Business Cycles

Econ 4002, Washington University in St. Louis

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Introduction

- Most economies grow in the long-run, but they experience fluctuations in the medium- and short-run
- These ups and downs are known as expansions and recessions
- The sequence of expansions and recessions is known as the **business cycle** of an economy
- We will study the history and characteristics of business cycles in the US
- In later lectures, we will combine what we have learned to develop models that allow us to analyze these business cycles
  - What causes them?
  - What are their effects?
  - How should policy respond?

Introduction

This series of lectures:

1. What is a Business Cycle?
2. The history of the American Business Cycle
3. Business Cycle Facts
4. Business Cycle Analysis

1. What is a Business Cycle?

What is a Business Cycle?

- The National Bureau of Economic Research (NBER) has been tracking the US business cycle since the 1920s

- The classic definition is due to Burns & Mitchell, 1946:

Business Cycle

A cycle consists of expansions occurring at about the same time in many economic activities, followed by similarly general recessions, contractions, and revivals which merge into the expansion phase of the next cycle; this sequence of changes is recurrent but not periodic; in duration business cycles vary from more than one year to ten or twelve years.

Burns-Mitchell Definition

The Burns-Mitchell definition makes five points about business cycles:

1. Business cycles are fluctuations of **aggregate economic activity**, and not just fluctuations in a single variable. In practice, we often look at real GDP as an indicator for the business cycle, as it combines information on all market sectors of the economy.

2. Business cycles feature **expansions**, when aggregate economic activity is growing faster than a certain trend, and **contractions**, when aggregate economic activity is growing slower than that trend.

   - The "low" point at which a recession becomes an expansion is called a **trough**
   - The "high" point at which an expansion becomes a contraction is a **peak**
   - Particularly severe recessions are called **depressions** or **crises**.

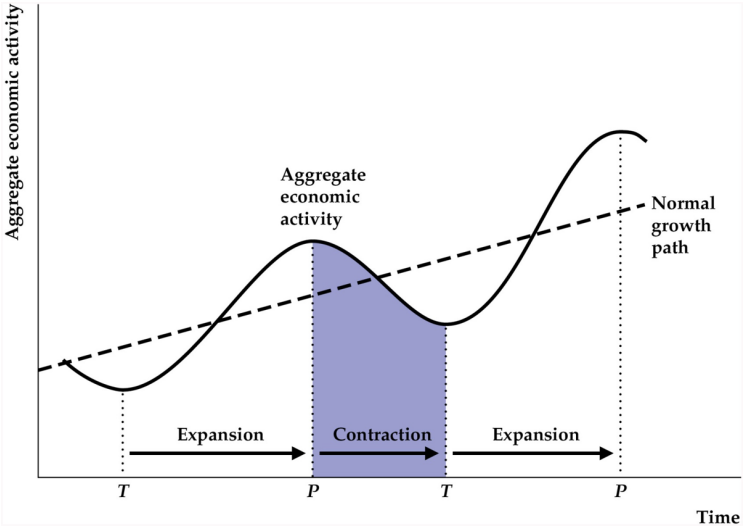
Burns-Mitchell Definition

3. Economic variables show **comovement**: expansions and recessions occur at about the same time in many activities. Variables such as prices, investment, etc. have regular and predictable patterns of behavior over the course of the business cycle.

4. Business cycles are **recurrent but not periodic**: business cycles do not last for fixed or predetermined lengths of time, but they are recurrent in the sense that the expansion-recession cycle happens again and again.

5. Business cycles are **persistent**: once expansions and recessions begin, they tend to last for some time (until the next turning point - peak or trough)

A Business Cycle



T = trough, P = peak

2. The American Business Cycle

American Business Cycle since 1854

Six major periods:

- Pre-World War I, 1854-1918
- Great Depression and WWII, 1919-1945
- Post-WWII, 1946-1982
- Great Moderation, 1983-2007
- Great Recession, 2008-2020
- COVID-19 and Inflation, 2020–

