ECO 3302 – Intermediate Macroeconomics

Lecture 12: Economic Fluctuations

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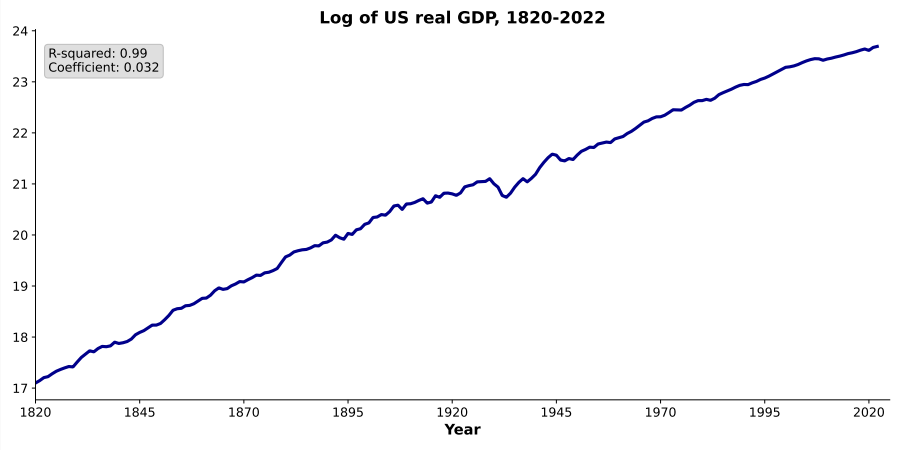
Introduction

Introduction

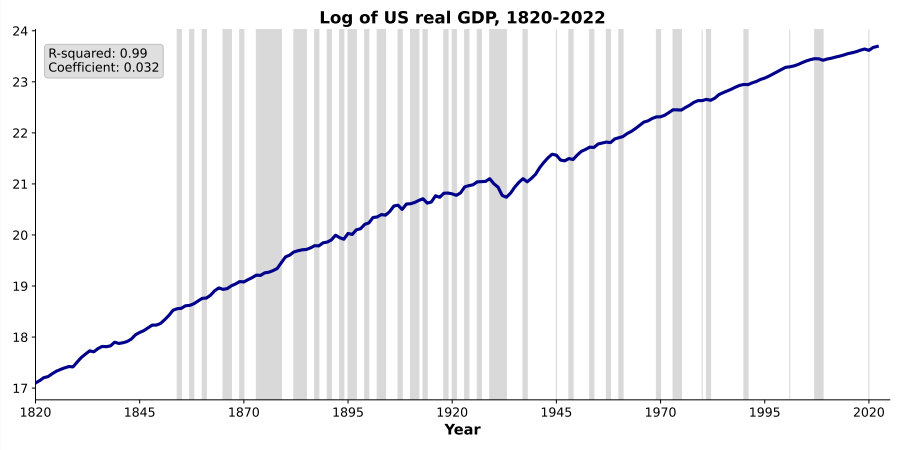
- From 1820 to 2022 the US economy grew at an annual rate of about 3%



Source. Maddison Project Database 2023.

Introduction

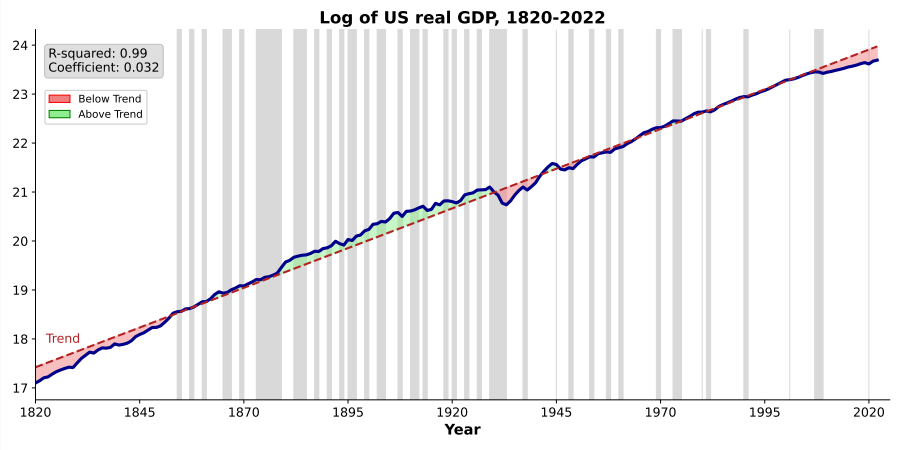
- But this long-run trend masks important fluctuations



Source. Maddison Project Database 2023.

Introduction

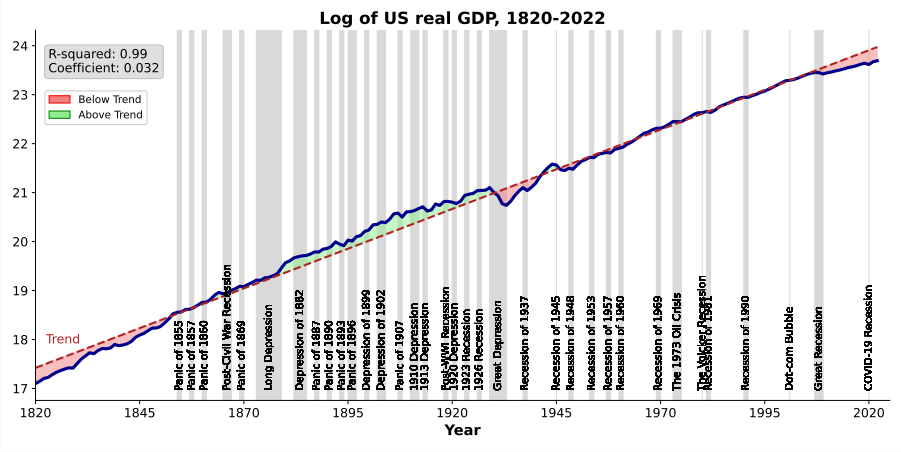
- US economy some times grew above trend; some others, below trend



Source. Maddison Project Database 2023.

