Topic 3

Economic Statistics

Agenda

- Recap what we've done so far
- What are we trying to do?
- What exactly GDP is and why it's useful
- How do we calculate GDP?
- NGDP vs. RGDP: How to account for price changes
- Unemployment
- Policy and Unemployment

Last Topic: Flow Diagrams and AD-AS equilibrium

- Mapped out the economy
  - Agents and Markets
- Turned output market into a supply-demand graph
  - AD and AS curves determine two types of equilibrium
  - short-run quantity = long-run quantity implies economy is stable, which is good

Suppose someone asks: "How much economic activity was there in the US in 2011?"

- What does this mean?
  - One option: Short-run equilibrium

- Recall, SR equilibrium = GDP (sort of)

How will GDP measure the “quantity”?

Back to the Farm Example

- Suppose two farms produce:

	Apples	Oranges
Farm 1	1	2
Farm 2	2	1

- Which farm produced more "value" to society from Year 1 to Year 2?
- Depends on the "value" of apples vs. the "value" of oranges

Market Value (using prices) is how we measure "value"

- Price reflects:
  - Cost to make the good (supply)
  - How much people like the good (demand)
- If apples cost $2 and oranges cost $3, which farm produced more value?

Note: price is not a perfect measure of "value" but it's the best we've got

Definition of GDP

- **Gross Domestic Product (GDP):** The market value of final goods and services produced within the borders of a given country within a given period of time.

- GDP extends the farm calculation to every good in the economy.

Definition of GDP – let's break it down

- **Gross Domestic Product (GDP):** The market value of final goods and services produced within the borders of a given country within a given period of time.

- 2008 USA GDP: the value of final goods and services produced in USA in 2008 (even if produced by foreigners)

Definition of GDP – let's break it down

- **Gross Domestic Product (GDP):** The market value of final goods and services produced within the borders of a given country within a given period of time.

- 2008 USA GDP: are goods produced by a BMW factory in California in 2009 included?

Definition of GDP – let's break it down

- **Gross Domestic Product (GDP):** The market value of final goods and services produced within the borders of a given country within a given period of time.

- *Market value:* The revenue firms receive from selling their products at the price the buyer and seller agree on.

Definition of GDP – let's break it down

- **Gross Domestic Product (GDP):** The market value of final goods and services produced within the borders of a given country within a given period of time.

- *Market value:* Does Ford's inventory of 2012 model Fusion's count towards GDP?

Definition of GDP – let's break it down

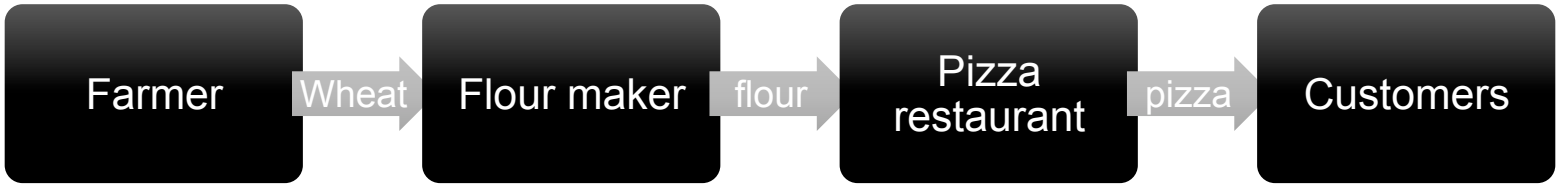
- **Gross Domestic Product (GDP):** The market value of final goods and services produced within the borders of a given country within a given period of time.

- *Intermediate good:* A good that's used entirely to produce another good
- *Final good:* Any good that's not an intermediate good

Definition of GDP – let's break it down

- **Gross Domestic Product (GDP):** The market value of final goods and services produced within the borders of a given country within a given period of time.

- Example (Flour and Pizza):



- Only count the pizza! No double-counting

A more intuitive interpretation

- GDP = The total money spent in the economy
- In equilibrium, total money spent =

Total Revenue

To include or not?

Item	Include?	Reason
Informal Production/Home Production		
Land		
Used Goods		

To include or not?

Item	Include?	Reason
Informal Production/Home Production	✘	can't measure
Land		
Used Goods		

To include or not?

Item	Include?	Reason
Informal Production/Home Production	✘	can't measure
Land	✘	Transfers of ownership – avoids double-counting
Used Goods		

To include or not?

Item	Include?	Reason
Informal Production/Home Production	✘	can't measure
Land	✘	Transfers of ownership – avoids double-counting
Used Goods	✘	Avoid double-counting

Let's test your understanding

Which of the following would be included in Japan's 2009 GDP?

Item	Include?	Reason
In 2009, sale of Starbucks coffee in Tokyo		
In 2009, purchase of land to build a house		
In 2009, sale of a handgun by organized crime		
In 2009, salary of a waiter at a restaurant		
In 2010, sale of Starbucks coffee in Osaka		

Let's test your understanding

Which of the following would be included in Japan's 2009 GDP?

