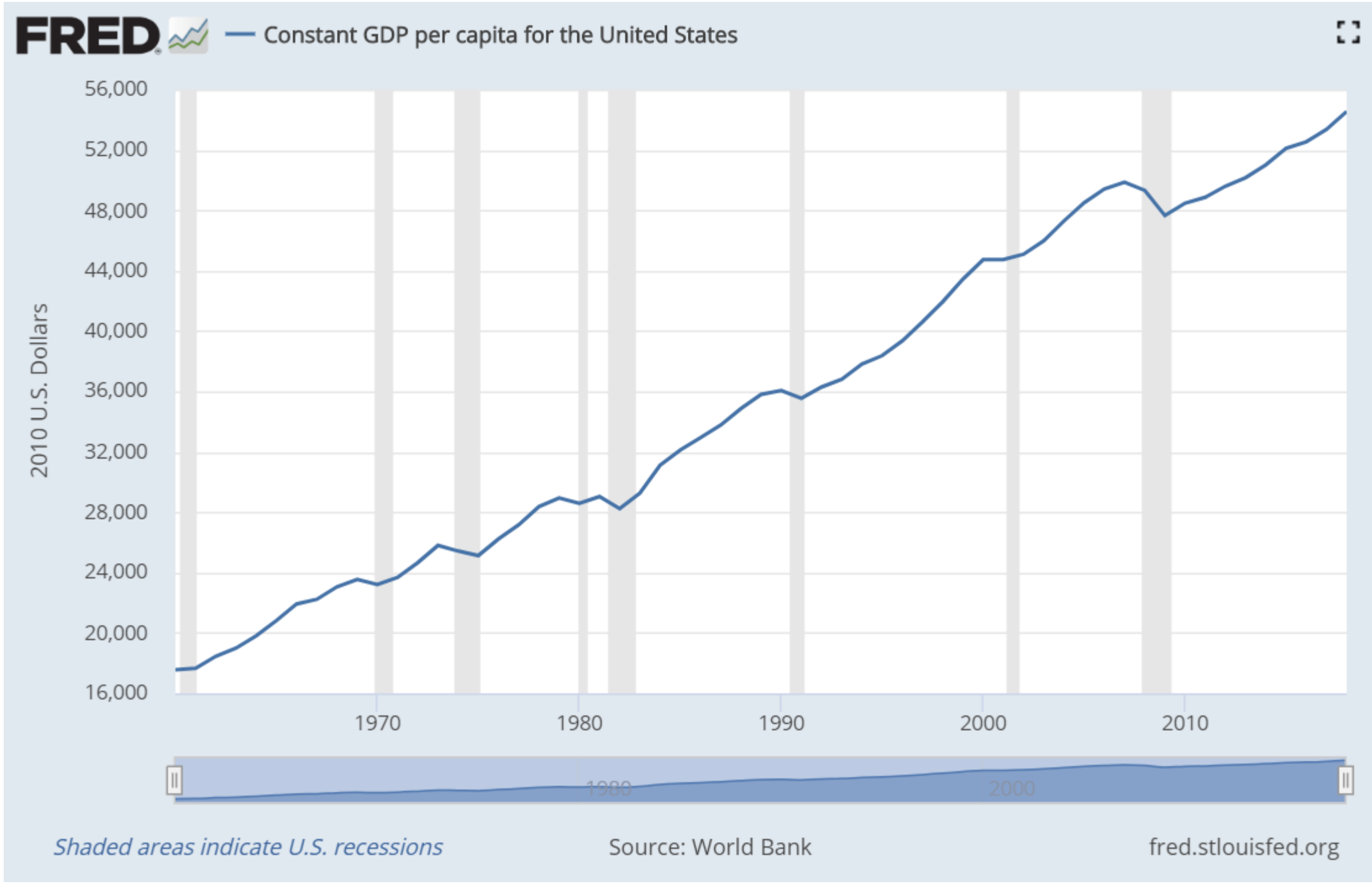
Lecture 2. GDP, Unemployment, and the Inflation rate

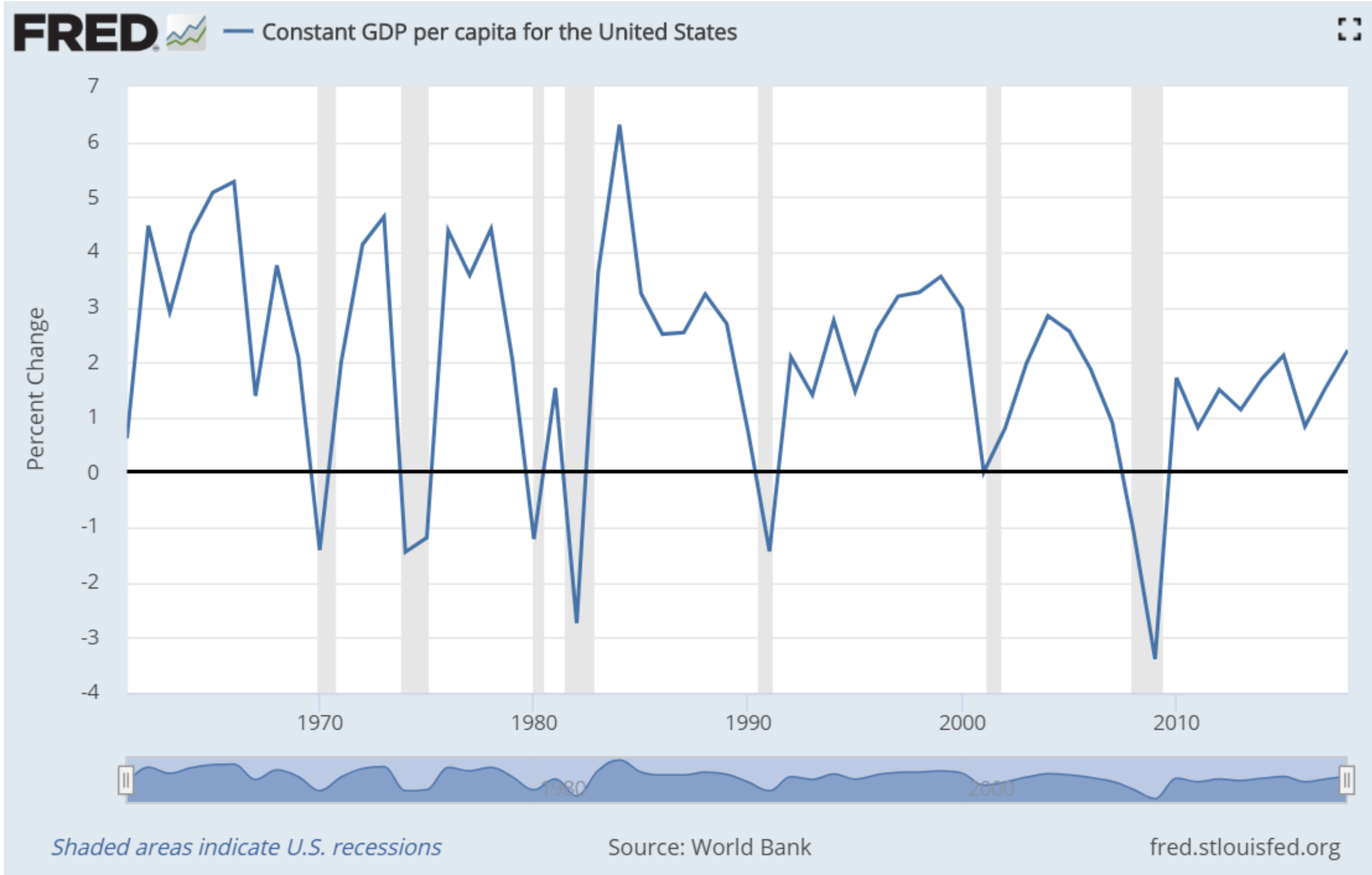
Reading: Blanchard, Chapter 2.