Peak month (Peak Quarter)	Trough month (Trough Quarter)	Contraction	Expansion	Cycle	
Red indicates that the turning point quarter does not include the turning point month		*Duration, peak to trough*	*Duration, trough to peak*	*Duration, trough to trough*	*Duration, peak to peak*
	December 1854 (1854Q4)				
June 1857 (1857Q2)	December 1858 (1858Q4)	18	30	48	
October 1860 (1860Q3)	June 1861 (1861Q3)	8	22	30	40
April 1865 (1865Q1)	December 1867 (1868Q1)	32	46	78	54
June 1869 (1869Q2)	December 1870 (1870Q4)	18	18	36	50
October 1873 (1873Q3)	March 1879 (1879Q1)	65	34	99	52
March 1882 (1882Q1)	May 1885 (1885Q2)	38	36	74	101
March 1887 (1887Q2)	April 1888 (1888Q1)	13	22	35	60
July 1890 (1890Q3)	May 1891 (1891Q2)	10	27	37	40
January 1893 (1893Q1)	June 1894 (1894Q2)	17	20	37	30
December 1895 (1895Q4)	June 1897 (1897Q2)	18	18	36	35
June 1899 (1899Q3)	December 1900 (1900Q4)	18	24	42	42
September 1902 (1902Q4)	August 1904 (1904Q3)	23	21	44	39
May 1907 (1907Q2)	June 1908 (1908Q2)	13	33	46	56
January 1910 (1910Q1)	January 1912 (1911Q4)	24	19	43	32
January 1913 (1913Q1)	December 1914 (1914Q4)	23	12	35	36
August 1918 (1918Q3)	March 1919 (1919Q1)	7	44	51	67
January 1920 (1920Q1)	July 1921 (1921Q3)	18	10	28	17
May 1923 (1923Q2)	July 1924 (1924Q3)	14	22	36	40
October 1926 (1926Q3)	November 1927 (1927Q4)	13	27	40	41
August 1929 (1929Q3)	March 1933 (1933Q1)	43	21	64	34
May 1937 (1937Q2)	June 1938 (1938Q2)	13	50	63	93
February 1945 (1945Q1)	October 1945 (1945Q4)	8	80	88	93
November 1948 (1948Q4)	October 1949 (1949Q4)	11	37	48	45
July 1953 (1953Q2)	May 1954 (1954Q2)	10	45	55	56
August 1957 (1957Q3)	April 1958 (1958Q2)	8	39	47	49
April 1960 (1960Q2)	February 1961 (1961Q1)	10	24	34	32
December 1969 (1969Q4)	November 1970 (1970Q4)	11	106	117	116
November 1973 (1973Q4)	March 1975 (1975Q1)	16	36	52	47
January 1980 (1980Q1)	July 1980 (1980Q3)	6	58	64	74
July 1981 (1981Q3)	November 1982 (1982Q4)	16	12	28	18
July 1990 (1990Q3)	March 1991 (1991Q1)	8	92	100	108
March 2001 (2001Q1)	November 2001 (2001Q4)	8	120	128	128
December 2007 (2007Q4)	June 2009 (2009Q2)	18	73	91	81
February 2020 (2019Q4)	April 2020 (2020Q2)	2	128	130	146

Pre-World War I, 1854-1918

- Recessions were very common and often severe
- 338 months of contraction and 382 months of expansion
- Compare to 642 months of expansion and 122 of contraction in 1945-2009
- Longest recession experienced by the US economy: 65 months, from 1873 to 1879

Great Depression and WWII, 1919-1945

- After a prosperous decade, activity peaks in 1929
- The US enters a financial crisis with the stock market crashing in October 1929
- Real GDP falls 30% peak to trough (vs. 4.2% for the Great Recession), unemployment peaks at 25% (vs. 10% for the GR)
- Economy recovers in 1933 thanks in part to FDR's New Deal policies, but enters recession again in 1937
- In 1939, unemployment was still over 17%
- Wartime production boosts the economy considerably: real GDP doubles in 1939-44 and unemployment falls to 1.2% in 1944

Post-WWII, 1946-1982

- General period of growth with few, brief, and mild recessions
- Continuous 106 month expansion 1961-69: business cycle was "tamed"
- Europe experiences "les Trentes Glorieuses"
- 1973 oil shock throws most advanced economies to a severe recession
- This recession was different than previous ones because inflation rose instead of falling
- Period of "stagflation" comes to an end in the early 80s with Paul Volcker at the head of the Fed

The Great Moderation, 1983-2007

- Starting in the early to mid 80s, macroeconomic volatility falls considerably
- This period becomes known as the "Great Moderation"
- Two short and mild recessions: 1990 and 2001
- The period between 1982 and 2001 is also known as the "Long Boom"

