

# Business Cycle Measurement

ECO 305: Intermediate Macroeconomics

## 1 Introduction

### 1.1 Goals/Reading

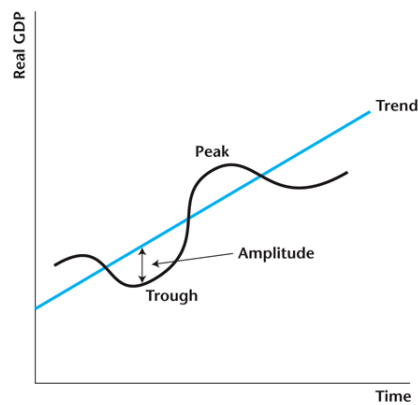
#### Goals / Reading

- Specific Goals:
  - Identify regularities (and irregularities) in macroeconomic activity.
  - Identify co-movement in macroeconomic variables.
  - Describe the behavior of key macroeconomic variables.
- Reading: Williamson, Chapter 3.

### 1.2 Business Cycle Fluctuations

#### Business Cycle Fluctuations

- **Business Cycle:** fluctuations around a trend in economic activity.
- **Peak:** a turning point in a business cycle at a large positive deviation from the trend.
- **Trough:** a turning point in a business cycle at a large negative deviation from the trend.

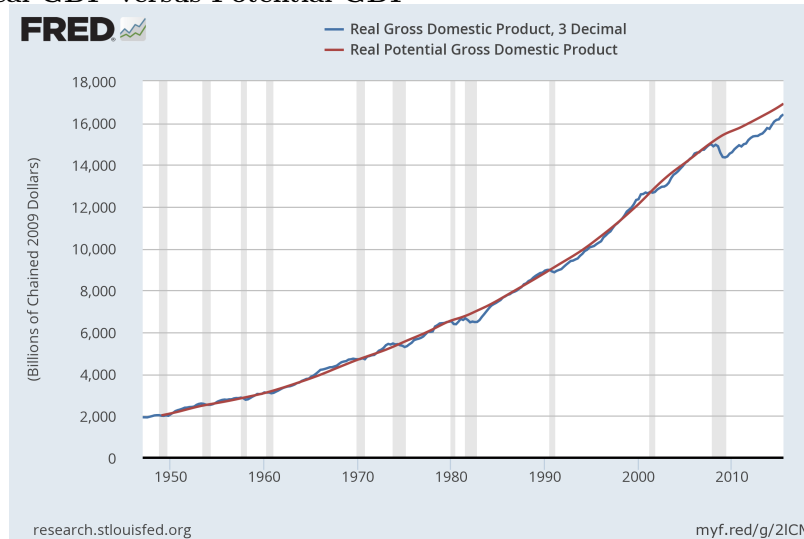


### 1.3 GDP Fluctuations

#### GDP Deviations from Trend

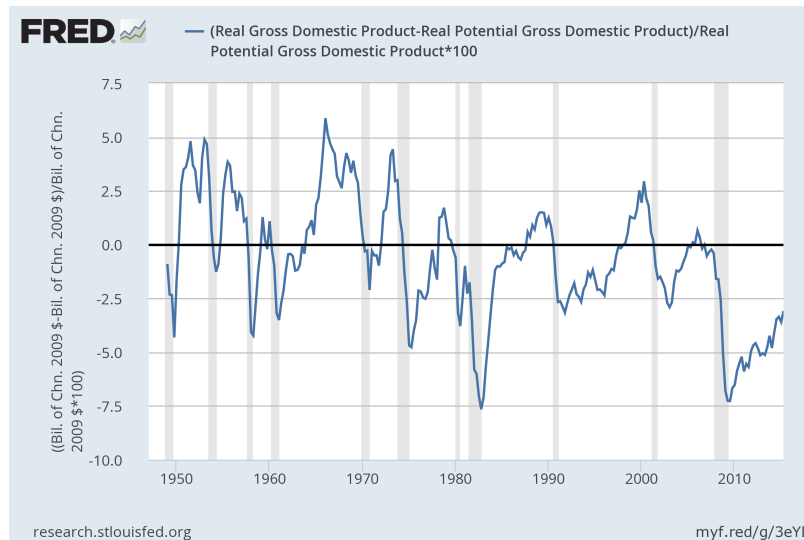
- **Real GDP:** A measure of the *quantity* of all final goods and services produced.
- **Potential GDP:** Value of real GDP if all factors of production are used efficiently. Trend GDP.
- **Output gap:** Percentage deviation of real GDP from potential.
- **Recessionary gap:** output gap that is negative.
- **Inflationary gap:** output gap that is positive.