In the last class…

- What is Macroeconomics about?
  1) Economic growth
     - The long run

  2) Business cycles
     - The short / medium run
     - Monetary policy
       - Central bank, interest rate
     - Fiscal policy
       - Government, government spending, taxes / transfers


FRED
Constant GDP per capita for the United States
56,000
52,000
48,000
44,000
40,000
36,000
32,000
28,000
24,000
20,000
16,000
2010 U.S. Dollars
1970
1980
1990
2000
2010
1980
2000
Shaded areas indicate U.S. recessions
Source: World Bank
fred.stlouisfed.org


FRED
Constant GDP per capita for the United States
Percent Change
7
6
5
4
3
2
1
0
-1
-2
-3
-4
1970
1980
1990
2000
2010
Shaded areas indicate U.S. recessions
Source: World Bank
fred.stlouisfed.org

Announcements

- For those who have enrolled in the course,
  - emails are sent to your HKUST accounts for Gradescope.

- If you are waitlisted but want to access Canvas and Gradescope,
  - please send me an email with your name, HKUST email address, and student ID.

Outline

- Measure of Aggregate Output (nominal / real GDP)
    - GDP =
- The Unemployment Rate

- The Inflation Rate

- In macroeconomics, everything is related.
    - Okun's law (real GDP & the unemployment rate)
    - The Phillips curve (the inflation & the unemployment rate)

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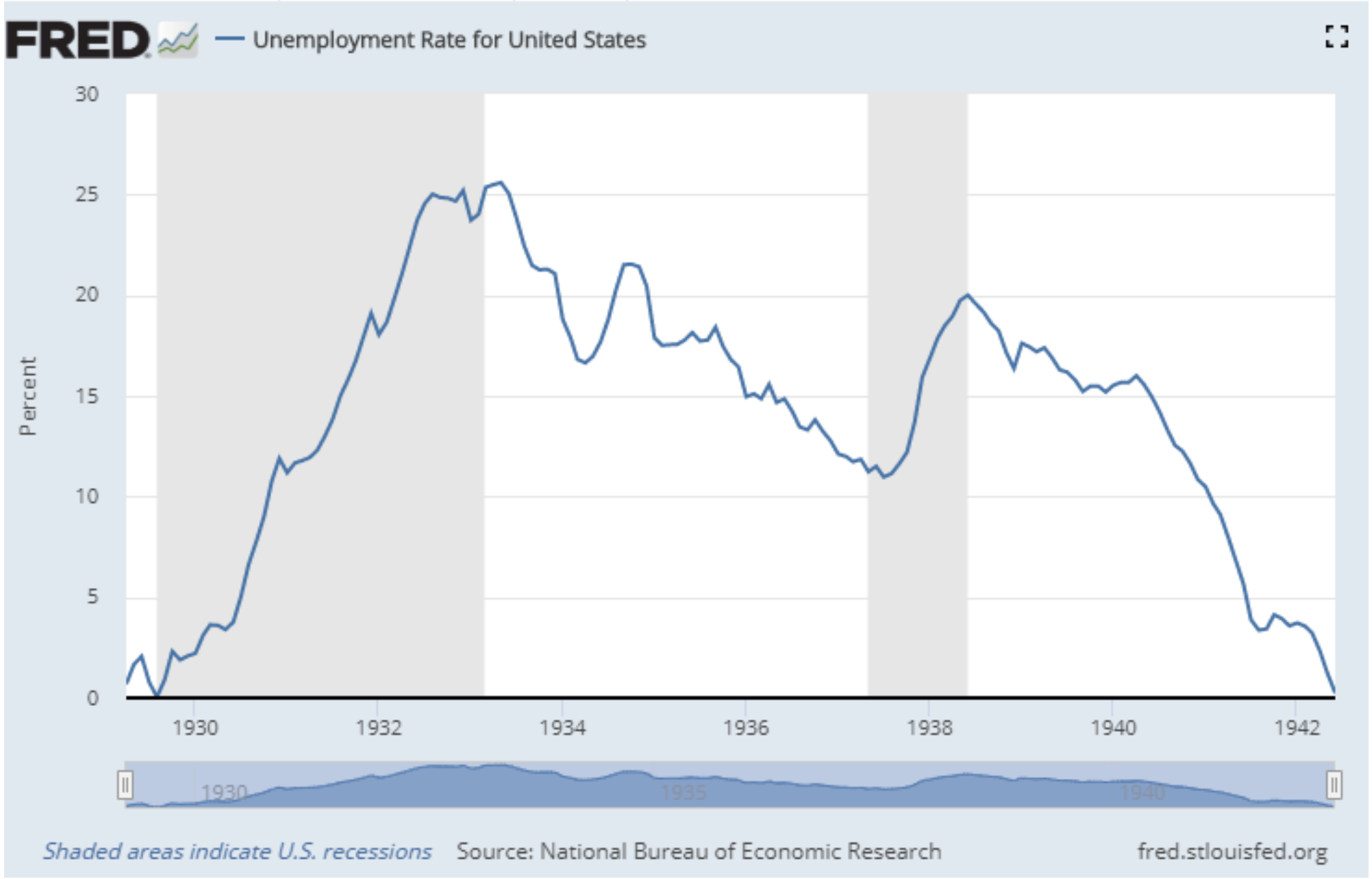
Motivation: the Great Depression

- In the U.S. from 1929 to the late 1930s.
- The U.S. economy was not good. Everyone knew that.

- …But no one knew how bad it was exactly.

- Source: https://www.pbs.org/wgbh/americanexperience/features/dustbowl-great-depression/

- Source: https://sites.google.com/site/bwimperialamerica12/home/the-great-depression



- Source: https://fred.stlouisfed.org/series/M0892AUSM156SNBR

But no one knew how bad it was exactly…

- “One reads with dismay of Presidents Hoover and then Roosevelt designing policies to combat the Great Depression of the 1930s on the basis of **such sketchy data** as stock price indices, freight car loadings, and incomplete indices of industrial production. The fact was that comprehensive measure of national income and output did not exist at the time.”

- Froyen, R. (2005), *Macroeconomics: Theories and Policies*, New Jersey: Prentice Hall.

National Income and Product Accounts (NIPA)

- Designed by Simon Kuznets for the US and Richard Stone for the UK.

- Thanks to them, e.g., in the US, measures of aggregate output have been published since 1947.

- The size of an economy can be measured in terms of

  1) , 2) , and 3) .

Gross Domestic Product (GDP) from the production side 1

•

- market value: prices are used to compare the values of different products
- final: no intermediate goods
- goods and services: cell phone and haircut
- produced: no used products are counted
- in the economy: anything produced in HK by foreigners is in HK GDP.

  cf) Gross National Product

An Example

Steel Company (Firm 1)		
Revenues from sales		$100
Expenses		$80
Wages	$80	
Profit		$20

Car Company (Firm 2)		
Revenues from sales		$200
Expenses		$170
Wages	$70	
Steel purchases	$100	
Profit		$30

- Intermediate good?
- Final good?
- GDP?
- What if Firm 1 is in a foreign country and the steel is imported?

GDP from the production side 2

- the sum of value added in the economy during a given period.

- the value added by a firm

  = the value of

  - the value of

An Example

Steel Company (Firm 1)		
Revenues from sales		$100
Expenses		$80
Wages	$80	
Profit		$20

Car Company (Firm 2)		
Revenues from sales		$200
Expenses		$170
Wages	$70	
Steel purchases	$100	
Profit		$30

- The value added by Firm 1?
- The value added by Firm 2?

- GDP?

GDP from the income side

- the sum of incomes in the economy during a given period.

