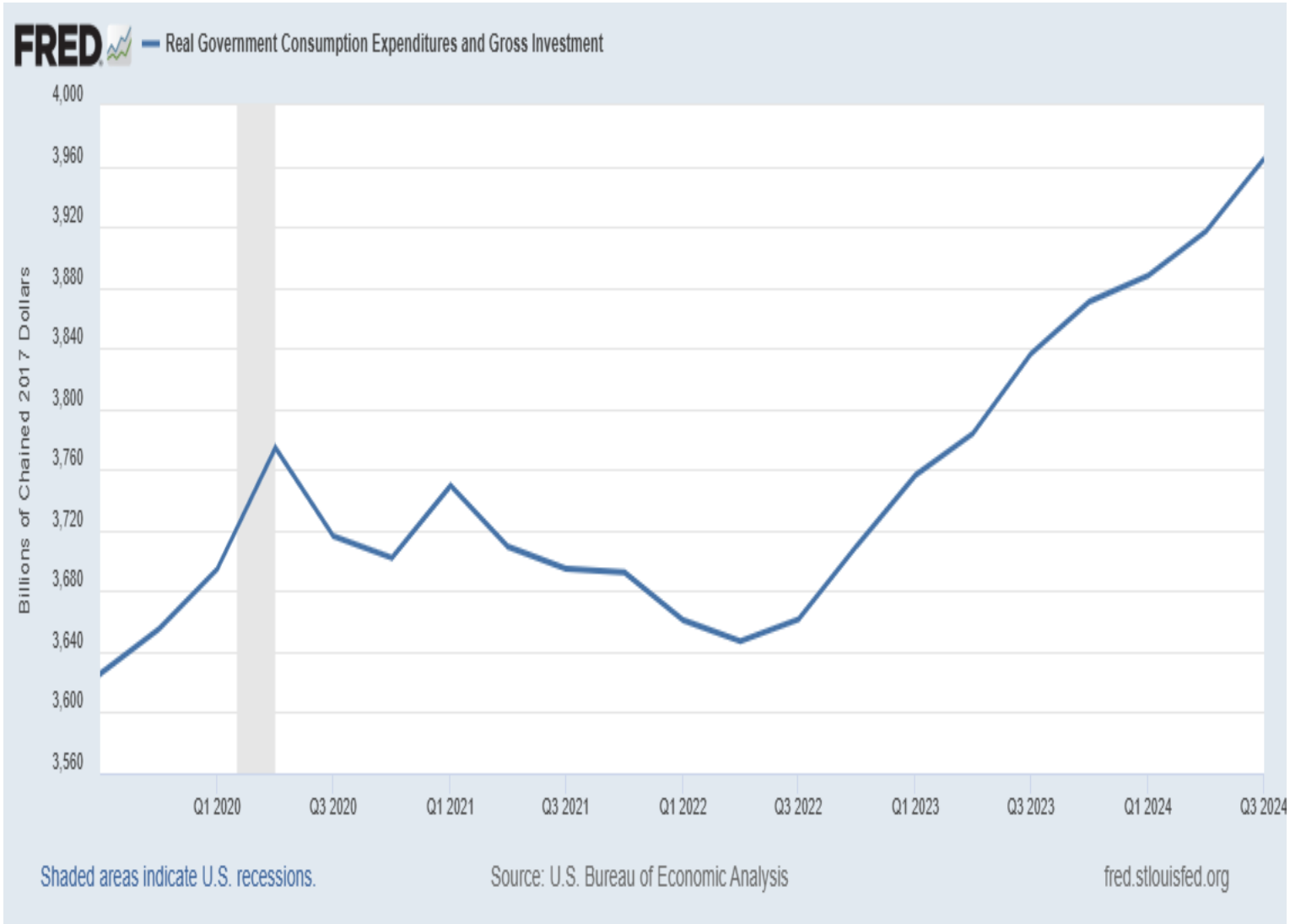
Federal Reserve Balance Sheet



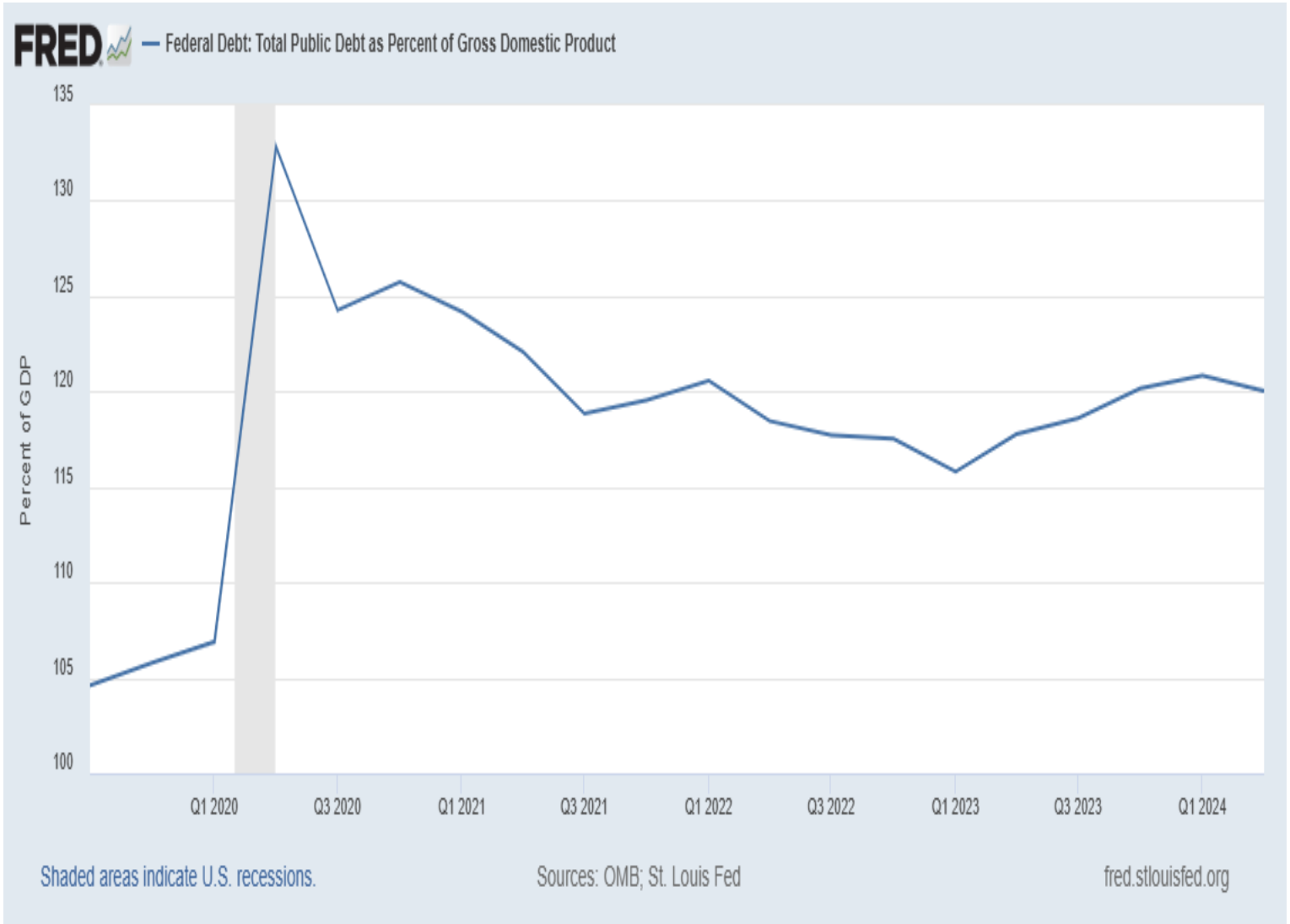