Introduction

- Large negative fluctuations in output (see shaded areas) create **recessions**
  These periods are naturally associated with employment losses



Introduction

- The **business cycle** is these short-term fluctuations in output and employment, which are unpredictable and irregular
- Business cycles have long fascinated economists:
  - What causes short-run fluctuations?
  - What economic model can best explain/predict them?
  - Is there anything the gvt can do to avoid or recessions?
  - If not, can it at least do something to reduce their length and severity?
  - How do business cycles affect the population at large? And its subgroups?
- **Today, we start our study of business cycles and try to shed light on some of these questions**

Facts About the Business Cycle

Facts about the business cycle

1. **Business cycle has two phases**:
   - **Expansion**: Economy grows as businesses increase production, investments rise, consumer confidence improves, and unemployment falls
   - **Contraction**: Economy experiences decline in economic activity as business investment and consumer spending fall, unemployment rises, and GDP shrinks
     - **Recession** typically defined as 2 consecutive quarters of negative GDP growth
     - When contraction is severe and prolonged, it may be called **depression**
2. **Beginning/end of phases marked by:**
   - **Peak**: Point at which econ growth reaches its highest level before a downturn. At the peak, economy is operating at or near full capacity
   - **Trough**: Lowest point in the business cycle, marking the end of the contraction. Economic activity stabilizes and begins to recover

Facts about the business cycle

3. **Duration of the business cycle**: recessions can last from a few months to several years, depending on the severity of the downturn
   - From 1854, the average US recessions has lasted 17 months
   - From 1945, the average US recessions has lasted 10 months
4. **In the US, the NBER's Business Cycle Dating Committee sets recession dates**:
   - To do so, committee analyzes range of economic indicators (income, employment, retail sales, industrial production, ...)
   - Committee doesn't use fixed rule; it follows its judgment
   - Depth, diffusion (ie, how widespread the decline is across the economy), and duration of economic downturn are key factors considered by the committee
   - Recession dates announced after recessions end due to nature of analysis

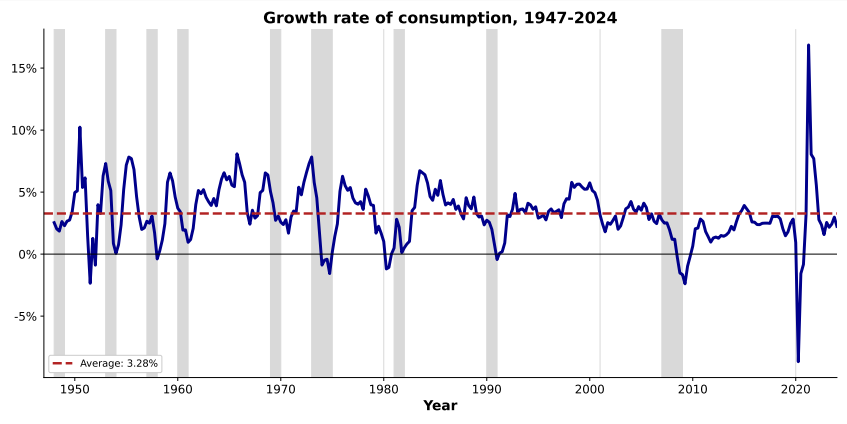
Facts about the business cycle

5. Business cycle is tracked using several economic indicators: GDP

Notes. Percent change from previous 4 quarters. **Source**. FRED: A191RL1Q225SBEA

Facts about the business cycle

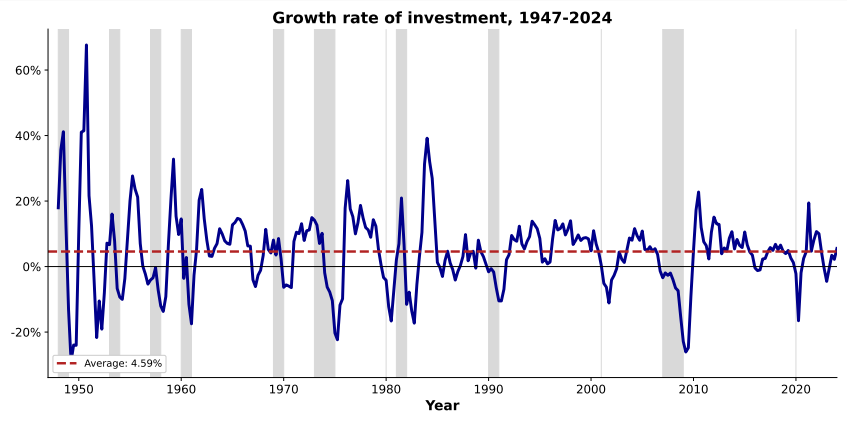
5. **Business cycle is tracked using several economic indicators**: consumption



Notes. Percent change from previous 4 quarters. **Source**. FRED: Real consumption expenditures (PCECC96)