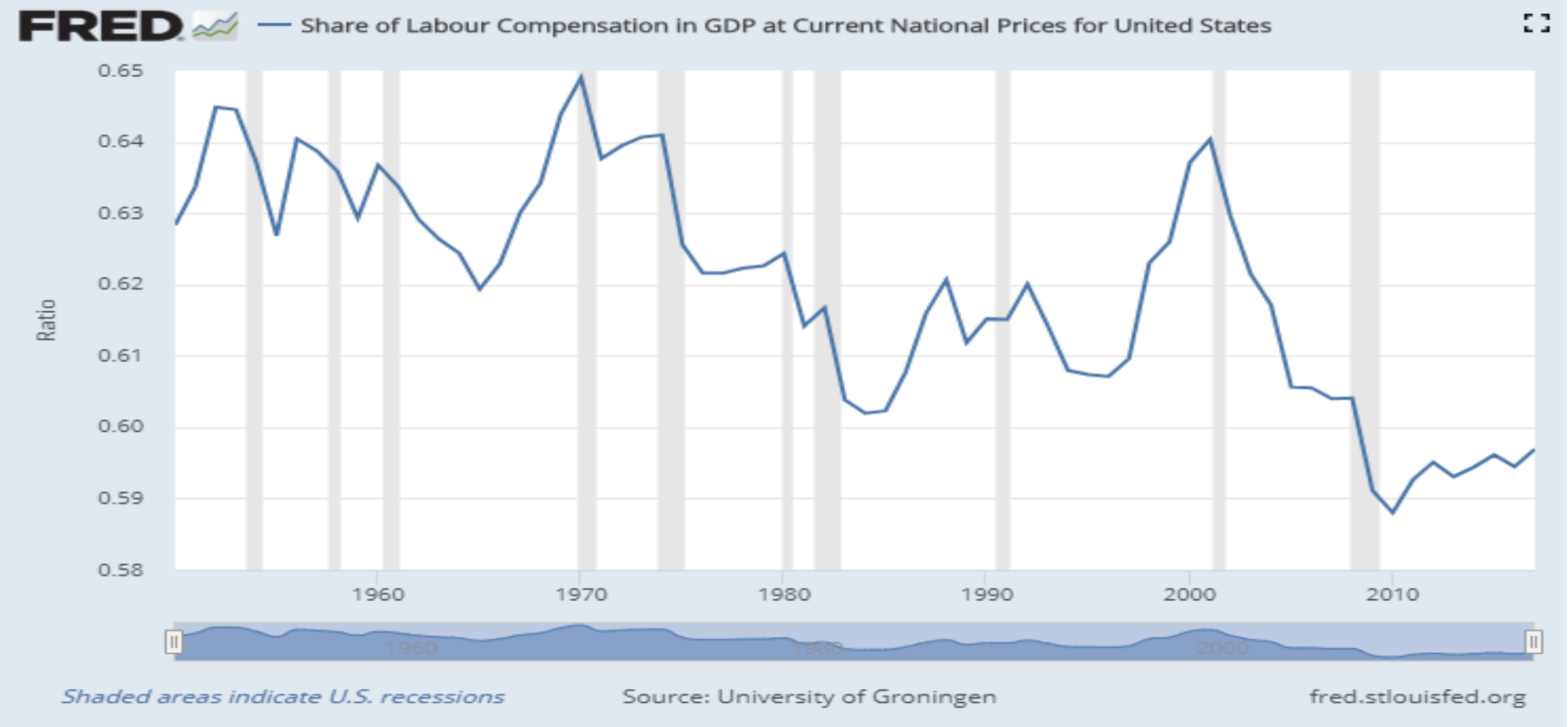
An Example

Steel Company (Firm 1)		
Revenues from sales		$100
Expenses		$80
Wages	$80	
Profit		$20

Car Company (Firm 2)		
Revenues from sales		$200
Expenses		$170
Wages	$70	
Steel purchases	$100	
Profit		$30

- Labor income?
- Capital income (or profit)?
- GDP?
- Labor's share of income?

Labor's share of income ↓ since the 1980s



- Source: https://fred.stlouisfed.org/series/M0892AUSM156SNBR

GDP from the expenditure side

- What is produced is purchased and used by either a consumer, a firm, the government, or a foreign agent.
- So we can recover GDP by looking at how much people spend.

- We will come back to this point in Chapter 3.1.

Nominal and Real GDP

- Nominal GDP in year t = $\$Y_t$=
  - Depends on both prices and quantities.
  - dollars

- We want to construct a measure which reflects only the quantities (i.e., the size) produced in the economy.

- Real GDP in year t in year t_0 'dollars' = Y_t =
  - Base year
  - dollars

Nominal GDP in Year 0 and in Year 1.

	Year 0		
	Quantity	$ Price	$ Value
Potatoes (pounds)	10	1	10
Wine (bottles), Nominal GDP	5	2	10
	Year 1		
	Quantity	$ Price	$ Value
Potatoes (pounds)	15	1	15
Wine (bottles), Nominal GDP	5	3	15

- Nominal GDP in year 0 and 1?
- Real GDP in year 0 prices?
- Real GDP in year 1 prices?
-
-

Why Chain-Type Indexes?

- Old relative prices may not reflect the true current values of different goods.
- Some goods may not even exist in the base year.

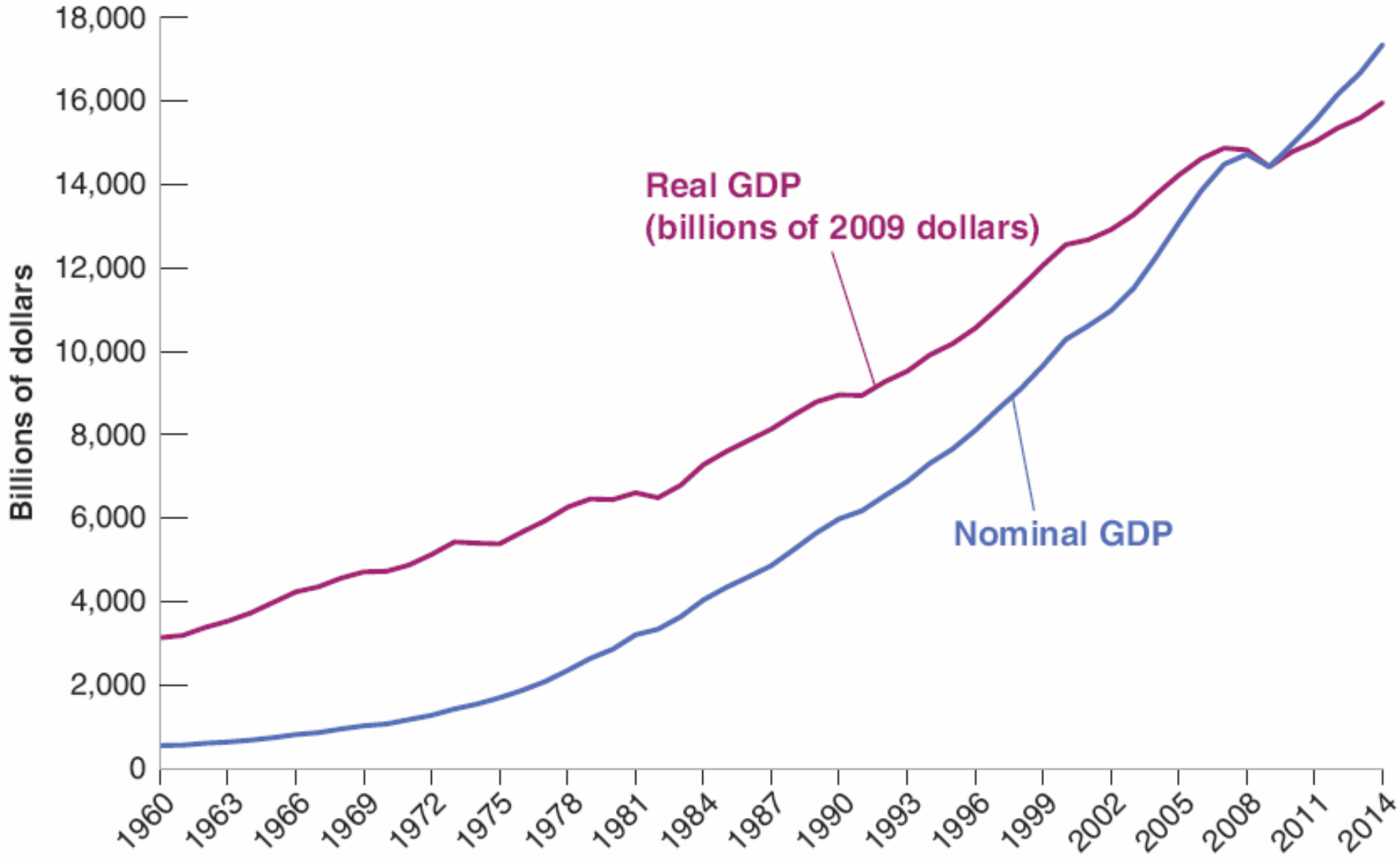
- So, the base year should be updated.