Government Transfers



Government Consumption Expenditures



Debt-GDP Ratio



AD-AS Analysis

By end of 2020, economy was at ZLB

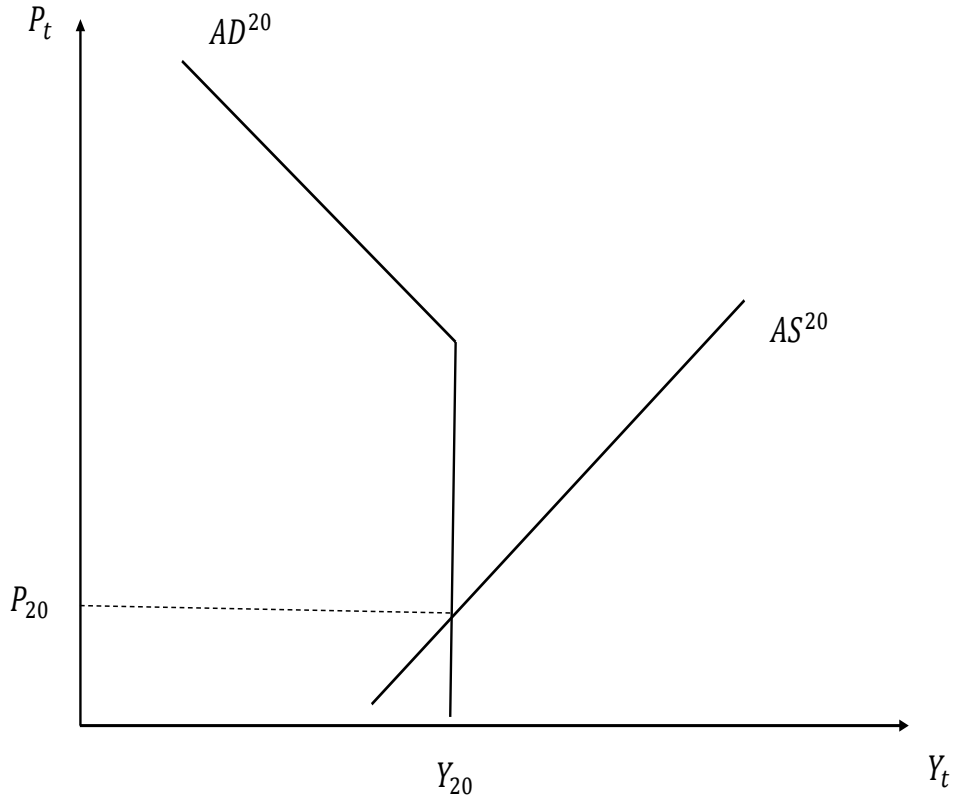
Supply disruptions remained real and remained elevated