Item	Include?	Reason
In 2009, sale of Starbucks coffee in Tokyo	✓	
In 2009, purchase of land to build a house	✗	Transfer of ownership
In 2009, sale of a handgun by organized crime	✗	Underground economy
In 2009, salary of a waiter at a restaurant	✗	Intermediate good (part of price of meal)
In 2010, sale of Starbucks coffee in Osaka	✗	Wrong year

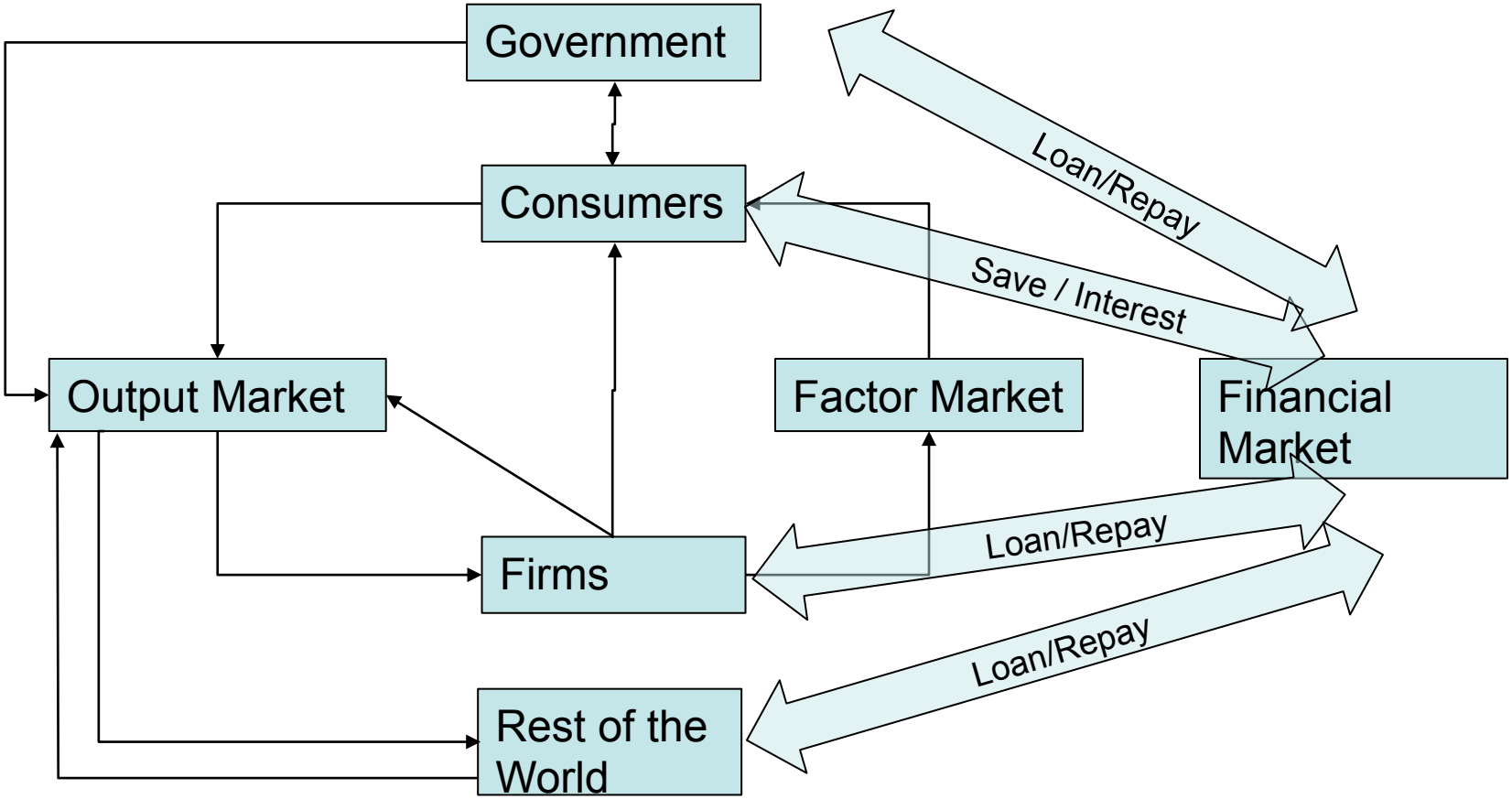
How do we calculate GDP?

How does our flow diagram help us break GDP into smaller components?

How do we calculate GDP?

- "The market value of final goods and services produced within the borders of a given country within a given period of time."
- Let's see if our flow diagram helps. Focus on the arrows pointing to and from the Output Market…

Complete Flow Diagram (without labels)



Option 1: GDP = Revenue

- If we add up all the revenue (from final goods and services) earned in a given country in a given period of time, that's GDP!
- So GDP (Y) = Revenue (R)

Option 2: Spending

- The money that flows into the Output Market (spending) = the money that flows out of it (Revenue)
- Another way of saying this is AD = AS
- So GDP (Y) = Consumption (C) + Gov't Spending (G) + Investment (I) + Exports (X) – Imports (M)

Let's review the abbreviations

- Y = GDP
- R = Revenue
- C = Consumption
- G = Gov't Spending
- I = Investment
- X = Exports
- M = Imports
- NX = Net Exports

- Therefore we have:
  - $Y = R$
  - $Y = C + G + I + X - M$
    $= C + G + I + NX$

Let's see what this looks like for the USA

- Data from the Bureau of Economic Analysis
- This is what pundits mean when they say we're a consumption-driven economy
- Also note that our trade deficit (i.e. we import more than we export)

Example 1

	Wheat	Plastic	Bread
Total Sales ($)	300	100	500

- Assumptions: Consumers purchase plastic and bread. The bread company purchases all the wheat from the wheat company.
- G=I=NX=0, so
  - Y = C = 500+100 =$600

Example 1: Accounting

	Total	Per capita (100 people)
Consumption	600	6
Investment	0	0
Government Purchases	0	0
Imports	0	0
Exports	0	0
GDP	600	6

Example 2

- 100 consumers
- Consumers purchase plastic bags and bread for a total of $600, and $40 on imported butter.
- The government spends $200, $150 of the $200 is spent buying imported peanut butter.
- The bread company buys $100 in new machines from a newly established machine company.
- The wheat company exports $20 of wheat.