- Then, everything should be re-calculated. The growth rate of real GDP will change, and so on.

Nominal GDP in Year 0 and in Year 1.

	Year 0		
	Quantity	$ Price	$ Value
Potatoes (pounds)	10	1	10
Wine (bottles), Nominal GDP	5	2	10
	Year 1		
	Quantity	$ Price	$ Value
Potatoes (pounds)	15	1	15
Wine (bottles), Nominal GDP	5	3	15

- $\bar{g}_{RGDP,t} = \sqrt{\frac{\sum P_{i,t-1}Q_{i,t}}{\sum P_{i,t-1}Q_{i,t-1}} \frac{\sum P_{i,t}Q_{i,t}}{\sum P_{i,t}Q_{i,t-1}}} - 1$
- RGDP in chained (year 0) dollars:
- RGDP in chained (year 1) dollars:



- From 1960 and 2014, nominal GDP increased by a factor of 32. Real GDP increased by a factor of about 5.

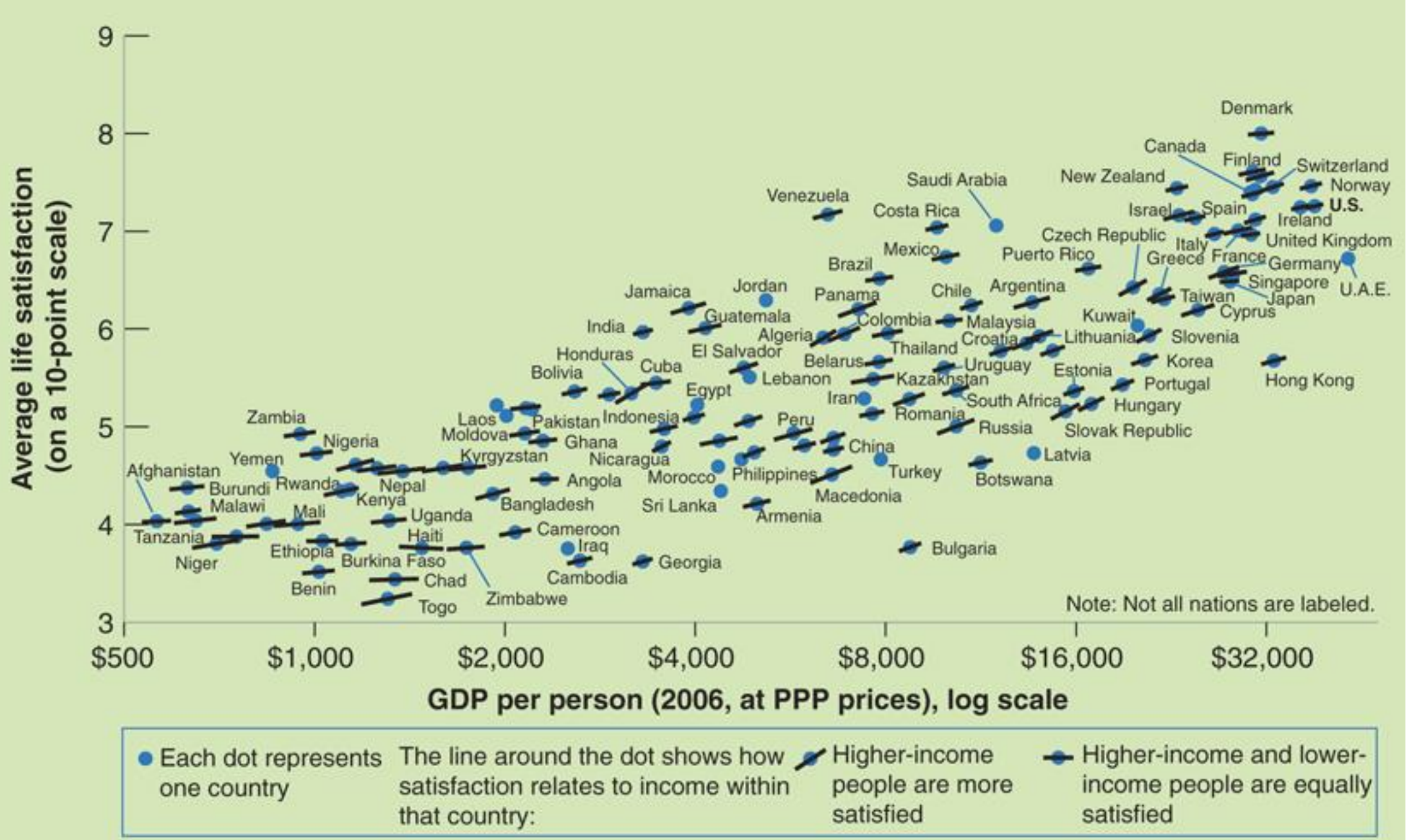
Why should we care about GDP?

- It is a measure of aggregate output i.e., the size of an economy.
- Anything out of the formal market is not included.
  - Home production, black market, negative impact of pollution

- It does not directly take “happiness” into account by construction.

- However, …

(Focus: Does Money Lead to Happiness? pp. 224-225.)



Source: Betsey Stevenson and Justin Wolfers, Wharton School at the University of Pennsylvania.

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- Measure of Aggregate Output (nominal / real GDP)
    - GDP = gross domestic product
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The Unemployment Rate

- $L \quad = \quad N \quad + \quad U$

  = employment + unemployment
- N = # of people who have a job
- U = # of people who do not have a job but are looking for one