#### Real GDP versus Potential GDP



<http://research.stlouisfed.org/fred2>

#### Output Gap



<http://research.stlouisfed.org/fred2>

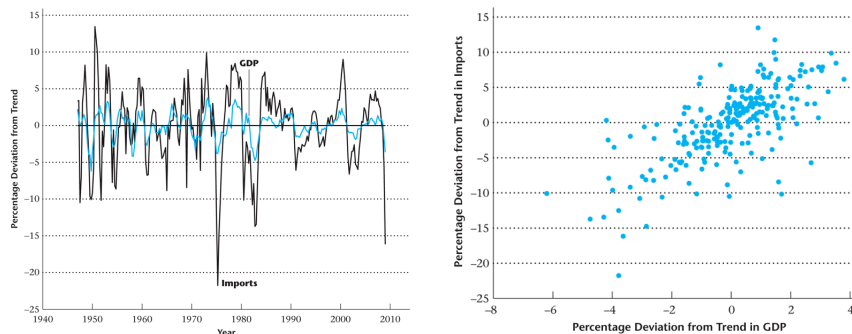
## 2 Co-movement

### 2.1 Cyclical

#### Co-movement

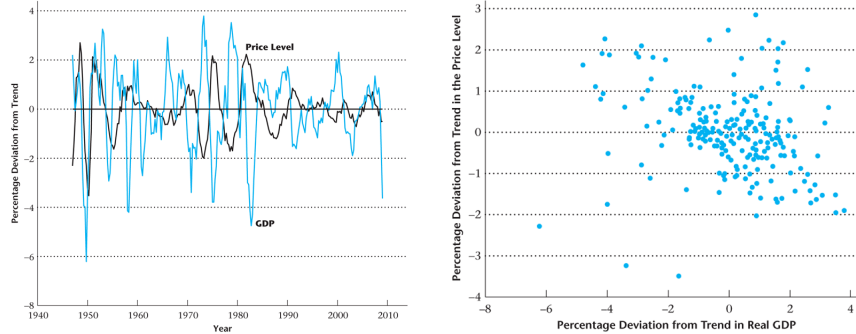
- **Procyclical:** A variable is procyclical if its deviations from trend are positively correlated with the output gap.
- **Countercyclical:** A variable is countercyclical if its deviations from trend are negatively correlated with the output gap.
- **Acyclical:** A variable is acyclical if it is *not procyclical nor countercyclical*.

#### Co-movement of Imports and GDP



Are imports are procyclical, countercyclical, or acyclical?

## Co-movement of Price Level and GDP



Is price level procyclical, countercyclical, or acyclical?

## 2.2 Leading and lagging variables

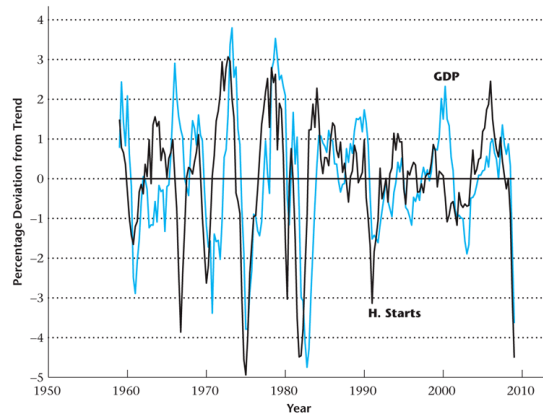
### Leading and Lagging Variables

- **Leading:** A variable is leading when it tends to predict upcoming movements in real GDP.
- **Lagging:** A variable is lagging when it tends to follow recent movements in real GDP.
- **Coincident:** A variable is a coincident variable when it is positively correlated with GDP, but not leading or lagging.
- **Leading Economic Indicators:** An index comprised of several leading economic variables, constructed using statistical forecasting techniques.
  - Conference Board's Index of Leading Economic Indicators.
  - Federal Reserve Bank of Philadelphia State and National Leading Indices.

## 2.3 Examples

### Housing Starts

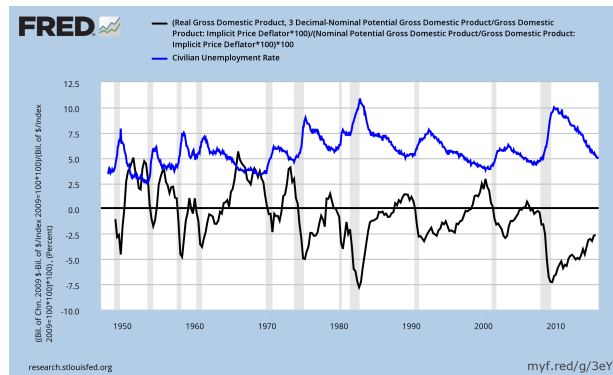
- Light blue: Real GDP
- Dark blue: Housing Starts



Is 'Housing Starts' a *leading*, *lagging*, or *coincident* economic variable?

### Unemployment Rate

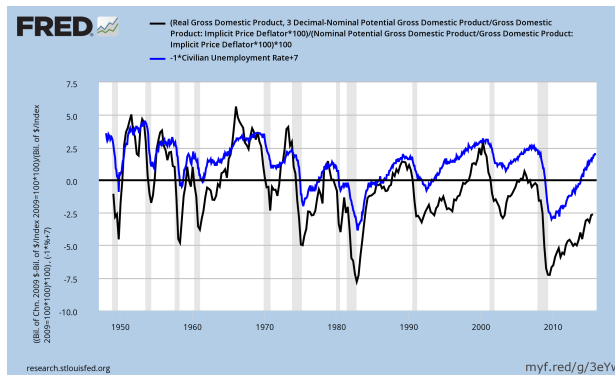
**Blue Line:** Unemployment rate **Black Line:** Output gap.