Facts about the business cycle

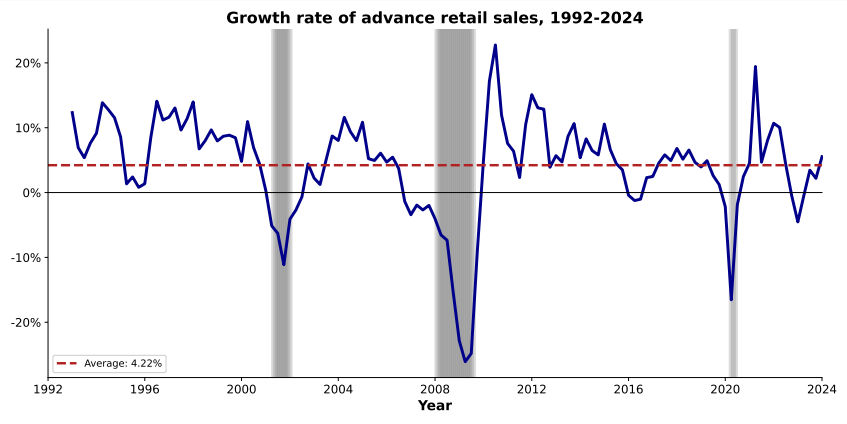
5. **Business cycle is tracked using several economic indicators**: investment



Notes. Percent change from previous 4 quarters. **Source**. FRED: Real gross private domestic investment (GPDIC1)

Facts about the business cycle

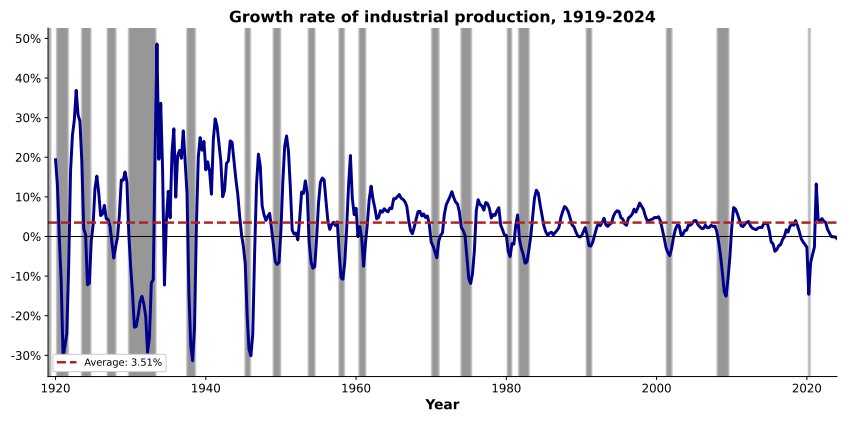
5. **Business cycle is tracked using several economic indicators**: retail sales



Notes. Percent change from previous 4 quarters. **Source**. FRED: Advance retail sales (RSAFS)

Facts about the business cycle

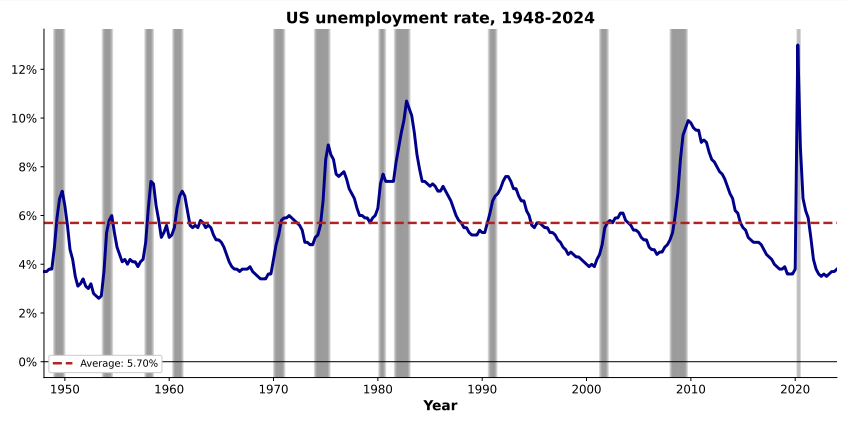
5. Business cycle is tracked using several economic indicators: industrial prod



Notes. Percent change from previous 4 quarters. **Source**. FRED: Industrial production (INDPRO)

Facts about the business cycle

5. Business cycle is tracked using several economic indicators: unemployment



Notes. Percent change from previous 4 quarters. **Source**. FRED: Unemployment rate (UNRATE)

Time Horizons in Macroeconomics

Time horizons in macroeconomics

- Previously, we studied long-run economic phenomena
  - Rooted in classical macroeconomic theory
- We now move to study short-run economic phenomena
- Doing so requires building different types of models
  - Recall that models are only useful when they capture essence of the problem
  - We now build short-run economic models
- **Long-run vs. short-run economic models**: flexible vs. sticky prices
  - In the long run, prices are flexible and adjust to clear markets
  - In the short run, prices are "sticky" and markets not need to clear

Long-run vs. short-run economic models

- Because prices behave differently in the short run than in the long run (flexible vs. sticky), economic events and policies may have different effects
- **Monetary-policy example:** Suppose Fed reduces money supply by 5%
  - In long run, monetary policy neutral: nominal variables affected, not real ones (classical macro theory)
  - In short run, monetary policy non-neutral: prices do not perfectly adjust and real variables may be affected (Keynesian macro theory)
- When building models of short-run economic phenomena, we must accommodate this price stickiness

Evidence of price stickiness

How sticky are prices?

- In a famous study of US firms, Alan Blinder asked firm managers how often they changed the prices on their most important products

Frequency	Percentage of firms
Less than once	10.2%
Once	39.3%
1.01 to 2 times	15.6%
2.01 to 4 times	12.9%
4.01 to 12 times	7.5%
12.01 to 52 times	4.3%
More than 52 times	10.2%

Source. Blinder 1994.

Evidence of price stickiness

How sticky are prices?