Example 2

- 100 consumers
- Consumers purchase plastic bags and bread for a total of $600, and $40 on imported butter.
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Example 2: Accounting

	Total	Per capita
Consumption		
Investment		
Government Purchases		
Imports		
Exports		
GDP		

Example 2: Accounting

	Total	Per capita
Consumption	+640	6.4
Investment		
Government Purchases		
Imports	-40	-.4
Exports		
GDP	600	6

Example 2 – work through the rest

- 100 consumers
- Consumers purchase plastic bags and bread for a total of $600, and $40 on imported butter.
- The government spends $200, $150 of the $200 is spent buying imported peanut butter.
- The bread company buys $100 in new machines from a newly established machine company.
- The wheat company exports $20 of wheat.

Example 2: Accounting

	Total	Per capita
Consumption	640	$6.4
Investment	100	$1
Government Purchases	$200	$2
Imports	-(150+40)=-$190	-$1.9
Exports	20	$0.20
GDP	$770	$7.7

Nominal GDP
vs.
Real GDP

How to take price changes into account when comparing GDP from one year to the next

The problem with NGDP

- **Nominal GDP:** GDP calculated using the current market prices.
- Recall what we're trying to do: measure the "quantity" or "value" of goods
- Suppose Macroland produces the exact same final goods and services in 2011 and 2012, but prices double. NGDP will double! Has "value" doubled?

RGDP is better

- **Real GDP:** GDP calculated using the market prices in the base year.
- **Base year:** The year of reference for the GDP index.
- Using 2011 as the base year in the previous example, Macroland's RGDP has not changed.

Example: Zimbabwe

- According to nominal GDP, Zimbabwe was doing very well in 2009
- Of course it actually wasn't
- Prices are changing over time, which skews our evaluation of how an economy is doing over time

Real GDP in Example 1

Base Year: 2002 GDP=P1*Q1 + P2*Q2

Year	Price per Loaf	Loaves of Bread	Price per bag	Number of bags	Nominal GDP	Real GDP
2002	$2	100	$1	100		
2003	$3	120	$1	140		
2004	$4	115	$0.5	120		

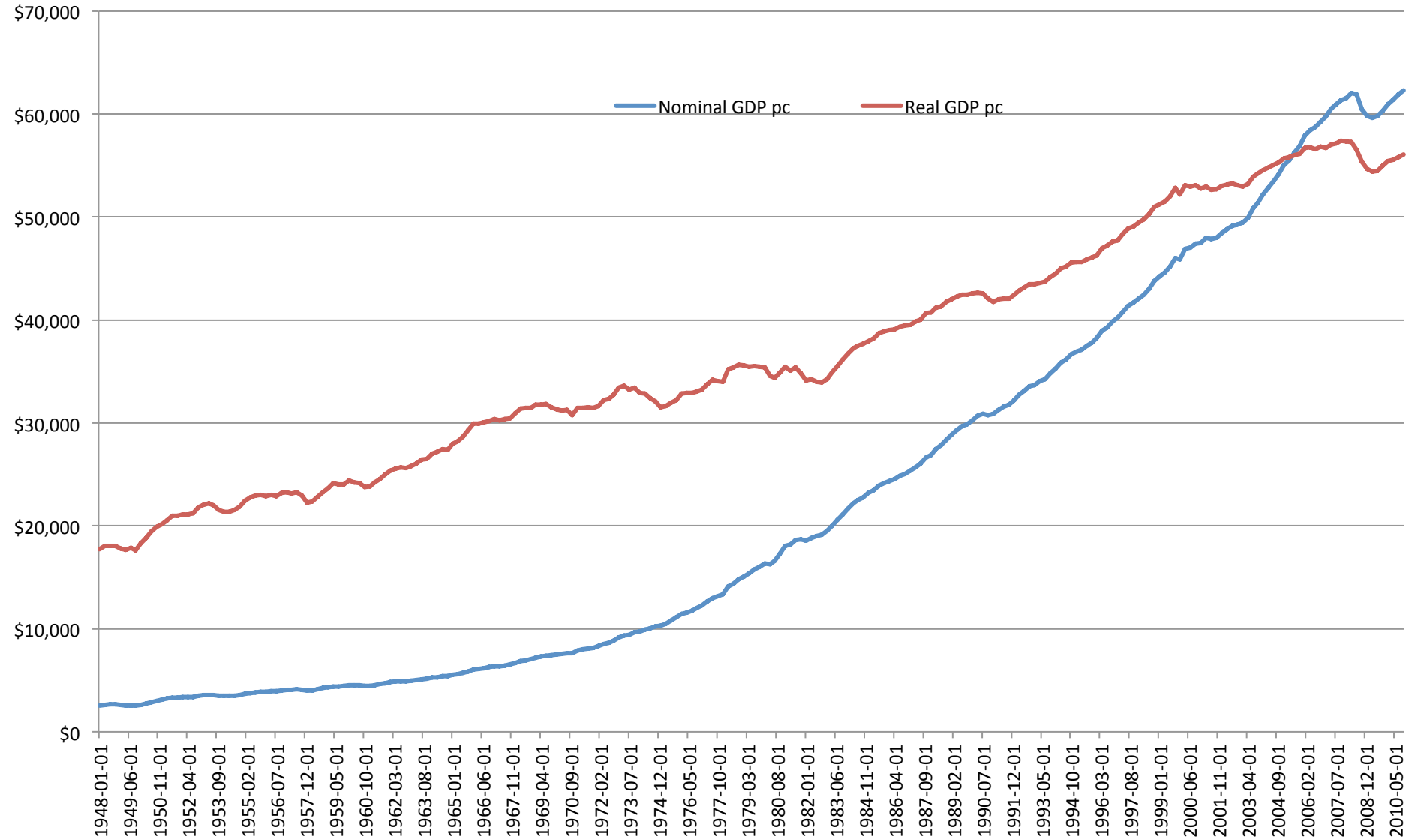
Real GDP in Example 1

Year	Price per Loaf	Loaves of Bread	Price per bag	Number of bags	Nominal GDP	Real GDP
2002	$2	100	$1	100	$2*100+ $1*100 =$300	$2*100+ $1*100= $300
2003	$3	120	$1	140	$3*120+ $1*140 =$500	$2*120+ $1*140= $380
2004	$4	115	$0.5	120	$4*115+ $0.50*120 =$520	$2*115+ $1*120= $350