At ZLB, these just cause prices to rise; no decline in output

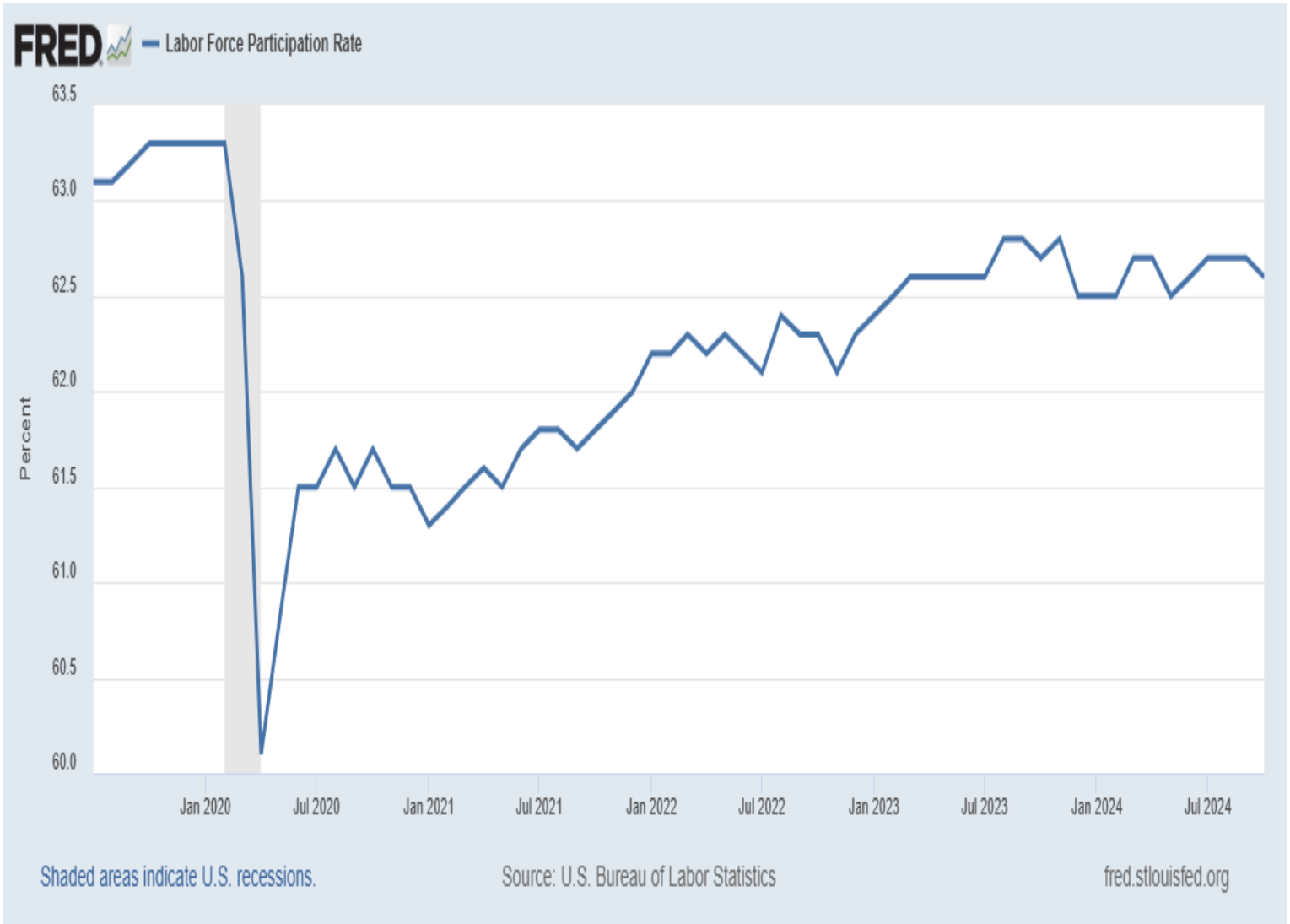
Large demand stimulus started to kick in, leading to output expansion and further increases in prices