- $u = \frac{U}{L}$

  unemployment rate = unemployment /

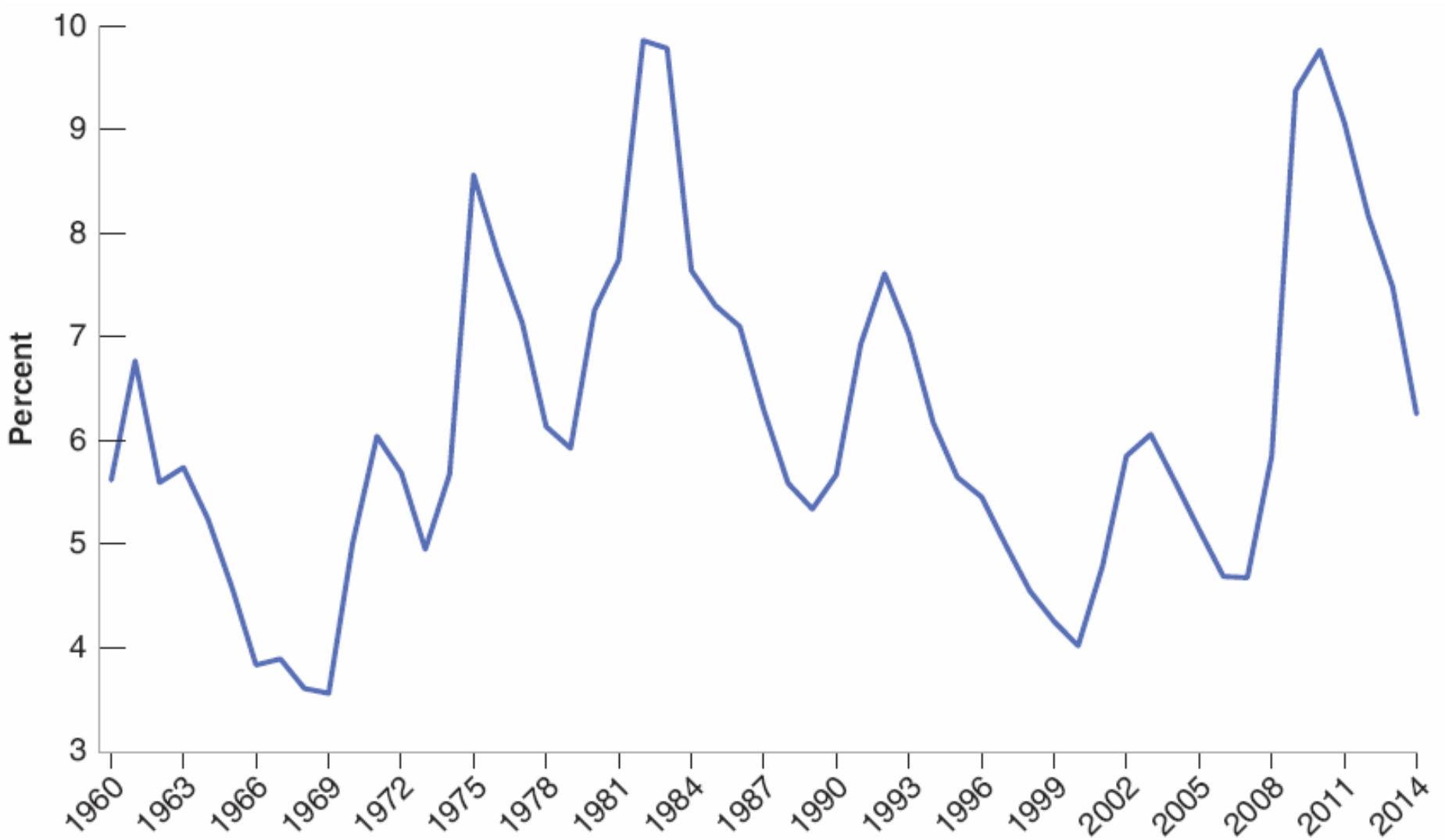
The Participation Rate

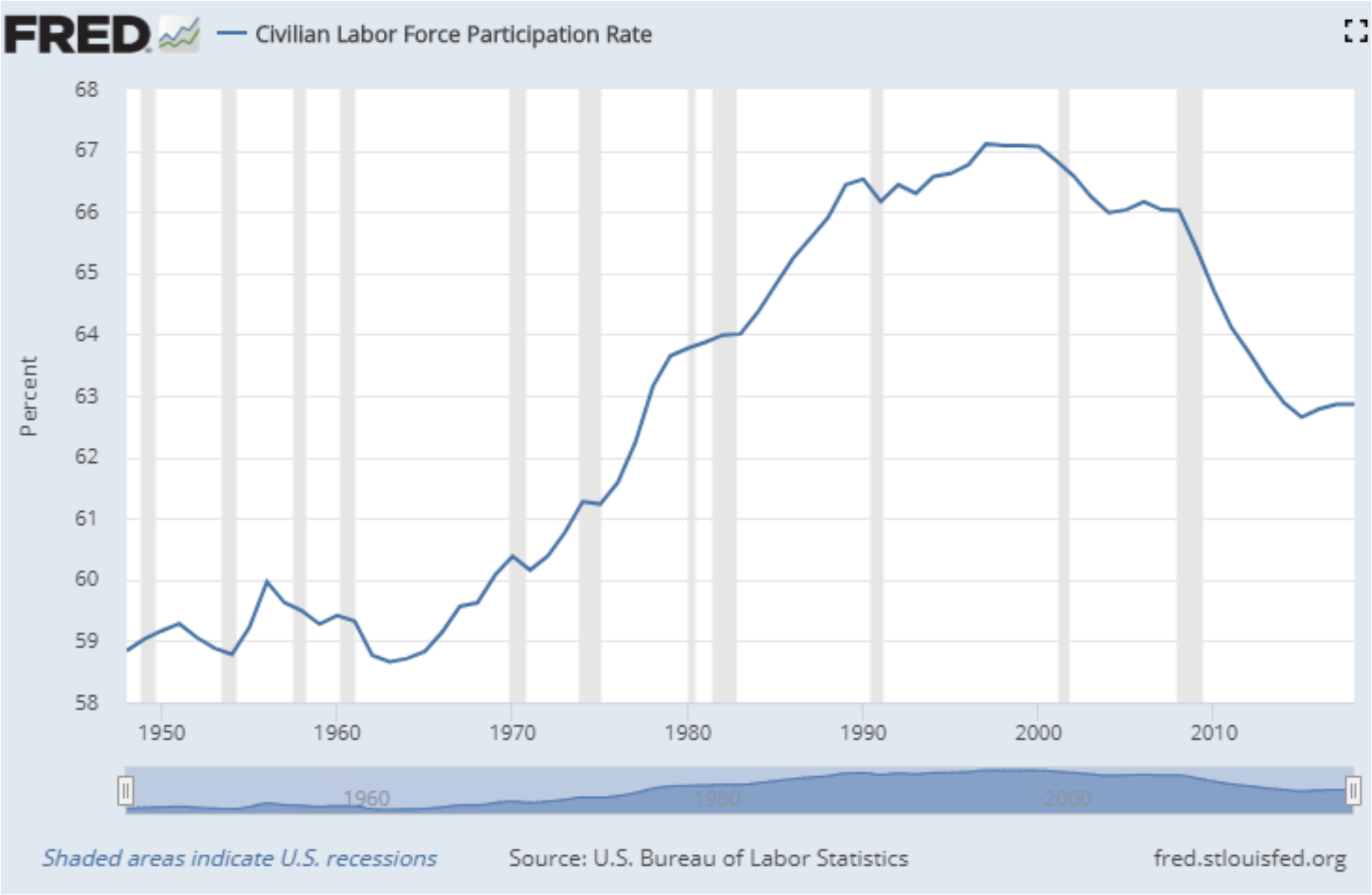
-

  = unemployed workers who gave up searching for a job
- They do not show up in the unemployment rate.

- Participation rate = $\frac{\text{Labor Force}}{\text{Total Population of Working Age}}$