- Real output grew 2002-2003, fell 2003-2004, but 2004 output still higher than 2002

USA GDP per capita

(Chained 2005$)



GDP Deflator

- tells us by how much we're deflating GDP when we go from NGDP to RGDP (how much does using the same prices affect our calculations of GDP)

- GDP Deflator = $\frac{\text{Nominal GDP}}{\text{Real GDP}} * 100$

GDP Deflator in Example 1

- GDP Deflator = $\boxed{\dfrac{\text{Nominal GDP}}{\text{Real GDP}} \times 100}$
- Deflator 2002 = $\dfrac{\$300}{\$300} \times 100 = 100$
- Deflator 2003 = $\dfrac{\$500}{\$380} \times 100 = 131.58$
- Deflator 2004 = $\dfrac{\$520}{\$350} \times 100 = 148.57$

GDP Inflation

- Intuitively: the change in how much prices affect our calculations of GDP
- Note that this is prices of *all* goods.
  - Different than “inflation”
  - Consider it inflation that **firms** experience (as opposed to households)

GDP Inflation

- GDP Inflation =

$$\frac{\text{GDP deflator in target year} - \text{GDP deflator in base year}}{\text{GDP deflator in base year}}$$

- Example: GDP inflation from 2002 to 2003 = $\frac{131.58 - 100}{100} = 0.3158 = 31.58\%$

So why use GDP?

- Several reasons
  1. Easy to measure across countries
  2. Governments are motivated to collect accurate data (for tax reasons)
  3. Related to many other measures of quality of life

Understanding the world

- GDP and Life Expectancy
- GDP and HDI

Using GDP to measure Quality of Life

- Pros:
  - Correlated with health
  - Correlated with quality of education
  - Correlated with consumption
  - Correlated (negatively) with corruption!
- Cons:
  - Doesn't factor in pollution
  - Worse health might mean more healthcare spending i.e. higher GDP!
  - Many others…

Unemployment

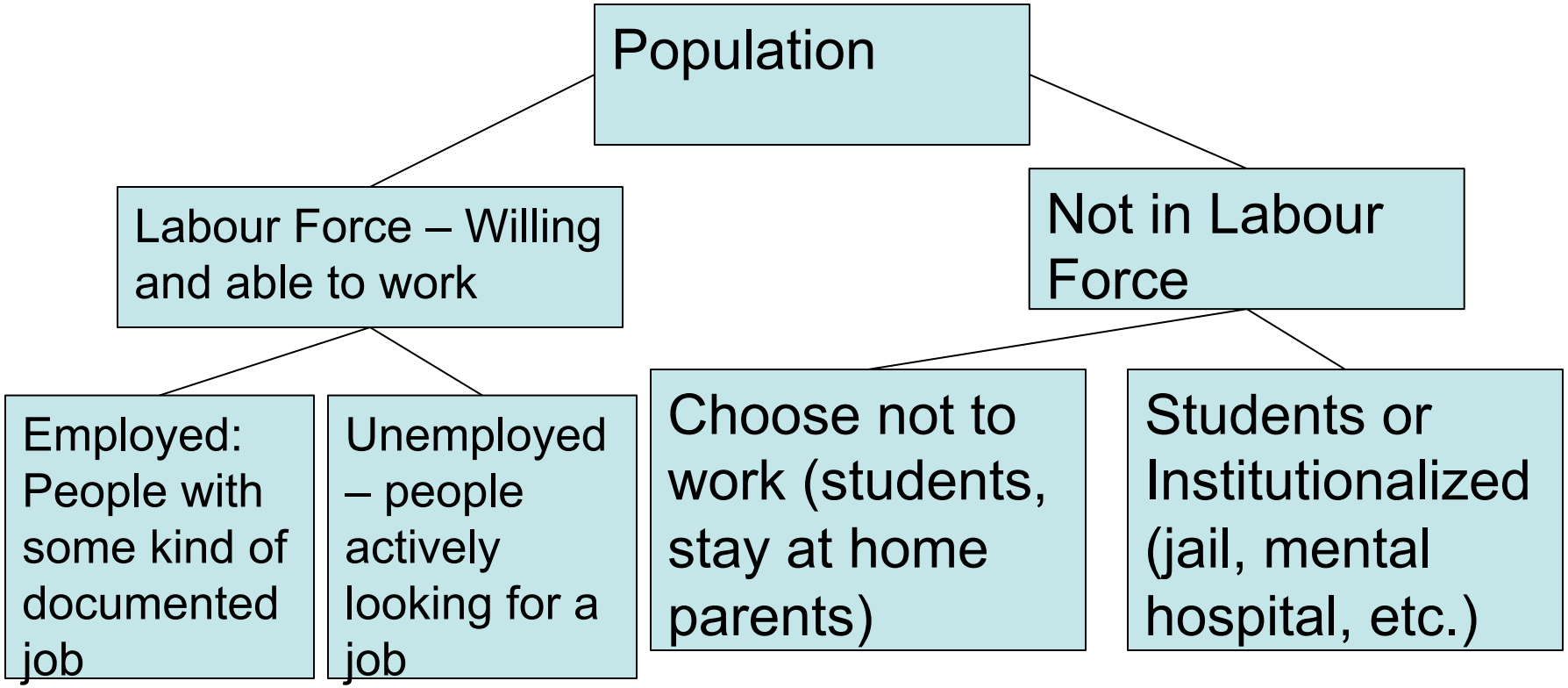
How good is it as an alternative measure of economic health?