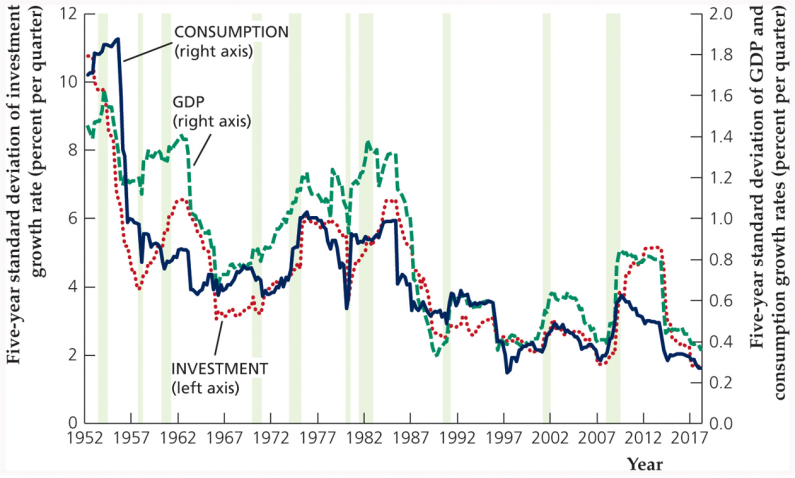
The Great Recession, 2008-2020

- The Great Moderation ends with the longest and deepest recession since the Great Depression
- Housing prices had been rising in the early 2000s, fueling household and financial leverage
- As house prices start falling, this causes serious problems for over-leveraged households and financial institutions
- Unemployment rate rises above 10% for the first time since the early 1980s
- Expansionary fiscal and monetary policies unable to produce strong recovery in the following years

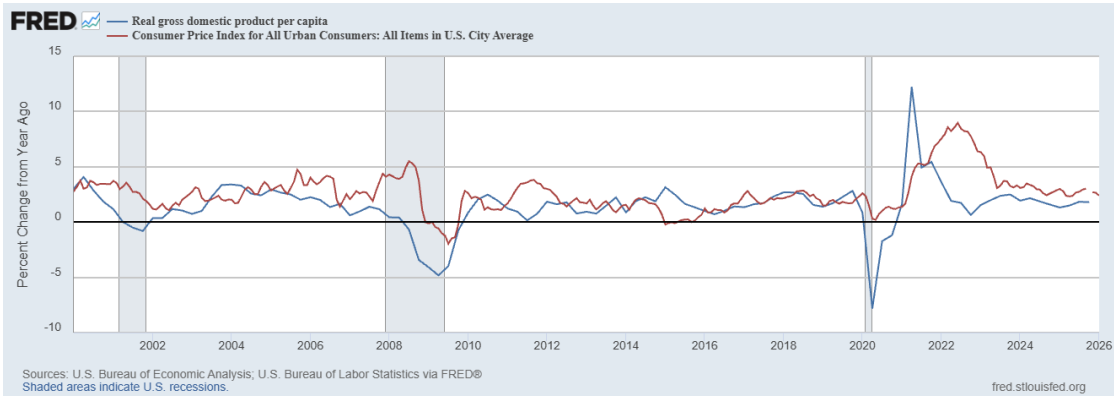
COVID-19 and Inflation, 2020-

- While the recovery from the GR was disappointing for many, it resulted in the longest expansion on record (128 months)
- As of January 2020, the unemployment rate was at its lowest level since the late 1960s
- The COVID-19 pandemic triggered a sharp decline of economic activity in the first quarters of 2020
- Unemployment reached 14.8% and GDP fell by 32.9%
- Recovery was swift once pandemic situation began to normalize
- Very expansionary fiscal and monetary policies
- Very high inflation starting in 2021 (8.9% in June 2022), falls subsequently but still above target as of 2025

The Great Moderation, 1983-2007



COVID-19, 2020-



3. Business Cycle Facts

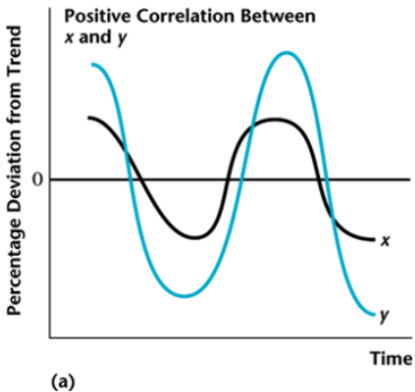
Business Cycle Facts

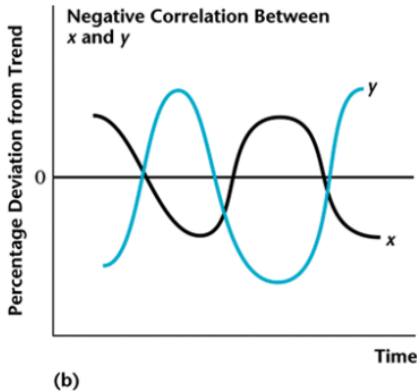
- There are many empirical regularities regarding business cycles
- While BCs vary in length and severity, there are systematic patterns in the way many macroeconomic variables move during these events
- The ability to reproduce these patterns is an important test of the validity of different BC theories