Unemployment Rate in the US



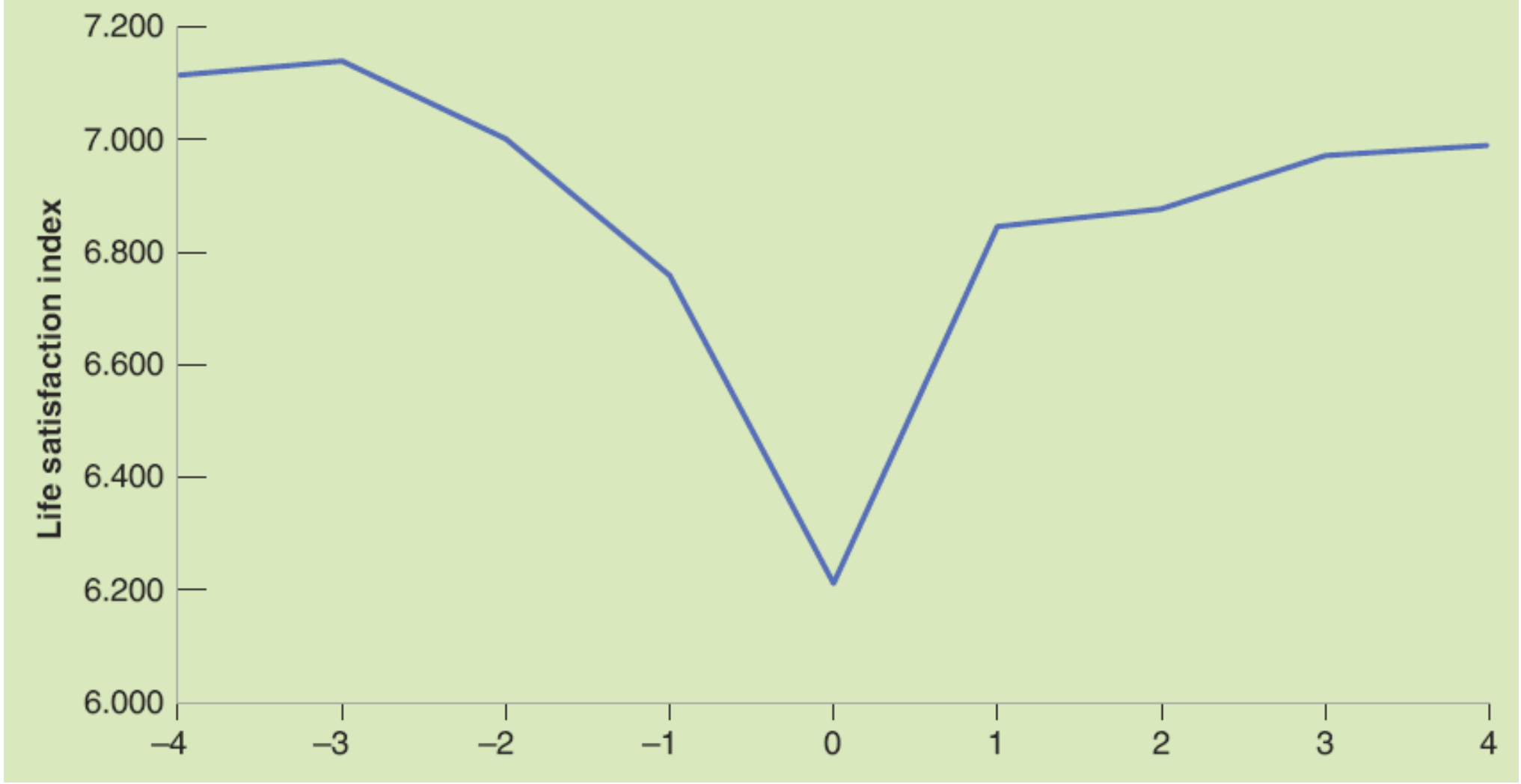


- Source: https://fred.stlouisfed.org/series/CIVPART#0

Why should we care?

- The unemployment rate is a good measure of the current status of an economy in terms of business cycles. If the rate is too high, the economy is not utilizing human resources efficiently.

- It matters for “welfare” or happiness.



- Focus: Unemployment and Happiness, p. 50.

- Unemployment is painful.

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The Inflation Rate

- $\pi_t = \text{growth rate of } P_t =$

The inflation rate = growth rate of the price level

- $\pi_t > 0$: , $\pi_t < 0$:

- How can we define the price level representing the entire economy?
  1) The GDP deflator
  2) The Consumer Price Index (CPI)

1) The GDP Deflator

- $P_t = \frac{\$Y_t}{Y_t} =$

- Or, equivalently, $Nominal\ \ GDP_t = P_t \times Real\ \ GDP_t$

- What is the value of GDP deflator in the base year of the real GDP?
  - The GDP deflator is an index number.
  - π_t has an economic interpretation, but P_t does not.

An Example

Year	Quantity of Cars	Price of Cars	Nominal GDP	Real GDP (in 2009 dollars)
2008	10	$20,000		
2009	12	$24,000		
2010	13	$26,000		

- Consider an economy producing only cars.

- Fill in the blanks.
- Calculate the GDP deflator.

2) The Consumer Price Index (CPI)

- It represents the cost of living.

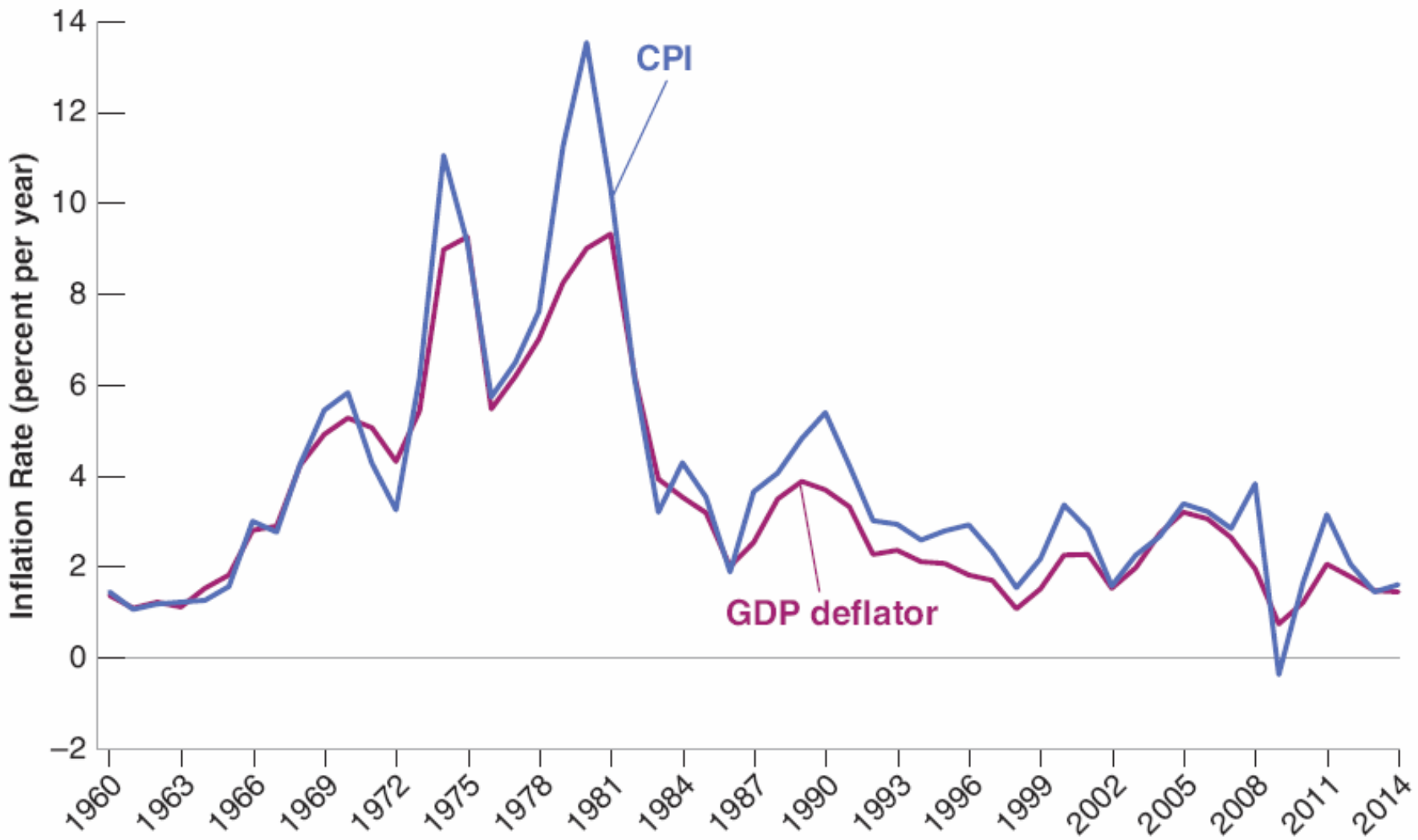
- Step1) Fix the basket: Determine the list of goods and services bought by a typical consumer
- Step2) Find the prices
- Step3) Calculate the basket's cost
- Step4) Choose a base year and compute the index

- $P_t = \frac{\text{Price of the basket in year } t}{\text{Price of the basket in the base year}}$