What measure of unemployment makes sense?

- Economists look at different measures, but the most popular measure is:
  - Percentage of those who are willing and able to work but that are not working.

- Before we calculate this, let's look at how we classify people

How do we break up the population?



Back to measuring the unemployment rate

- "Percentage of those who are willing and able to work that are not working."

$$\text{Unemployment Rate} = \frac{\text{Unemployed}}{\text{Labor Force}}$$

- **Participation Rate:** Percentage of the population that is part of the labor force.

$$\text{Participation Rate} = \frac{\text{Labor Force}}{\text{Population}}$$

Remember what "unemployed" means

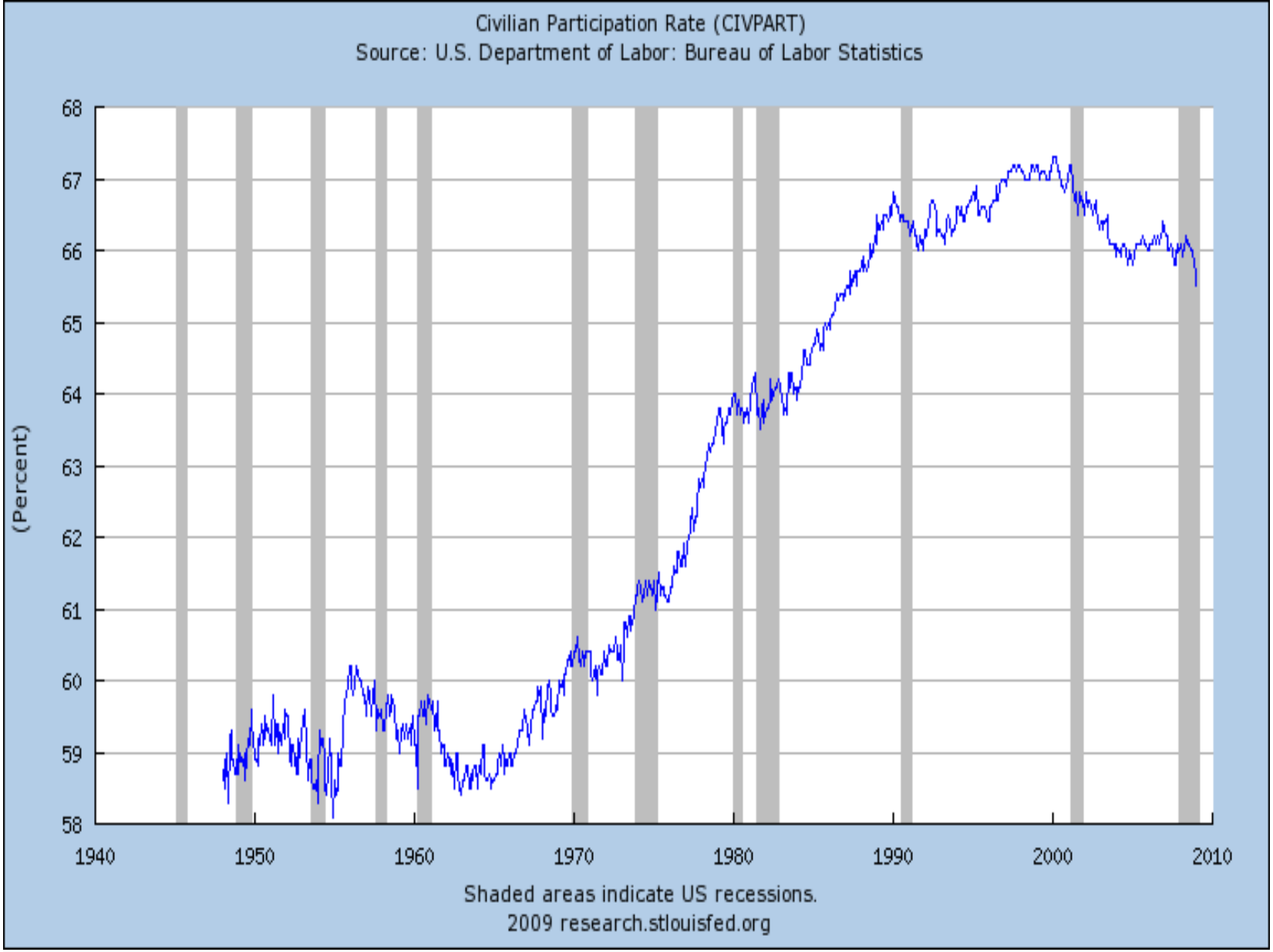
- Have to be actively looking for a job.
- **Discouraged Workers:** Someone who has given up looking for a job because they don't think they can find one.
  - Not part of the labor force! Not actively looking for a job.

Example

- Suppose that you know the following information about a city in Econland.