- In a famous study of US firms, Alan Blinder asked firm managers how often they changed the prices on their most important products. Study revealed:
  - **Prices are sticky**: 50% of firms adjust their prices once or less a year
  - **Large difference among firms in frequency of price adjustment**:
    - 10% of firms do not change their prices during the year
    - 10% of firms do change their prices more than once a week
    - 40% of firms change their prices once a year
    - 16% of firms change their prices twice a year
    - 13% of firms change their prices 3–4 times per year

Evidence of price stickiness

Why are prices sticky?

- In a famous study of US firms, Alan Blinder asked firm managers why they didn't change their prices more often

Theory	Percentage of firms
Coordination failure: firms wait for others to move first	60.6%
Cost-based pricing with lags: price increases delayed until costs rise	55.5%
Delivery lags, service, quality: firms prefer to vary other attributes	54.8%
Implicit contracts: firms tacitly agree to offer stable prices	50.5%
Nominal contracts: prices are fixed by contracts	35.7%
Costs of price adjustment: changing prices is costly	30.0%
Procyclical elasticity: demand curves become less elastic	29.7%
Pricing points: prices have psychological significance (eg, $9.99)	24.0%
Inventories: firms vary inventory stocks instead	20.9%
Constant marginal cost: constant MC and markups	19.7%
Hierarchical delays: bureaucratic delays slow down decisions	13.6%
Judging quality by price: fear customers will mistake price cuts with quality reductions	10.0%

Evidence of price stickiness

Why are prices sticky?

- In a famous study of US firms, Alan Blinder asked firm managers why they didn't change their prices more often. Study revealed:
  - **Coordination failures** (ie, inability of firms to coordinate price changes) **is main reason for price stickiness and short-run economic fluctuations**
  - Most firms only increase prices when costs rise and sometimes, even if that's the case, they prefer to adjust other margins
  - Some firms are unwilling or unable to increase prices
  - Increasing prices is costly

Aggregate supply and aggregate demand

- In classical macroeconomic theory:
  - Economy's output depends on supplies of capital and labor: $Y = F(K, L)$
  - Flexible prices clear markets: P, R, W adjust so that Y, K, L markets clear
- In Keynesian macroeconomic theory:
  - Economy's output depends on demand for goods and services
  - Demand in turn depends on consumers' and firms' sentiment (*animal spirits*) and monetary and fiscal policy—which can influence demand
  - Sticky prices provide rationale for use of fiscal and monetary policies to stabilize demand
- We now build a model of aggregate supply and aggregate demand to explain short-run fluctuations in economic activity

Aggregate Demand

Aggregate demand

- **Aggregate demand (AD)**: relationship between quantity of output demanded (Y) and aggregate price level (P)
  - AD curve: quantities of goods & services people want to buy at given prices

The quantity equation as aggregate demand

- Recall **quantity theory**:

$$M_t V_t = P_t Y_t$$

M: money supply V: money velocity P: price level Y: output

- With constant money velocity, nominal GDP determined by money supply

- Also recall **quantity equation** can be rewritten **in terms of supply and demand of real money balances**:

$$\frac{M_t}{P_t} = \left(\frac{M_t}{P_t}\right)^d = \underbrace{\gamma}_{\equiv 1/V} \times Y_t$$

where γ is share of income people want to hold as money

  - Assumption of constant velocity equivalent to assumption of constant demand for real money balances per unit of output

The quantity equation as aggregate demand

- **Quantity equation** in terms of supply and demand of real money balances

$$\frac{M_t}{P_t} = \left(\frac{M_t}{P_t}\right)^d = \underbrace{\gamma}_{\equiv 1/V} \times Y_t$$

"Supply of real money balances equals its demand, which is prop. to output"

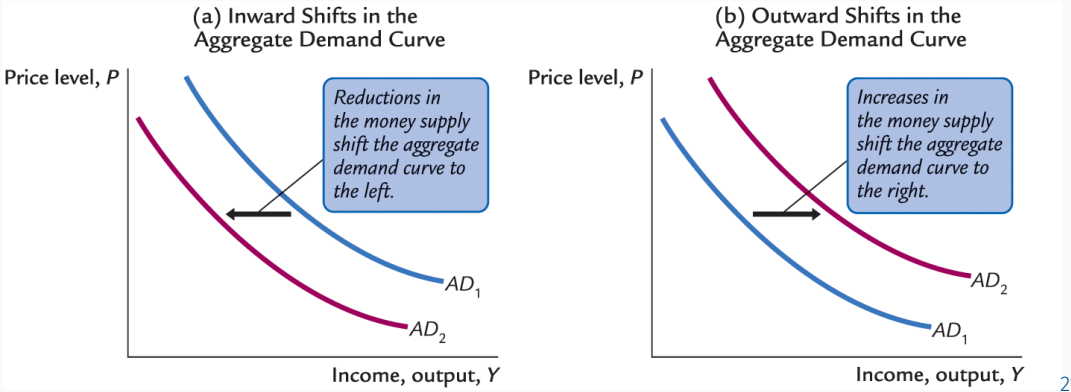
- If we assume money velocity V is constant and money supply M is fixed by central bank, **quantity equation yields negative relationship b/w P and Y**
  - Ie, AD curve is downward sloping as shown in previous figure

Why does the aggregate demand curve slope downward?