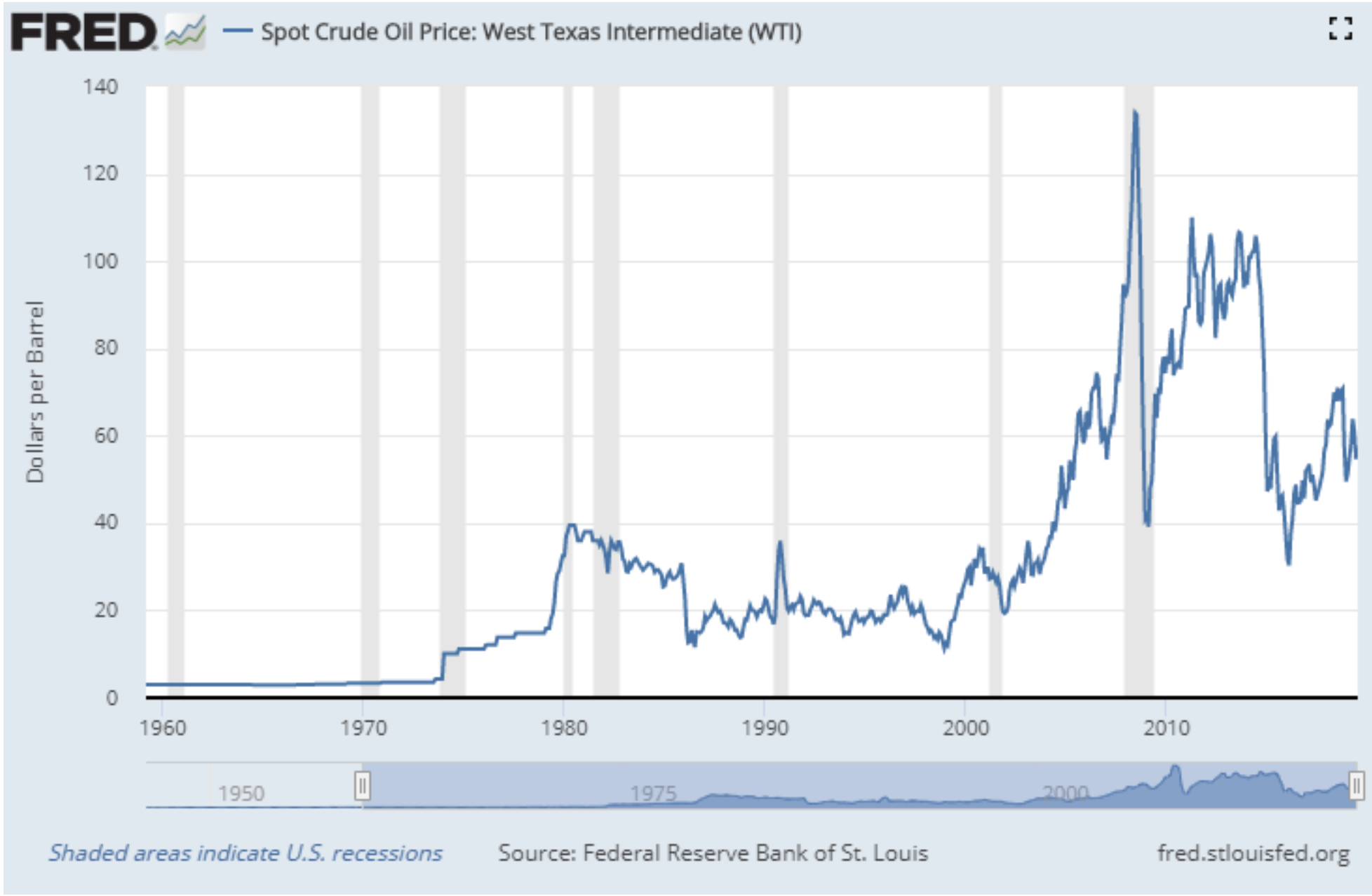
GDP deflator vs. CPI

- The consumption basket does not include some products sold to firms, to the government, or to foreigners.
- ex) Do you care about the price of tower cranes? How about F-22?

- The consumption basket includes some goods that are imported.
- ex) Oil in a non-oil-producing country



- Inflation Rate, Using the CPI and the GDP Deflator, 1960–2014
- In general, both index induce similar rates of inflation.
- Great inflation / oil prices



- Source: https://fred.stlouisfed.org/series/WTISPLC#0

Why should we care?

- Pure inflation: if all prices move proportionally, relative prices would be unaffected.

- However, prices of individual goods and services are rigid (or sluggish or sticky): therefore, inflation generates distortions in relative prices.

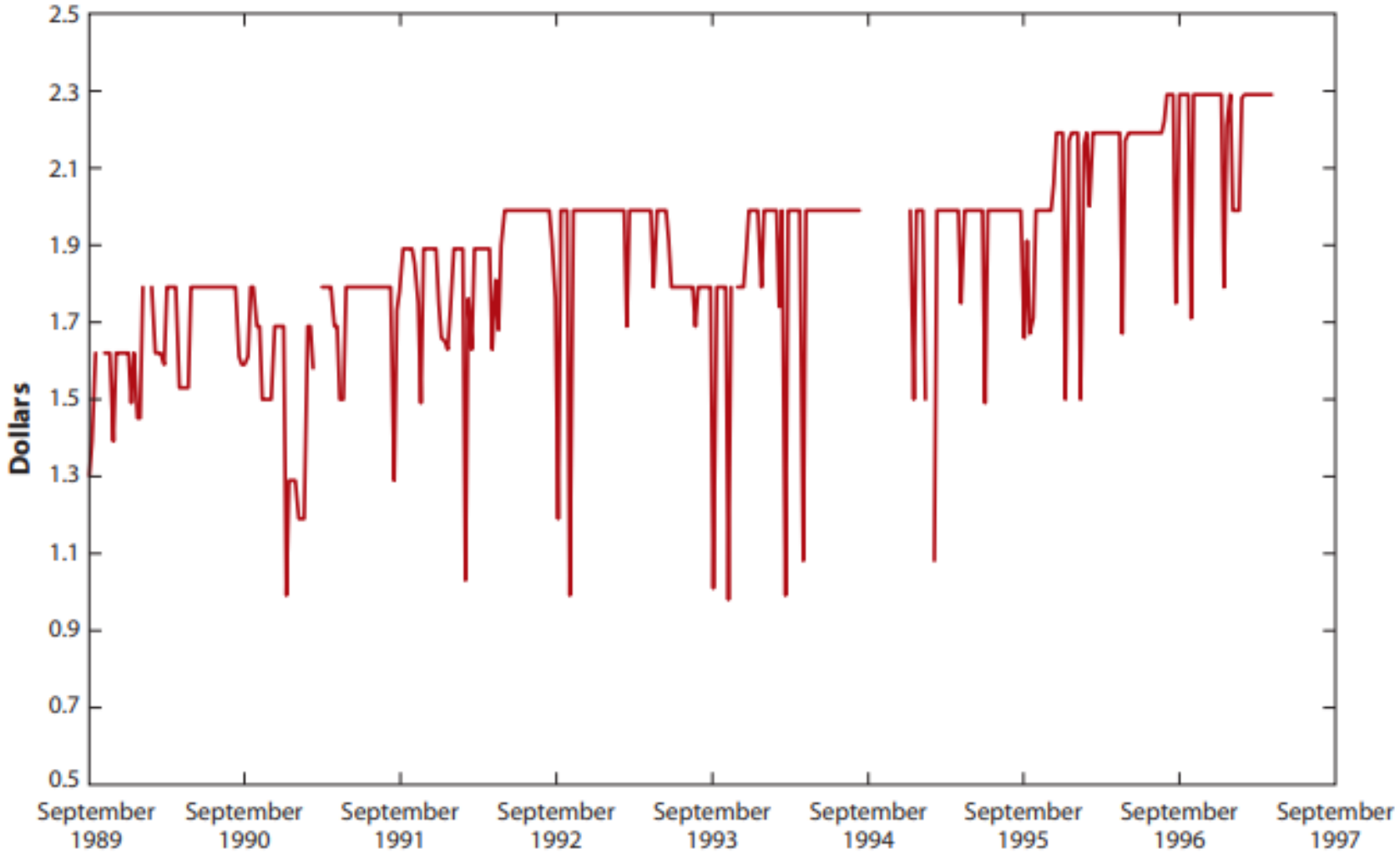


Figure 2

Price series of Nabisco Premium Saltines (16 oz) at a Dominick's Finer Foods store in Chicago.

- Source: Nakamura, E. and J. Steinsson (2014), Price Rigidity: Microeconomic Evidence and Macroeconomic Implications.