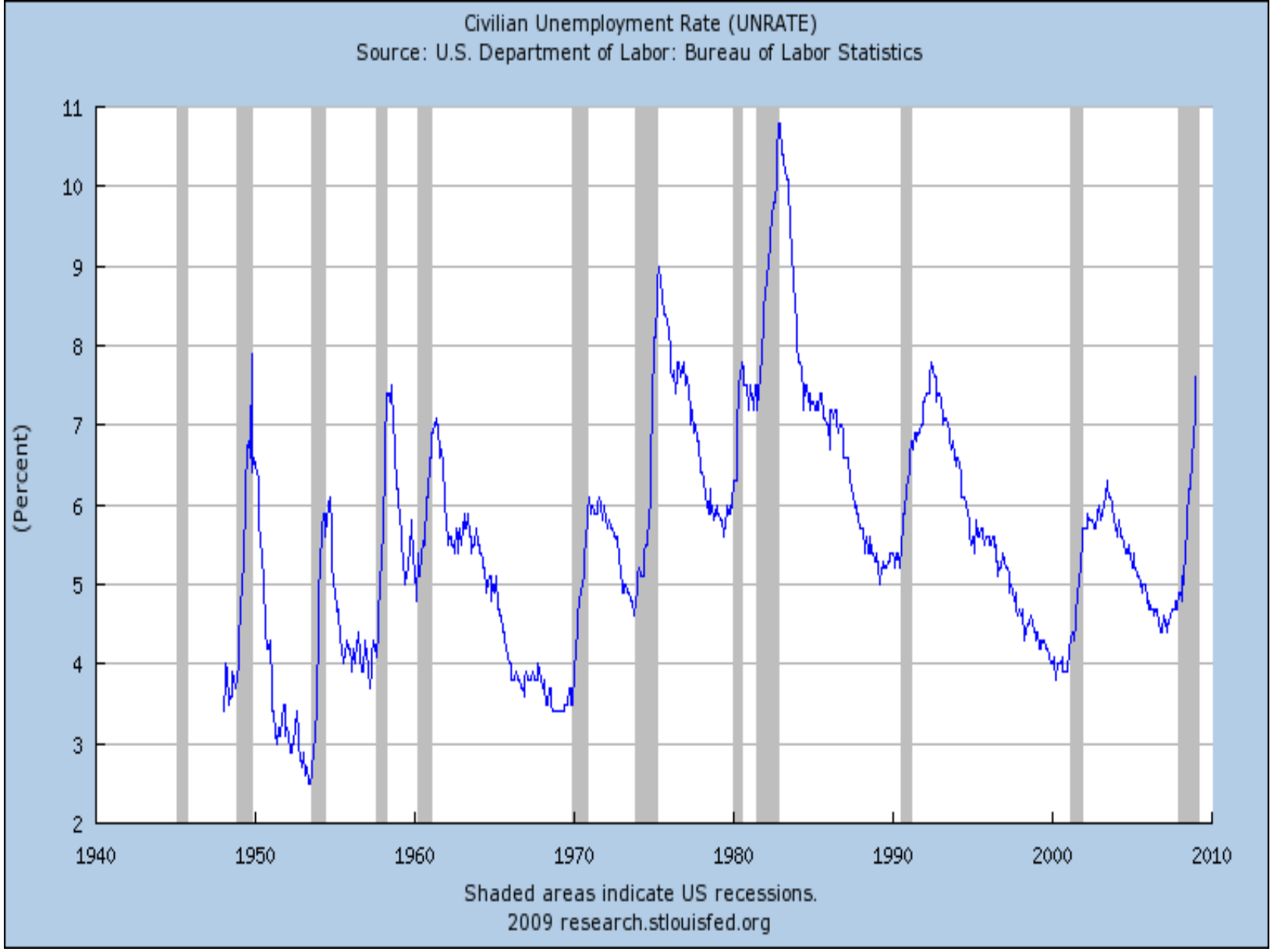
Full time	Part time	Not working, seeking job	Not working, gave up looking.	Children (under 10)
225	100	55	85	35

- (a) Total population? (b) # employed?
  (c) # unemployed? (d) labor force?
  (e) unemp. rate? (e) participation rate?


Civilian Participation Rate (CIVPART)
Source: U.S. Department of Labor: Bureau of Labor Statistics
(Percent)
68
67
66
65
64
63
62
61
60
59
58
1940
1950
1960
1970
1980
1990
2000
2010
Shaded areas indicate US recessions.
2009 research.stlouisfed.org

Higher participation rates…

- Question: Why has the USA participation rate increased almost 10 percentage points since the early 60s? (i.e. an additional 10% of the population joined the labor force)
- Answer: Women entering the workplace