Cyclical Behavior of Economic Variables

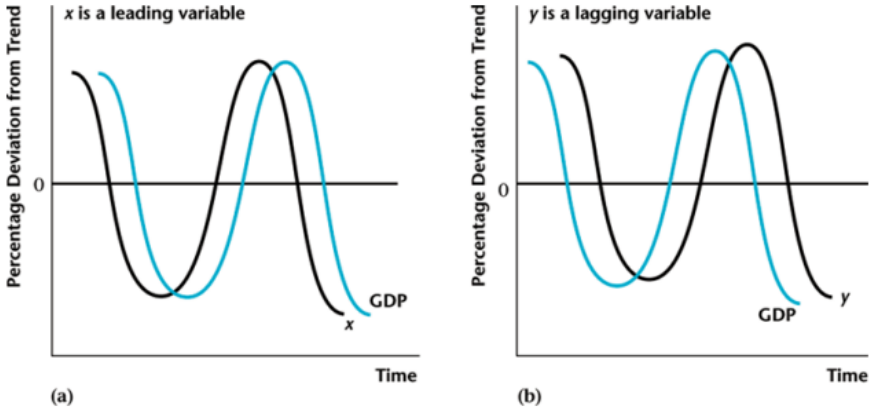
- The cyclical behavior of economic variables refers to their **direction** and **timing**
- In what **direction** does a variable move relative to aggregate economic activity?
  - Procyclical: in the same direction (ex: investment)
  - Countercyclical: in the opposite direction (ex: unemployment)
  - Acyclical: with no clear pattern (ex: real interest rates)
- What is the **timing** of the variable's turning points relative to those of the BC?
  - Leading: the variable moves in advance of the BC (ex: stock prices)
  - Coincident: the variable moves at roughly the same time (ex: consumption)
  - Lagging: the variable moves after the BC (ex: inflation)

Procyclical vs. Countercyclical Variables





Leading vs. Lagging Variables



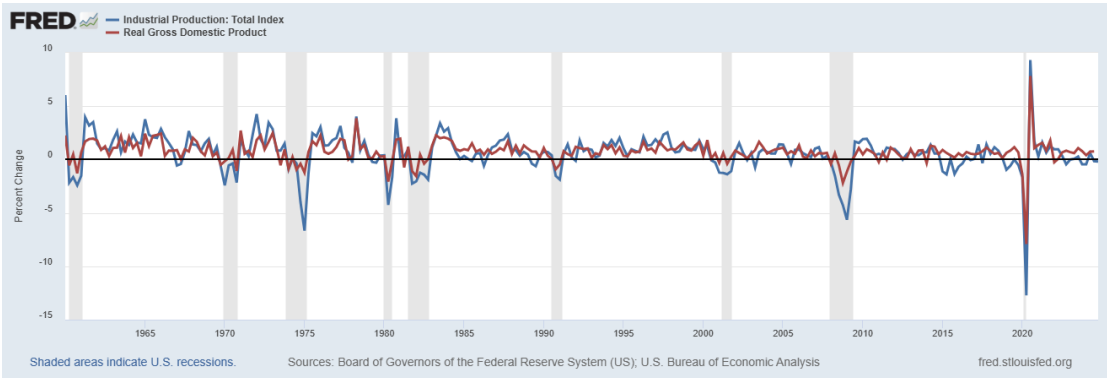
Business Cycle Indicators

Variable	Direction	Timing
Production		
Industrial production	Procyclical	Coincident
Durable goods industries are more volatile than nondurable goods and services		
Expenditure		
Consumption	Procyclical	Coincident
Business fixed investment	Procyclical	Coincident
Residential investment	Procyclical	Leading
Inventory investment	Procyclical	Leading
Government purchases	Procyclical	—[a]
Investment is more volatile than consumption		
Labor Market Variables		
Employment	Procyclical	Coincident
Unemployment	Countercyclical	Unclassified[b]
Average labor productivity	Procyclical	Leading[a]
Real wage	Procyclical	—[a]
Money Supply and Inflation		
Money supply	Procyclical	Leading
Inflation	Procyclical	Lagging
Financial Variables		
Stock prices	Procyclical	Leading
Nominal interest rates	Procyclical	Lagging
Real interest rates	Acyclical	—[a]