- Mathematically: $\overline{M}/P_t = \gamma Y_t$
  - Since $\overline{M}$ fixed and γ constant, if P goes up, Y must go down
- Intuitively, with constant velocity of money:
  - Money supply determines dollar value of all transactions ($\overline{M}V = P_t Y_t$)
  - If price level rises, each transaction requires more dollars
  - Because money supply is fixed, the number of transactions/quantity of goods and services purchased must fall

Shifts in the aggregate demand curve

- AD curve is drawn for fixed money supply M
  (It tells us possible combinations of P and Y given M)
- If Fed changes M, AD curve shifts: possible P-Y combinations change



Shifts in the aggregate demand curve

- **In reality, aggregate demand changes not only because of fluctuations in money supply**
- Even if money supply is held constant, AD curve may shift if money velocity changes or because of other reasons
- For now, we try to gain simple intuition behind movements in the AD curve
- Soon enough we'll develop a (IS-LM) model which will allow us to consider many reasons for shifts in the AD curve

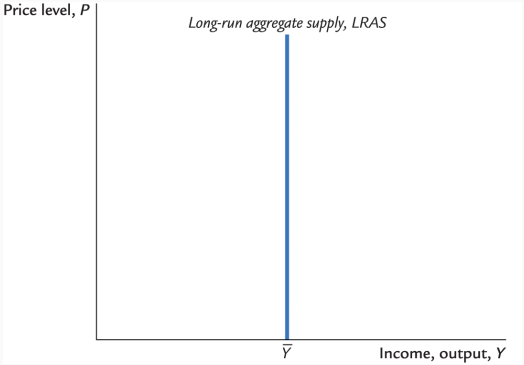
Aggregate Supply

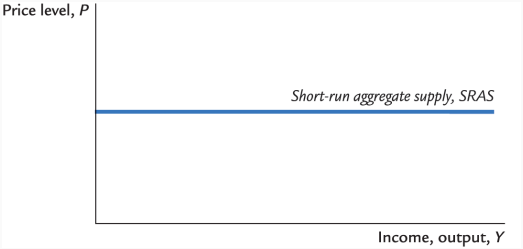
Aggregate supply

- AD curve shows relationship between P and Y, but it doesn't tell us equilibrium price and output levels.
- To obtain equilibrium price and output levels, we need both demand and supply curves: their intersection pins down equilibrium levels
- **Aggregate supply (AS)**: relationship between quantity of output supplied (Y) and aggregate price level (P)
  - AS curve: quantities of goods & services firms want to supply at given prices
- **Shape of AS curve depends on time horizon**:
  - Long-run aggregate supply (LRAS) curve is vertical: output is determined by capital, labor and technology; not by price level, which is perfectly flexible
  - Short-run aggregate supply (SRAS) curve is horizontal: prices are perfectly sticky

Aggregate supply curves: long-run vs. short-run

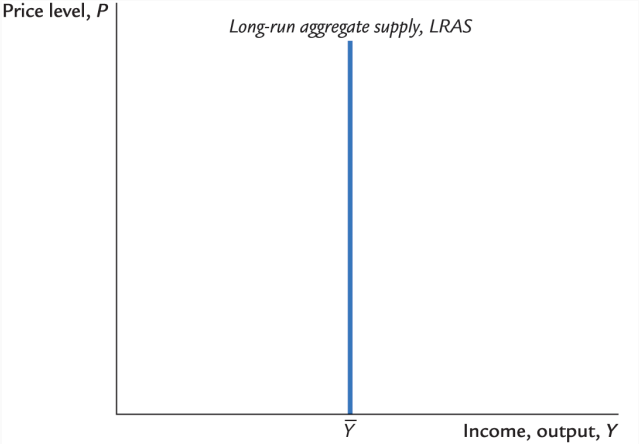
- **LRAS curve**: prices are perfectly flexible
- **SRAS curve**: prices are perfectly sticky





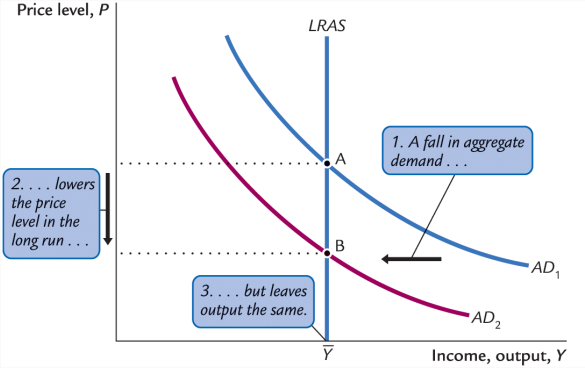
The LRAS supply curve

- In long run, output is determined by supply of capital, labor, and technology: $Y = F(K, L) = \overline{Y}$; not by the price level, which adjusts to clear market



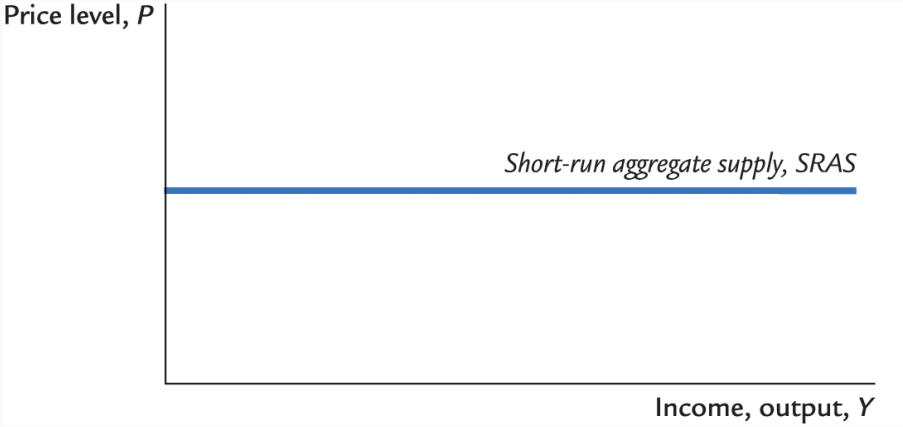
Long-run equilibrium in the market for goods and services

- In the long-run equilibrium, changes in aggregate demand affect prices but **not output**, which is determined by available resources and technology
  - $\overline{Y}$ is the full-employment (or natural or potential) level of output
  - LRAS curve satisfies classical dichotomy: money is neutral