Civilian Unemployment Rate (UNRATE)
Source: U.S. Department of Labor: Bureau of Labor Statistics
(Percent)
11
10
9
8
7
6
5
4
3
2
1940
1950
1960
1970
1980
1990
2000
2010
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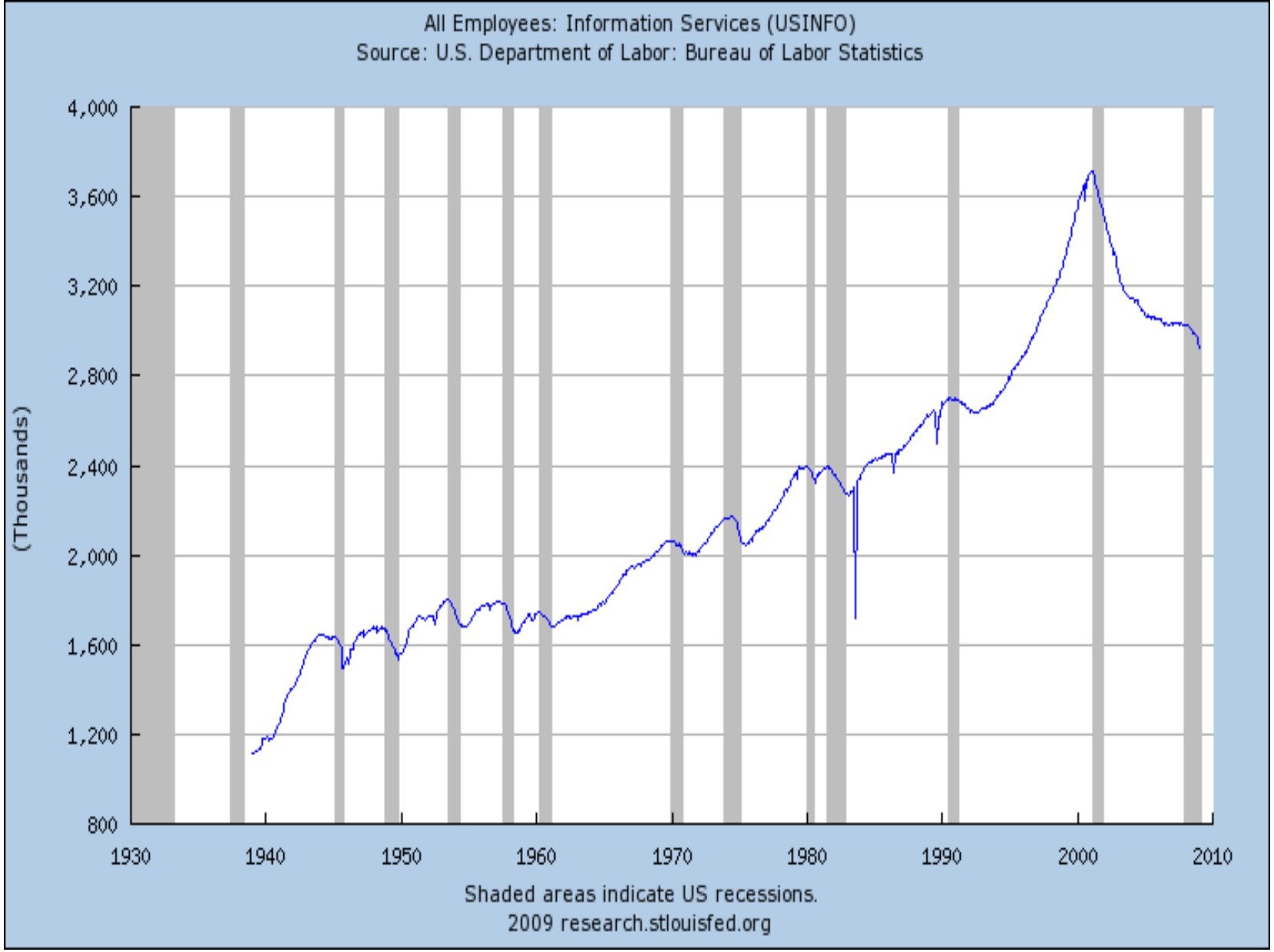
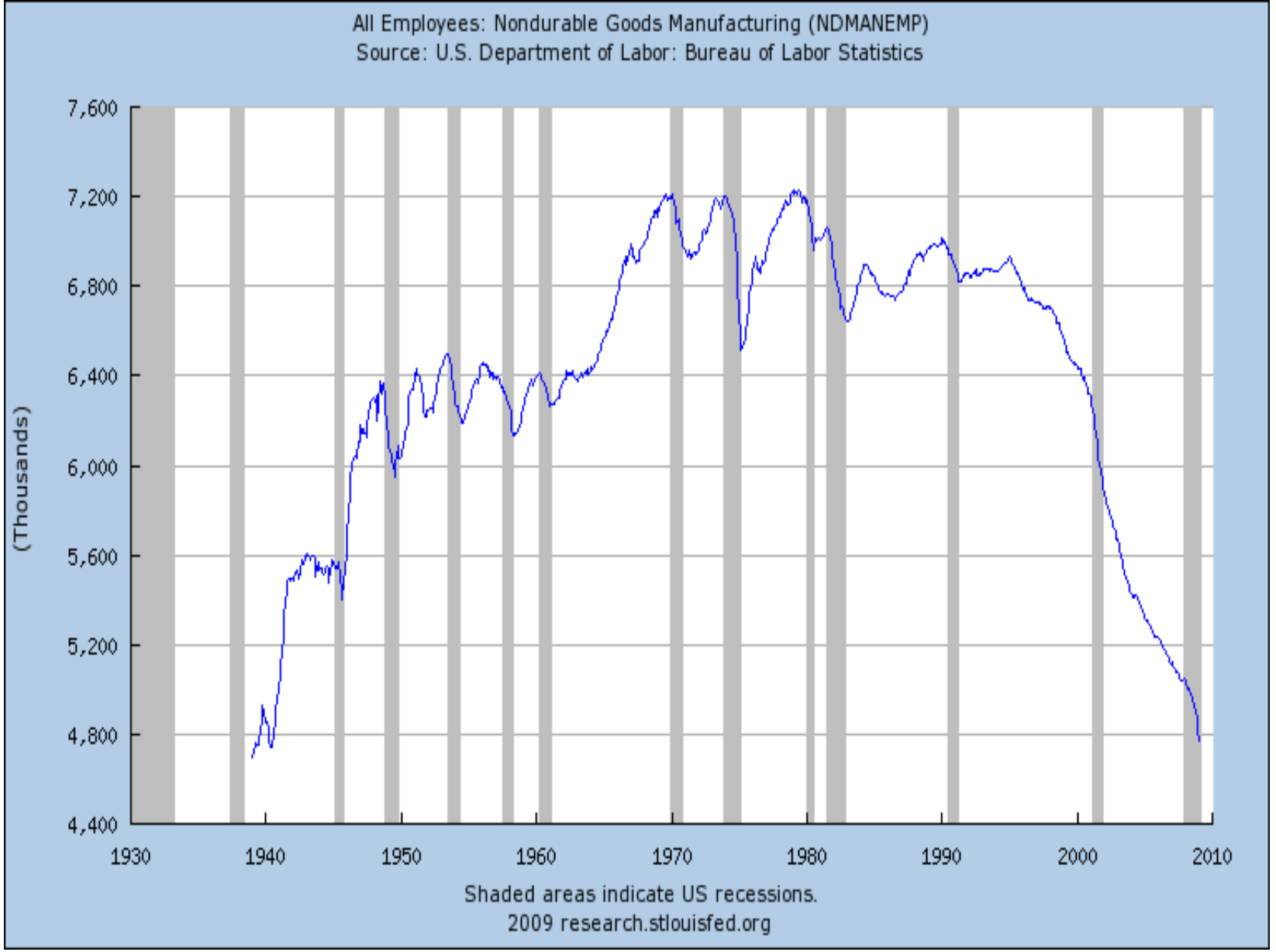