[a] Timing is not designated by The Conference Board.
[b] Designated as "unclassified" by The Conference Board; leading at peaks and lagging at troughs.
Source: Business Cycle Indicators, April 2018. Industrial production: series 47 (industrial production); consumption: series 57 (manufacturing and trade sales, constant dollars); business fixed investment: series 86 (gross private nonresidential fixed investment); residential investment: series 26 (new private housing units started); inventory investment: series 30 (change in business inventories, constant dollars); employment: series 41 (employees on nonagricultural payrolls); unemployment: series 43 (civilian unemployment rate); money supply: series 106 (money supply M2, constant dollars); inflation: series 120 (CPI for services, change over six-month span); stock prices: series 19 (index of stock prices, 500 common stocks); nominal interest rates: series 119 (Federal funds rate), series 114 (discount rate on new 91-day Treasury bills), series 109 (average prime rate charged by banks).

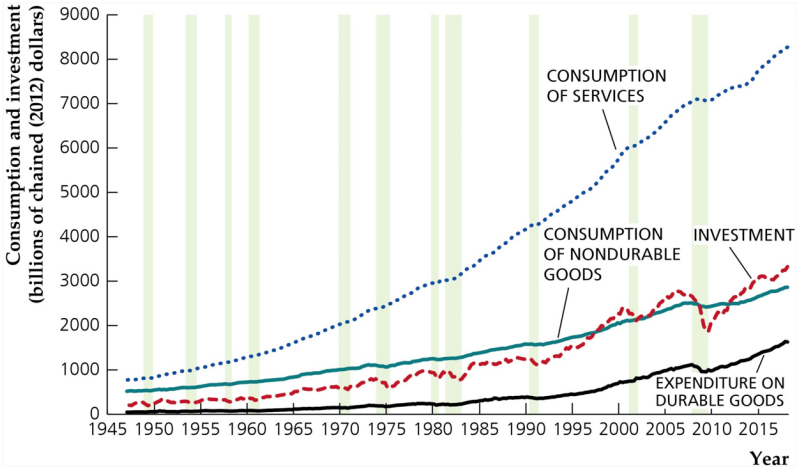
Industrial Production

Procyclical and coincident indicator



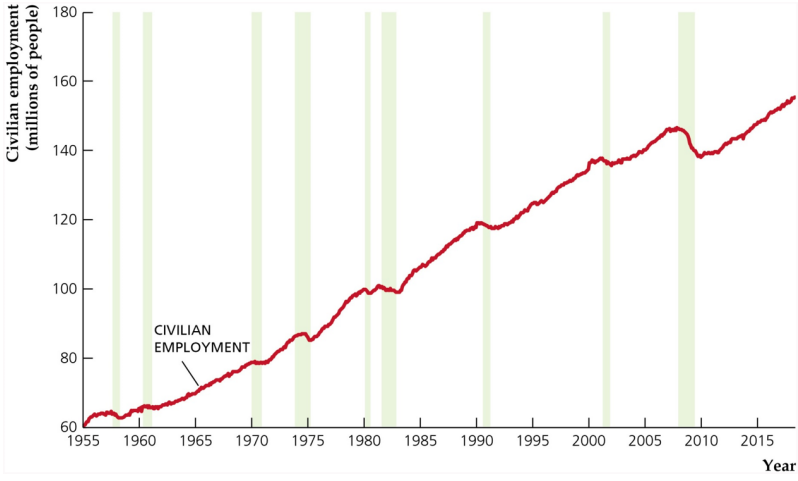
Expenditure Components

Procyclical and coincident (investment sometimes leading)