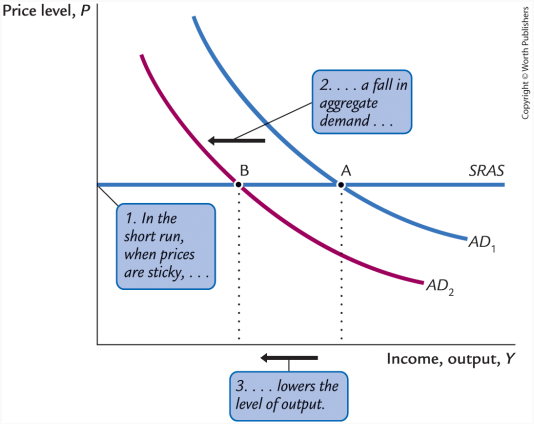
The SRAS supply curve

- In the short run, prices are sticky and do not adjust to changes in demand, so the SRAS curve is horizontal (assuming prices are fully sticky)



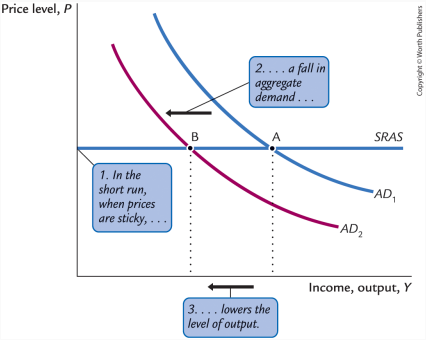
Short-run equilibrium in the market for goods and services

- In the short-run equilibrium, changes in aggregate demand affect output because prices do not adjust
  - Monetary policy is non-neutral: $\downarrow M \rightarrow \downarrow Y$



Short-run equilibrium in the market for goods and services

- In the short-run equilibrium, changes in aggregate demand affect output because prices do not adjust
  - If prices could adjust, they would go down; currently, they are “too high”
  - With low demand and high prices, firms sell less and reduce production by laying off workers, which leads the economy to a recession



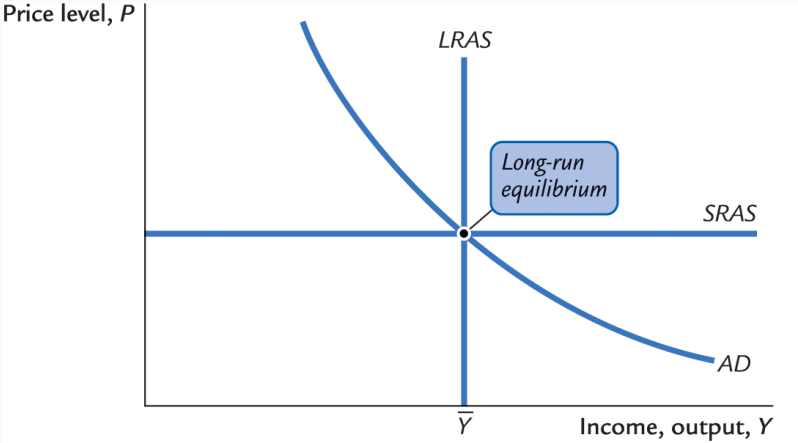
Recap: short-run vs. long-run

- In the long run, prices are fully flexible; that is, the aggregate supply curve is vertical and changes in agg. demand affect nominal but not real quantities

- In the (very) short run, prices are fully sticky; that is, the aggregate supply curve is horizontal and changes in aggregate demand affect real quantities

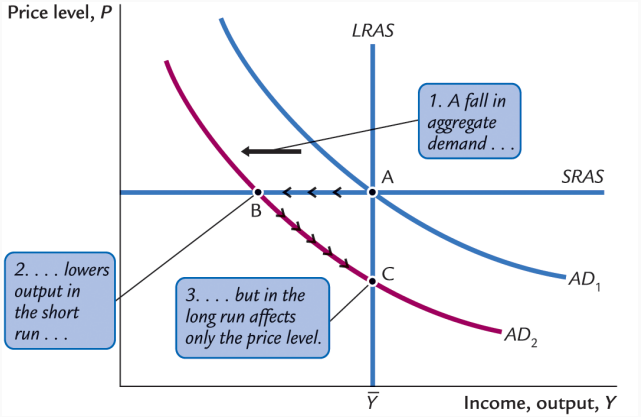
Transition from the short-run to the long-run

- **Economy begins in long-run equilibrium**: AD crosses LRAS (and SRAS) curve
  - Prices adjusted to reach this equilibrium



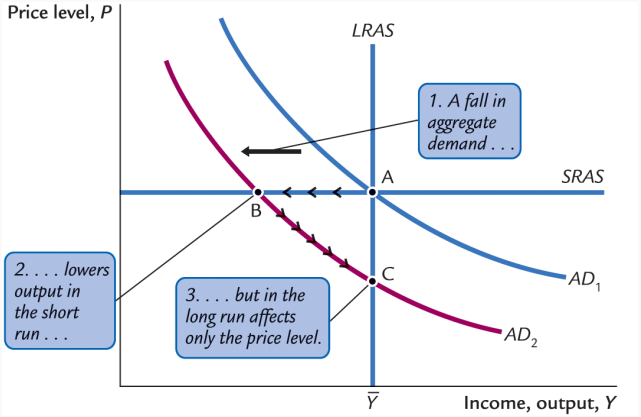
Transition from the short-run to the long-run

- Now suppose Fed reduces money supply and AD curve shifts downward
  - Because prices are sticky in the short run, economy moves to equilibrium B: output and employment fall below natural levels and economy enters recession