Supply pressures plus massive demand stimulus and ZLB: lots of inflation

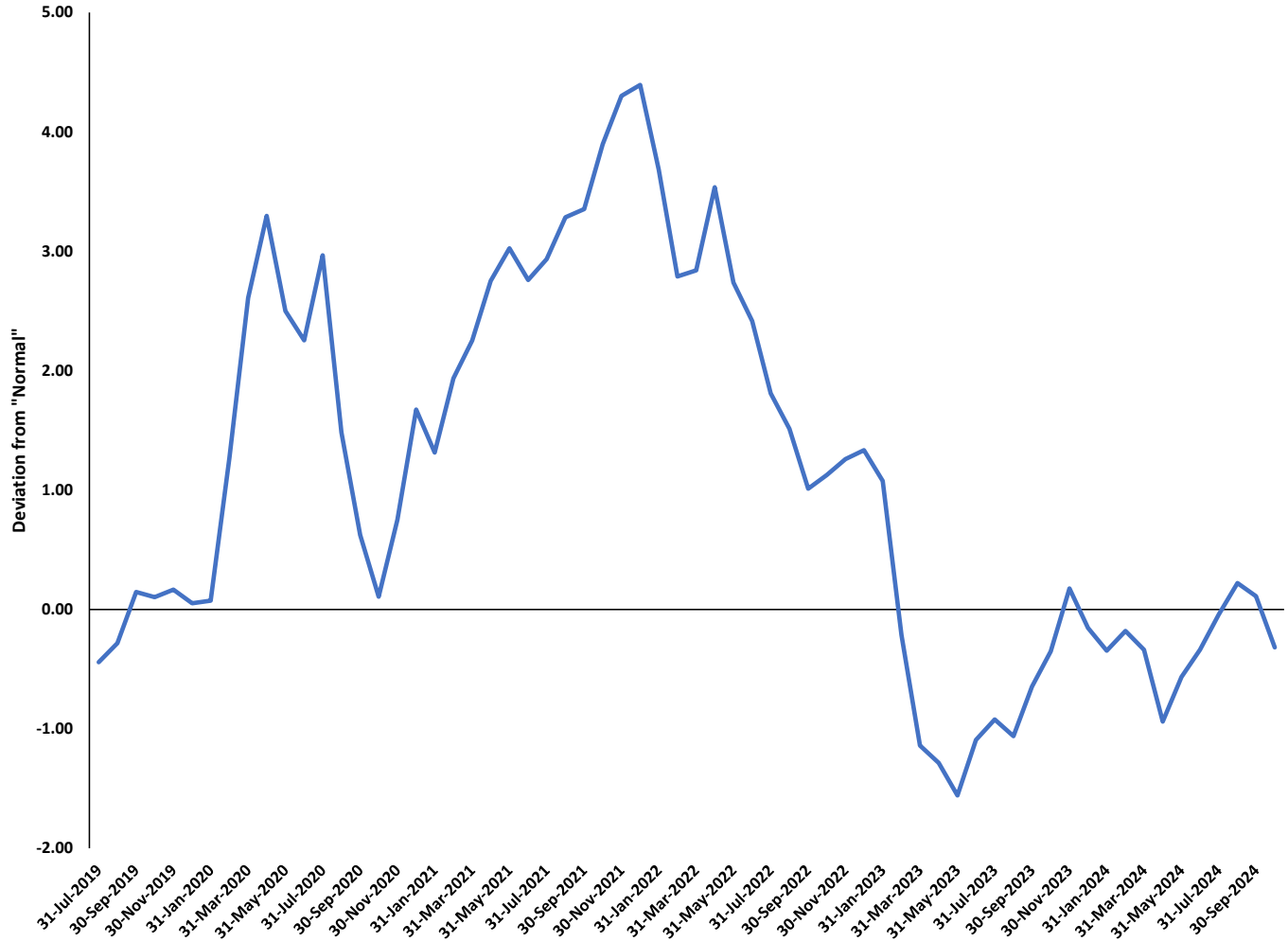
AD-AS: Fall 2020



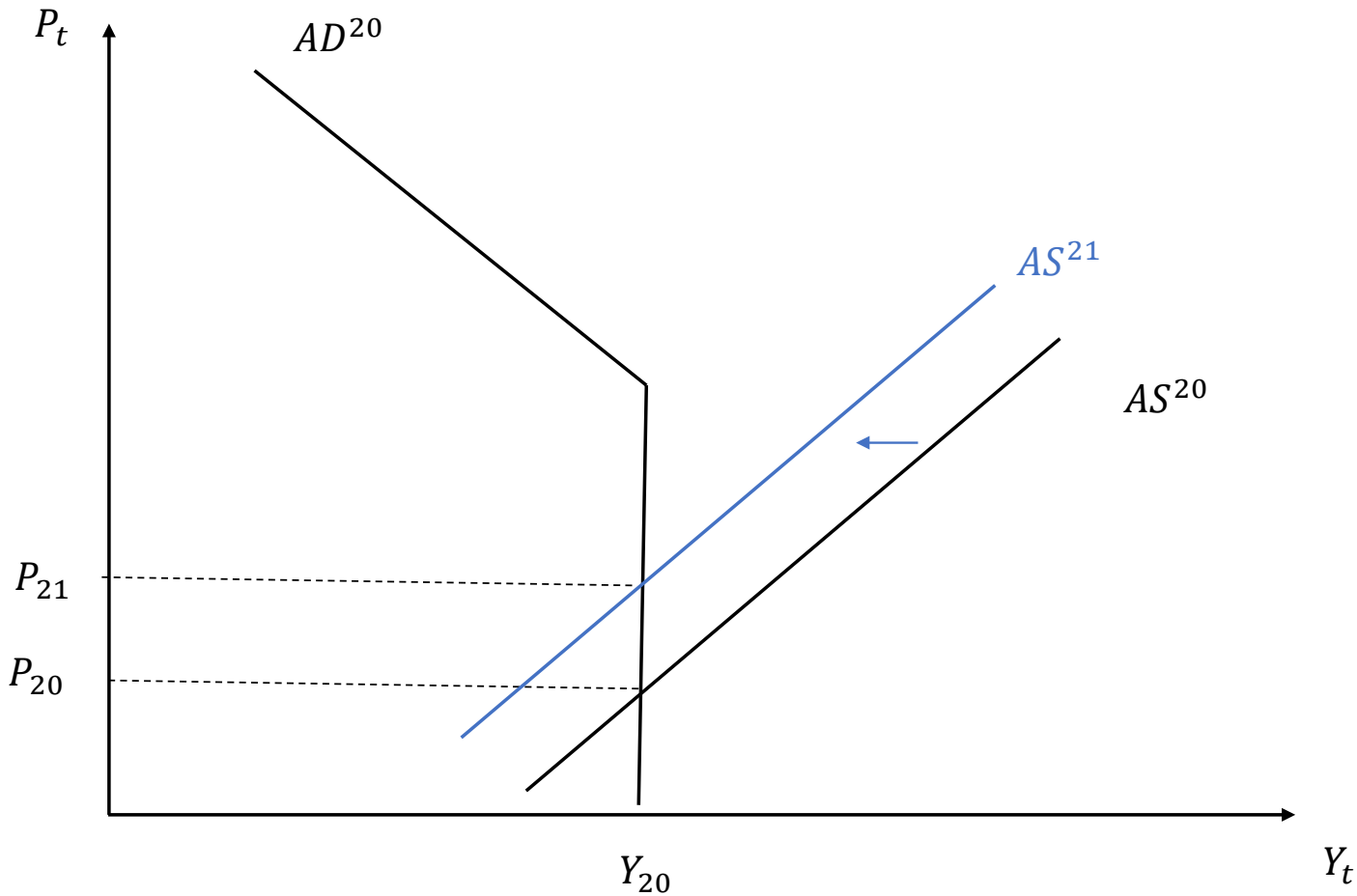
Labor Force Participation



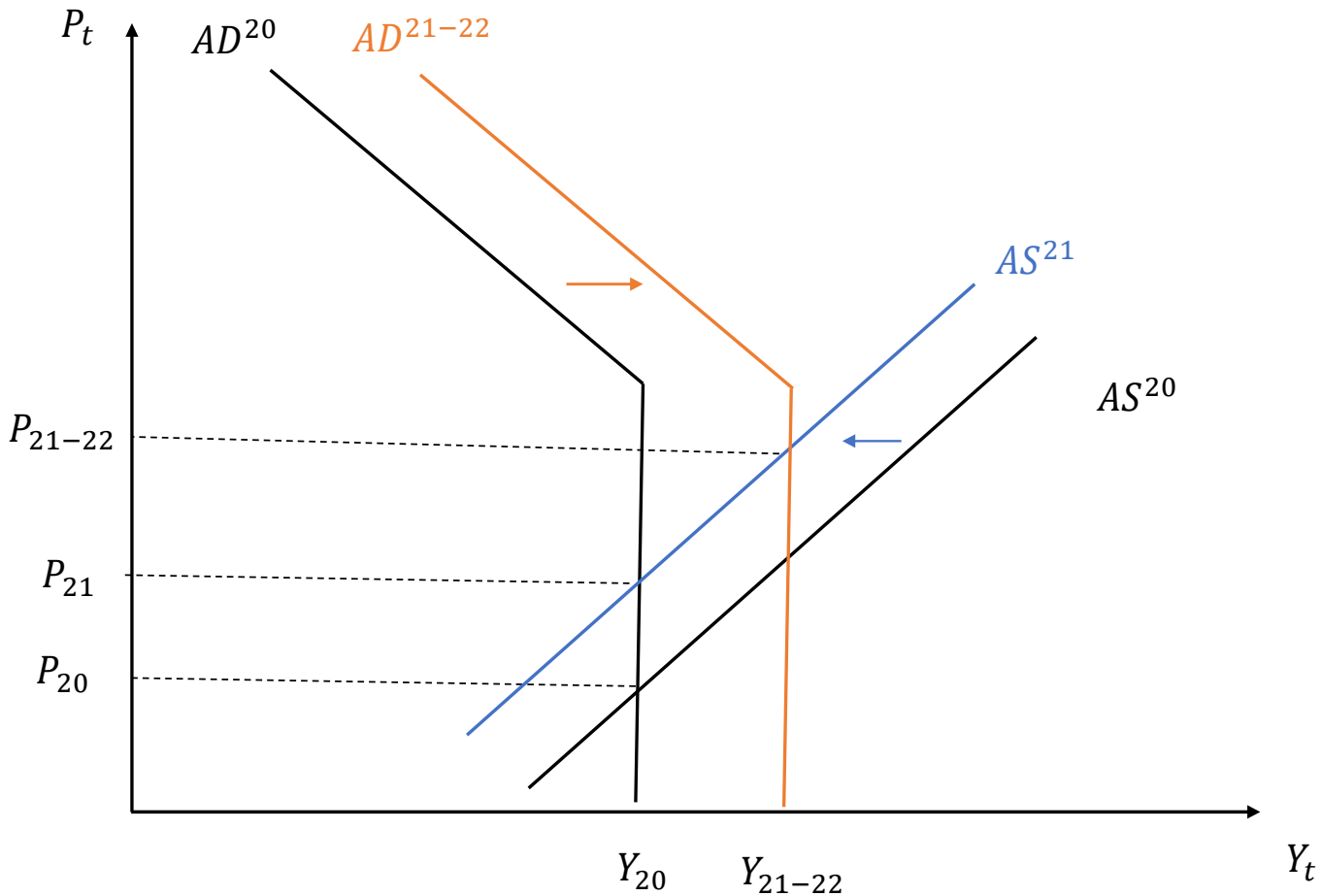
Global Supply Chain Pressure Index



AD-AS: Supply Disruptions Through 2021



AD-AS: Demand Stimulus, 2021-22



Criticism and Retrospective

Aggressive policy responses did help facilitate a quick, strong recovery

But it was almost certainly too much for too long

Fed was "fighting the last war:" not clear at first, but became clear that this wasn't like the GFC and shouldn't be treated as such

You don't fight supply problems with demand stimulus: pretty clear Y_t^f had fallen, at least temporarily

Inevitable response of overdoing demand stimulus: high inflation

Have largely succeeded in bringing inflation down without economic harm because supply pressures have eased as demand has receded

- Perhaps also a credit to Fed credibility and communication: tightening was anticipated and orderly