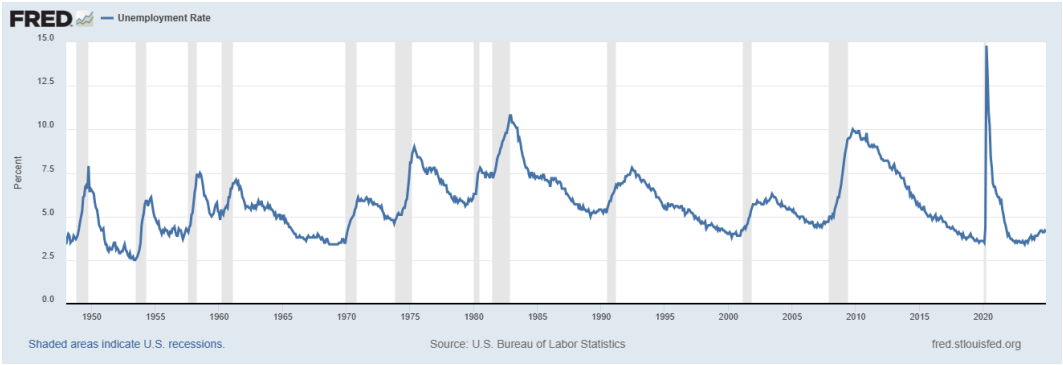
Civilian Employment

Procyclical and coincident



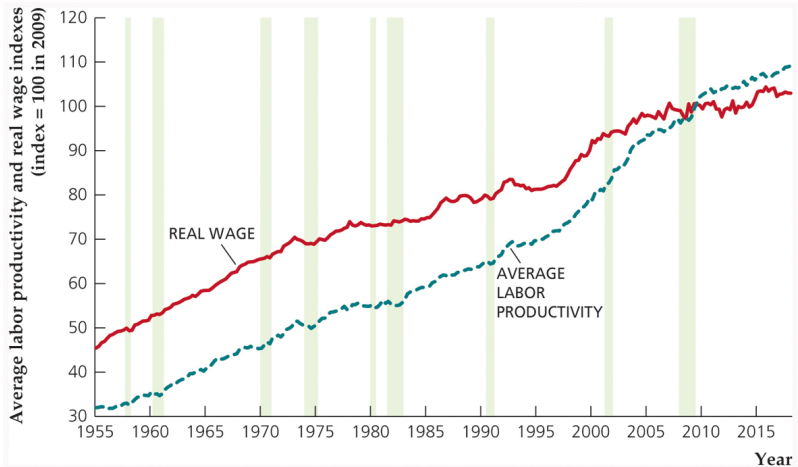
Unemployment Rate

Countercyclical indicator, unclassified with respect to timing (i.e., jobless recoveries)



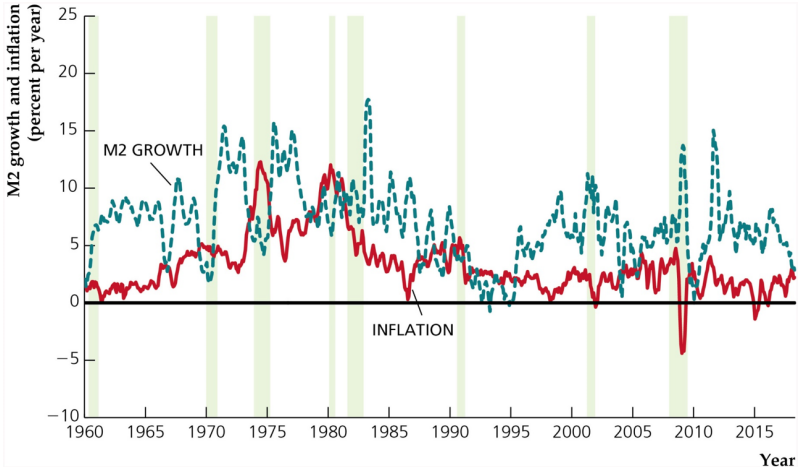
Real Wages and Average Labor Productivity

- Real wages: procyclical, coincident
- Average labor productivity: procyclical, leading