Is the unemployment rate a *leading*, *lagging*, or *coincident* economic variable?

### Unemployment Rate

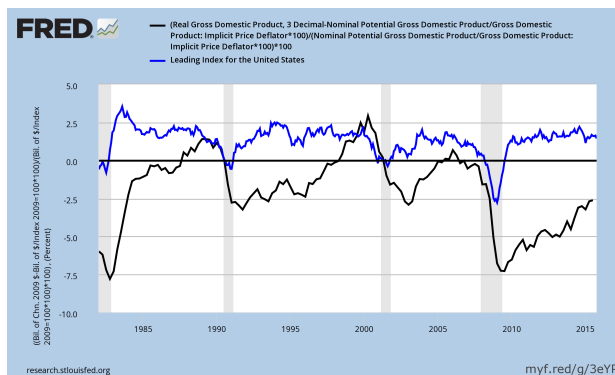
**Blue Line:** Unemployment rate (multiplied by -1, scaled 7 percentage points). **Black Line:** Output gap.



Is the unemployment rate a *leading*, *lagging*, or *coincident* economic variable?

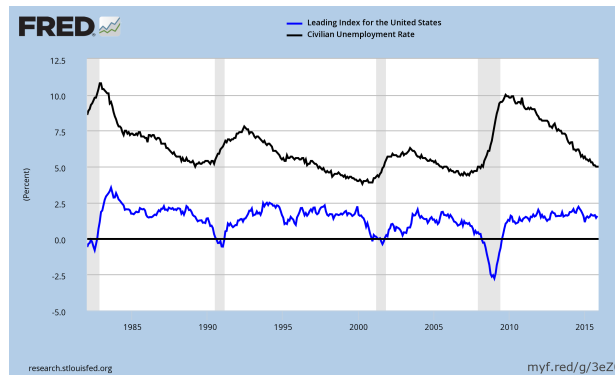
### FRB Philadelphia National Leading Index

**Blue Line:** Leading Index  
**Black Line:** Real GDP Growth



### FRB Philadelphia National Leading Index

**Blue Line:** Leading Index  
**Black Line:** Unemployment Rate



### 3 Volatility

#### 3.1 Measure of variance

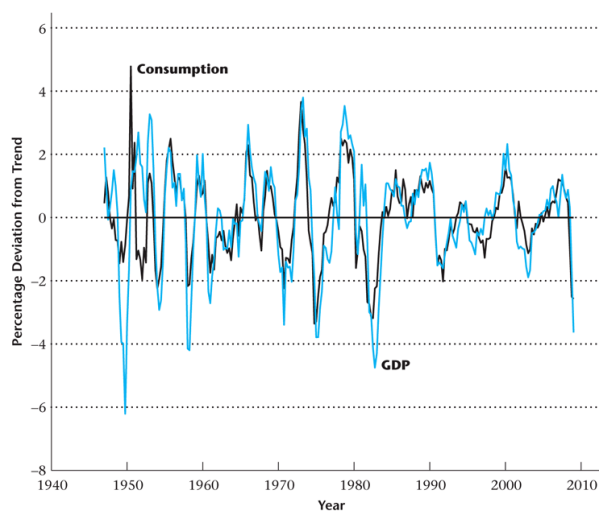
##### Volatility

- **Volatility** is a description of how much a variable deviates from its trend.
- Volatility is the opposite of stability.
- Typically measured by the variance of the variable's deviation from its trend, as a ratio of the variance of the output gap.

#### 3.2 Consumption

##### Consumption Volatility

Light blue: Real GDP  
 Dark blue: Consumption

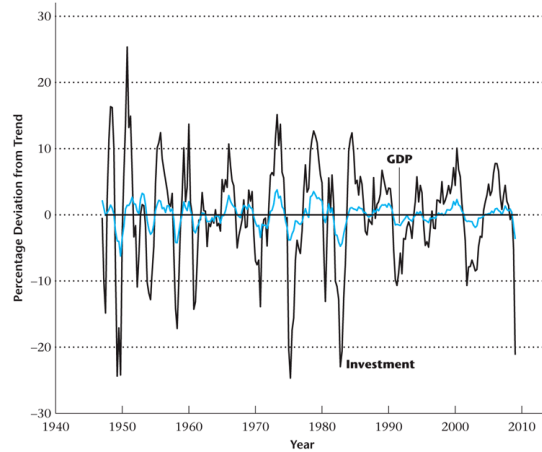


Consumption Volatility = 75%.

### 3.3 Investment

#### Investment Volatility

Light blue: Real GDP  
Dark blue: Investment



Investment Volatility = 473%.

## 4

### 4.1 Coming up!

#### Coming Up!

- Next class: One-period model of the macroeconomy.
- Read Chapter 4
- Homework
  - Convert any Word documents to PDF.
  - Type up answers and upload to D2L dropbox.