Transition from the short-run to the long-run

- Now suppose Fed reduces money supply and AD curve shifts downward
  - Over time, wages and prices fall in response to low demand and we move to C: in new eq., output and employment back at natural levels and prices are lower



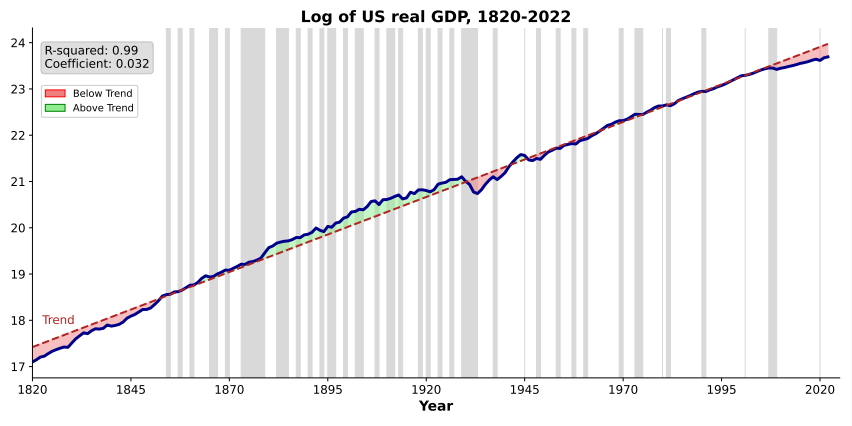
Stabilization Policy

Stabilization policy

- **Fluctuations come from changes in aggregate supply or aggregate demand**
- Economists refer to exogenous events shifting these curves as “shocks”:
  - A **demand shock** shifts the aggregate demand curve
  - A **supply shock** shifts the aggregate supply curve
- Demand and supply shocks push economy away from natural levels of employment and output
- Two-fold purpose of short-run models of aggregate supply and demand:
  1. Understand how shocks cause economic fluctuations
  2. Assess appropriate policy responses to shocks (**stabilization policy**)

Stabilization policy

- **Stabilization policy**: policy actions aimed at reducing severity of short-run economic fluctuations; Goal is to minimize fluctuations from long-run trend



Source. Maddison Project Database 2023.

Stabilization policy: demand shocks

- Consider the demand shock that it is the availability of credit cards:
  it reduces quantity of money that people want to hold, $\downarrow M^d$
- Reduction in money demand is equivalent to increase in money velocity:

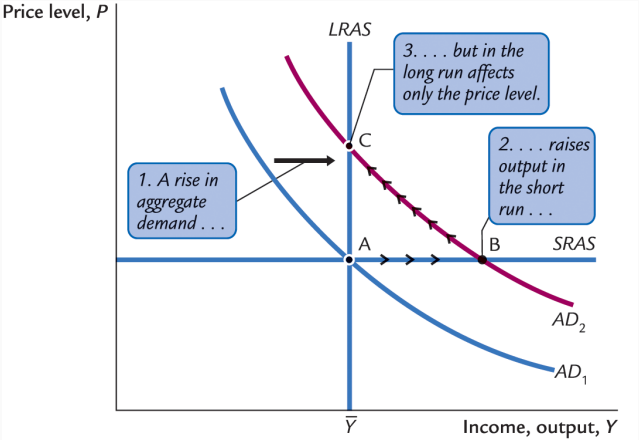
$$\frac{M_t^d}{P_t} = \underbrace{\gamma}_{\equiv 1/V} \times Y_t$$

  - When people hold less money ($\downarrow M^d$), share of income held in cash lower ($\downarrow \gamma$)
  - This means each dollar moves from hand to hand quicker ($\uparrow V$)
- If money supply is held constant, the increase in money velocity causes nominal spending to rise and AD curve to shift outward ($MV = PY$)

Stabilization policy: demand shocks

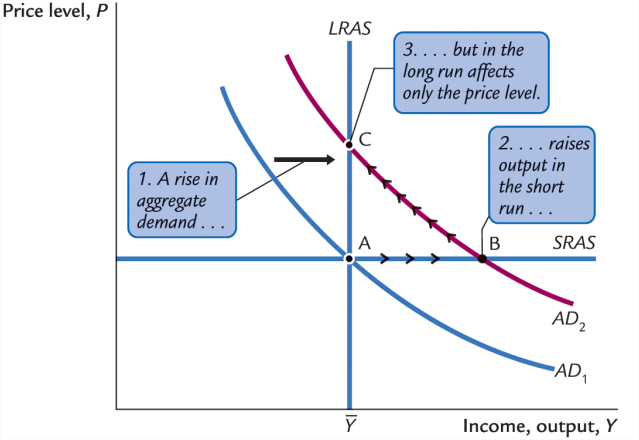
- In the short run, increase in demand rises economy's output: $A \to B$

  (At the old prices, firms can sell more products: they increase employment and production)



Stabilization policy: demand shocks

- Over time, high demand pushes up wages and prices, reducing aggregate demand and moving economy to its natural level of production: $B \to C$



Stabilization policy: demand shocks

- During the transition (from A to C), output exceeds its natural level
- What can the Fed do to dampen boom & keep output closer to natural level?
  - Fed can reduce money supply M to *fully* offset increase in money velocity

$$\frac{M_t}{P_t} = \frac{M_t^d}{P_t} = \underbrace{\gamma}_{\equiv 1/V} \times Y_t$$