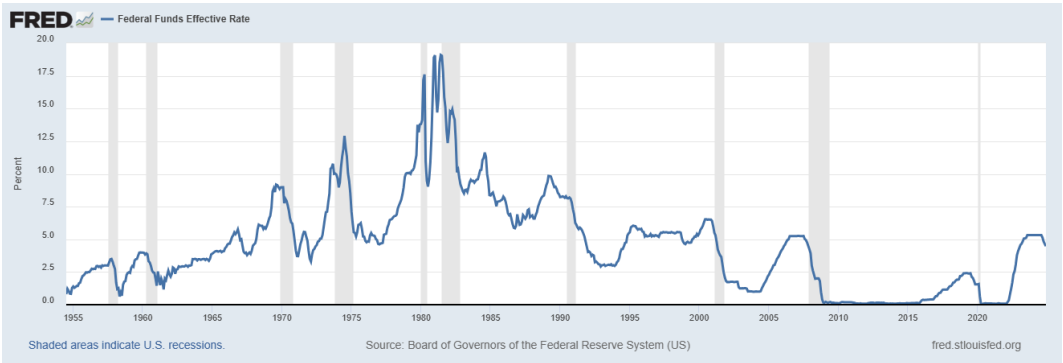
Nominal Money Supply and Inflation

- Money supply: procyclical, leading
- Inflation: procyclical, lagging



Nominal Interest Rate

Procyclical, lagging



Countercyclical, Leading Variable: VIX

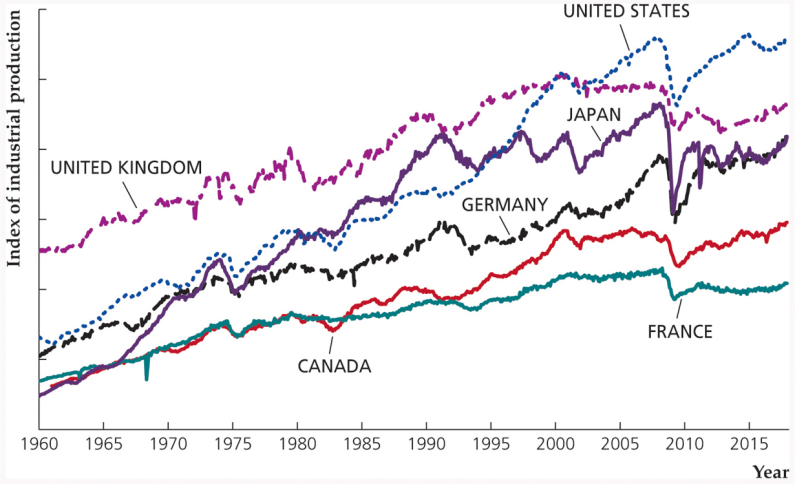
The VIX is a stock index option-based measure of implied market volatility

Business Cycle Facts

Other relevant characteristics:

- **Volatility**: certain variables are more volatile than others.
  - Investment is more volatile than GDP, but consumption is less volatile than GDP.
- **Seasonality**: certain variables have predictable systematic movements throughout the year.
  - GDP tends to be highest in the 4th quarter and lowest in the 1st quarter
  - Most macroeconomic variables are **seasonally adjusted** to remove these effects.
- **International Business Cycles**: major advanced economies tend to undergo recessions and expansions at roughly the same time, suggesting that there exists a global business cycle.

International Business Cycles



4. Business Cycle Analysis

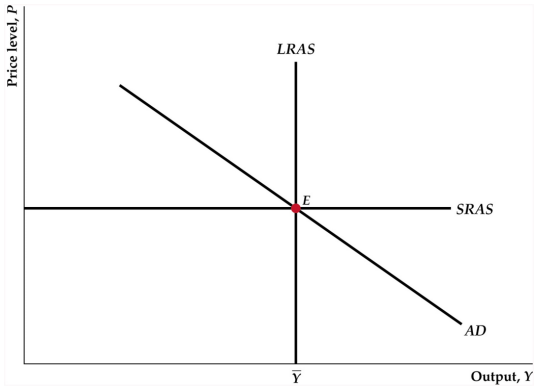
Business Cycle Analysis

- Business cycle analysis is essential to understand **why** they happen, which in turn allows economists to advise policymakers on what to do about them
- Theories of the business cycle have two main components:
  1. **Shocks** are typically unpredictable factors that affect the economy, such as wars, technological innovation, changes in government policies, etc. Shocks are treated as exogenous variables by theories of the business cycle
  2. A **Model** is a stylized description of how certain variables behave after shocks hit the economy. It describes the response of endogenous variables to movements in the exogenous variables.
- We focus on two types of theories that can be analyzed using variations of the same model:
  1. Classical Business Cycle Analysis
  2. Keynesian Business Cycle Analysis

Aggregate Demand and Aggregate Supply

The joint framework we will use to analyze these theories is the **AD-AS model**

- (Y, P) space: output and price level
- AD: aggregate demand curve
- $SRAS$: short-run aggregate supply
- $LRAS$: long-run aggregate supply



Key Assumption: prices are fixed in the short-run, but flexible in the long-run

Aggregate Demand

AD Curve

- The AD curve represents a negative relationship between real output and the price level, holding other factors constant
- A decrease in aggregate demand for a given P shifts the curve to the left
  - decrease in govt expenditures
  - wave of pessimism that leads households to consume less or companies to invest less
  - etc.