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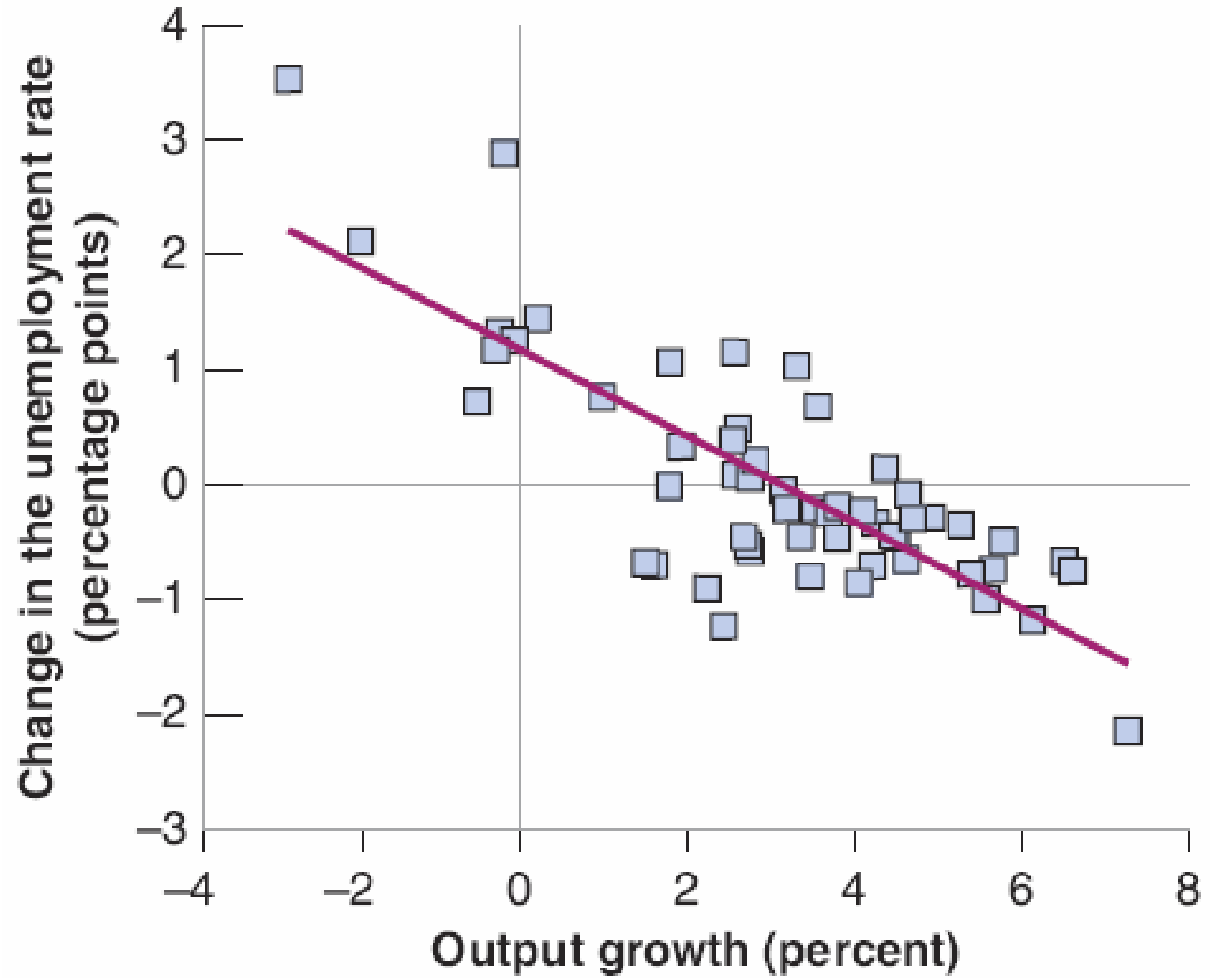
Okun's Law

- A negative relationship between (the change in) GDP and (the change in) unemployment.
- Low u

  ~ More employment

  ~ More output

  ~ Larger GDP



- Changes in the Unemployment Rate versus Growth in the United States, 1960–2014
- Slope = -0.4

The Phillips Curve

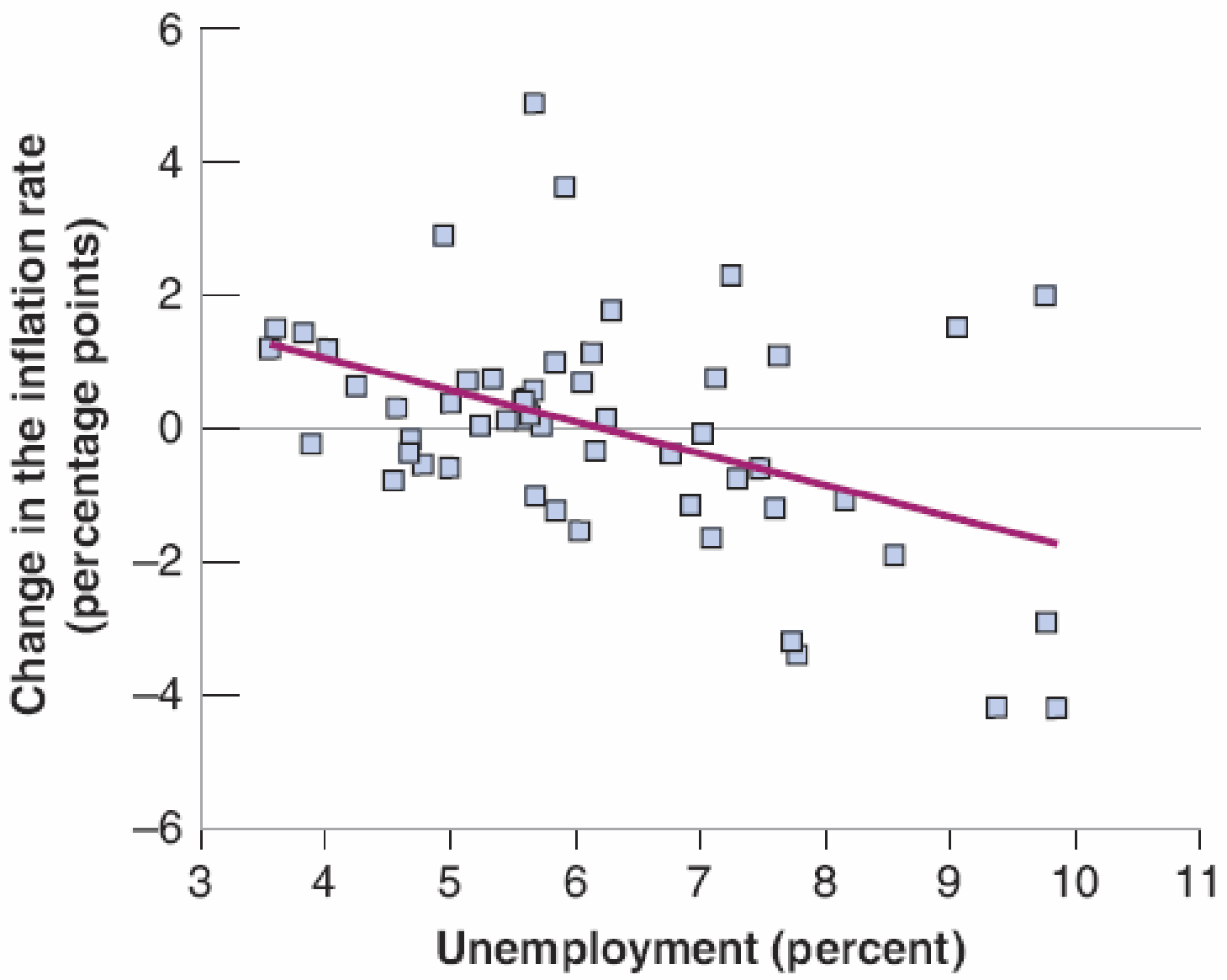
- A negative relationship between (the change in) the rate of inflation and unemployment.
- Low u

  ~ More employment

  ~ Higher wage

  ~ Higher costs

  ~ Higher prices



- Changes in the Inflation Rate versus the Unemployment Rate in the United States, 1960–2

In the next class…

- We will look at an equilibrium in the goods market and the determination of output. We focus on the interaction among demand, production, and income.

- Blanchard, Chapter 3.