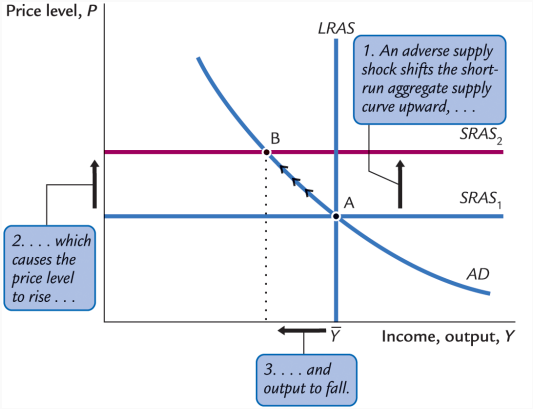
  - Offsetting change in velocity stabilizes aggregate demand
  - Fed could eliminate impact of demand shocks on output and employment by adjusting money supply

Stabilization policy: supply shocks

- **Supply shocks alter cost of producing goods and services and hence can affect the prices firm charge**
  - Even if prices are sticky, a large-enough shock can trigger a price response
- Supply shocks have a direct impact on the price level and thus are sometimes referred to as **price shocks**
- Examples of adverse supply shocks:
  - Drought destroying crops increases food prices
  - New environmental law requires lower pollution and leads to higher prices
  - Mandatory unionization pushes up wages and thus consumer prices
  - Cartel formation pushes up prices by purposedly reducing production levels

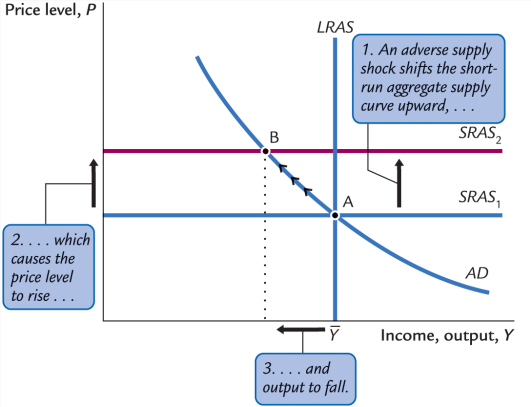
Stabilization policy: supply shocks

- Consider the supply shock that it is regulation reducing allowable pollution: it pushes up price level and reduces quantity produced ($A \to B$)
  - Stagflation: falling output and inflation



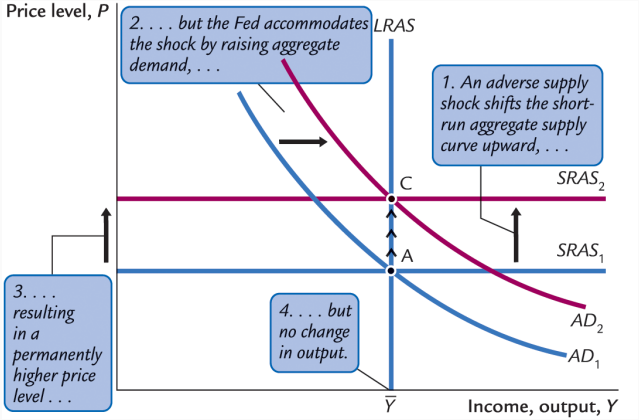
Stabilization policy: supply shocks

- What can the Fed do to mitigate impact of shock? **Allow recession**
  - Hold agg. demand constant so that output and employment first fall below natural level and wait for initial eq. to be restored when prices fall in response



Stabilization policy: supply shocks

- What can the Fed do to mitigate impact of shock? **Mitigate recession**
  - Stimulate aggregate demand to bring economy to natural level quickly at the cost of (permanently) higher price level ($A \to B \to C$ vs. $A \to B \to A$)



Adverse supply shocks: OPEC

- Real-life example of adverse supply shock: OPEC in 1970s and 1980s
  - Organization of oil suppliers that coordinate production levels and prices
- In the 1970s, OPEC reduced supply of oil causing a doubling of its price
- Increase of oil prices caused stagflation: falling output + rising price levels

Year	Change in oil price	Inflation rate (CPI)	Unemployment rate
1973	11%	6.2%	4.9%
1974	68%	11%	5.6%
1979	25%	11.3%	5.8%
1980	48%	13.5%	7.0%
1981	44%	10.3%	7.5%

Taking Stock

Taking stock

- For the past two centuries, US grew at an averge annual rate of 3%, but trend masks important fluctuations (eg, great depression, oil crises, ...)
- **Business cycle** is this period of short-term fluctuations in output and employment causing deviation from long-term growth
- **Key facts about business cycles**:
  - Two phases: expansions and contractions
  - Beginning and end of phases marked by peak and trough
  - Unpredictable and of uncertain duration
  - When business cycle is severly bad, economy enters into recession
  - Analyzed looking at battery of economic indicators: GDP, unemployment, consumption, investment, sales, industrial production, ...

Taking stock

- Analysis of business cycles (short-run phenomena) requires different economic models
  - We used classical models to study long-run phenomena
  - We use Keynesian models to study short-run phenomena
- Key difference between long-run and short-run economic models is the behavior of prices:
  - In the long run, prices are flexible and adjust to clear markets
  - In the short run, prices are stikcy and markets not need to clear
- Because prices behave differently in the short run than in the long run (flexible vs. sticky), economic events and policies may have different effects
  - In the long run, monetary policy is neutral whereas in the short run is not (Ie, monetary policy affects real quantities only in the short run)

Taking stock

- Easiest to understand distinction between short-run and long-run economic models of aggregate demand and supply in terms of supply curves:
  - LRAS curve is vertical: prices fully flexible
  - SRAS curve is horizontal: prices completely stuck
- Short-run models of aggregate supply and demand useful to study **stabilization policy** (ie, policy actions that reduce severity of short-run econ fluctuations)
  - Fed can eliminate impact of demand shocks on output and employment by managing money supply
  - Fed can mitigate impact of supply shocks on output and employment at the cost of permanently higher prices

Questions?

Thank You!

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