Aggregate Supply

SRAS Curve

- The SRAS curve represents aggregate supply in the short-term: the quantity of output producers are willing to supply at a given P
- We assume that prices are fixed in the short-run and firms are willing to supply any quantity of output at a given P, hence the SRAS is flat

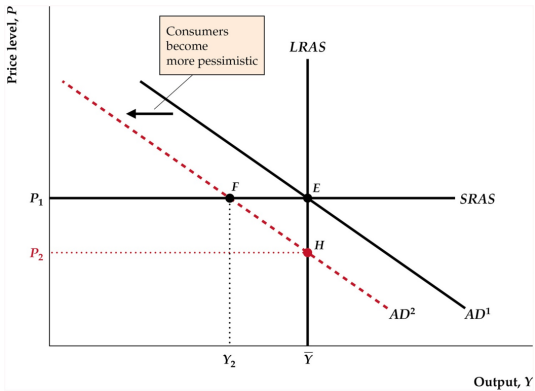
LRAS Curve

- If demand is persistently high/low at a given P, producers start adjusting prices
- In the long-run, prices are perfectly flexible and production converges to its "natural level", the full-employment level of output $\bar{Y}$
- This is represented by the vertical LRAS curve

Aggregate Demand Shocks

Consider a wave of pessimism among consumers: a negative aggregate demand shock

- AD shifts to the left
- **Short-run**: equilibrium shifts $E \rightarrow F$
- Prices are fixed, output falls $\bar{Y} \downarrow Y_2$
- **Long-run**, producers respond to lower demand by lowering prices
- Equilibrium shifts $F \rightarrow H$
- Output returns to $\bar{Y}$ and the price level falls $P_1 \downarrow P_2$



Aggregate Demand Shocks

How long does it take to get from the short-run to the long-run equilibrium?

- This is a very important question in macroeconomics, and the source of debate among different theories of the business cycle
- If the adjustment is very slow, this means that output remains below potential for a long time
- This can be an argument for active macroeconomic policy (fiscal or monetary)

Aggregate Demand Shocks

- **Classical theory** argues that prices adjust rapidly
  - This means that recessions are short
  - And so there is little need for government intervention
- **Keynesian theory** argues that prices and wages adjust slowly
  - Adjustment may take several years, and so recessions may be long
  - Government should fight recessions by taking action to manage the *AD* curve

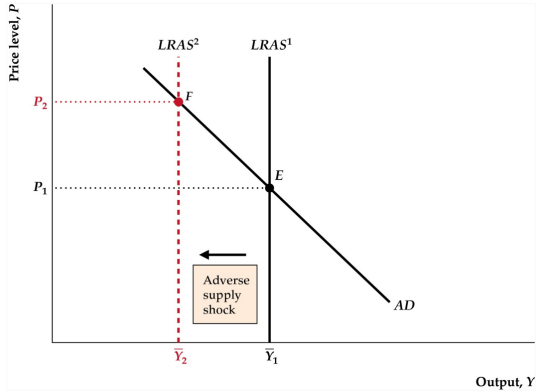
Aggregate Supply Shocks

- Classical theory views supply shocks as the main source of economic fluctuations
- These are shocks that change the full-employment level of output $\bar{Y}$ and therefore shift the *LRAS* curve
- Examples:
  - technological innovation
  - movements in the price of an important commodity (such as oil)
  - changes in policy that affect the incentives of workers to supply labor

Aggregate Supply Shocks

Consider a negative supply shock, such as a drought that affects agricultural productivity

- *LRAS* shifts to the left
- Equilibrium shifts $E \rightarrow F$
- Full-employment output falls $\bar{Y}_1 \downarrow \bar{Y}_2$
- Price level rises $P_1 \uparrow P_2$



Firms are less efficient at producing, so they produce less and charge higher prices.

Differences between Classical and Keynesian Theories

Two key differences between the two theories:

1. **Shocks**: each theory postulates that business cycles are primarily driven by different types of shocks: aggregate supply shocks (Classical) or aggregate demand shocks (Keynesian).

2. **Models**: Classical theory assumes that prices are relatively flexible, even in the short-run. Keynesian theory assumes that prices are sticky.