All Employees: Nondurable Goods Manufacturing (NDMANEMP)
Source: U.S. Department of Labor: Bureau of Labor Statistics
(Thousands)
7,600
7,200
6,800
6,400
6,000
5,600
5,200
4,800
4,400
1930
1940
1950
1960
1970
1980
1990
2000
2010
Shaded areas indicate US recessions.
2009 research.stlouisfed.org

Criticisms of Unemployment Measure

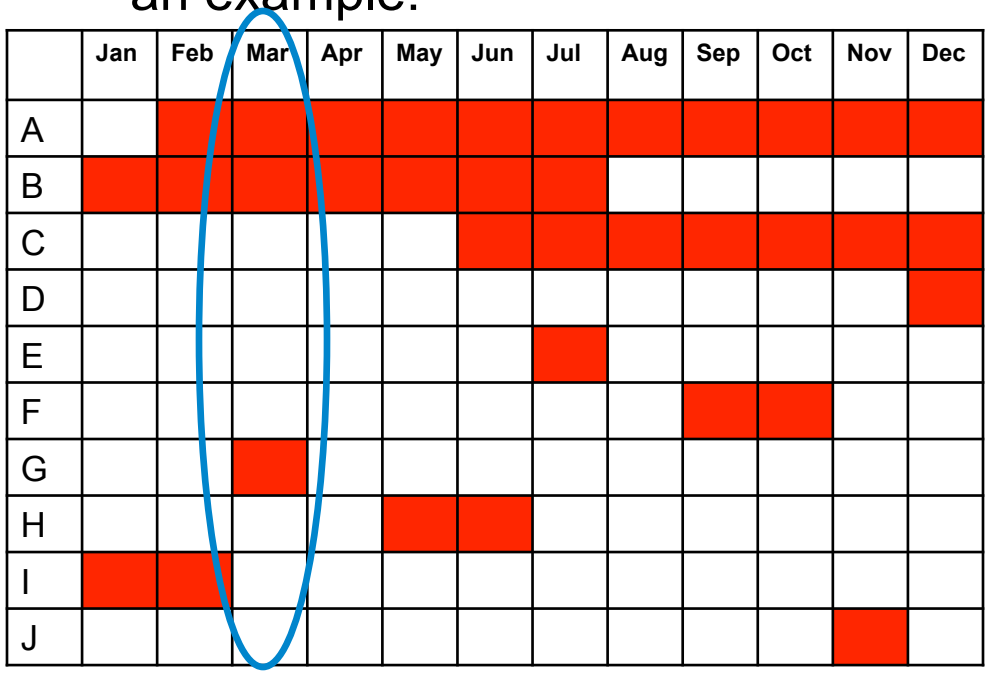
1. Could be undercounting. Does not count discouraged workers as unemployed.
2. Does not consider quality of jobs (i.e. part-time workers are “employed”).
3. Does not count people without home address or that “the gov’t doesn’t know about.”

Criticisms of Unemployment Measure (cont'd)

4. Does not include jobs people don't want the gov't to know about (drug dealer, babysitter)
   - Adds to unemployment rate.
5. Could be over-counting b/c people want to qualify for unemployment benefits

Length of Unemployment

- "Most spells of unemployment are short, and most unemployment observed at any given time is long term." Here's an example:



- Rows are people
- 3 long spells, 7 short spells
- In a given month, more long spells than short spells

Why not 0% unemployment?

- **Frictional Unemployment:** (*Search and Wait unemployment*) caused by workers taking their time searching for a job that matches their skill and tastes.
- **Example:** An architect gets laid off, waits for a firm that designs the kind of buildings she likes

Another reason we never have 0% unemployment

- **Structural Unemployment:** caused by workers whose skills are not in demand by employers, who lack sufficient skill to obtain employment, or who cannot easily move to locations where jobs are available. (more "serious," long-term)
- **Example:** Typists became unemployed when computers became popular

Natural Rate of Unemployment

- **Natural Rate of Unemployment:** The normal rate of unemployment around which the unemployment rate fluctuates.
- **Cyclical Unemployment:** The deviation of unemployment from its natural rate.

Policy and Unemployment

What are the goals of unemployment policies? Do they meet those goals?

Should we help people take their time to find a new job?

- **Unemployment Insurance**
  - lengthens the time of unemployment by making it less costly to be unemployed.
  - Gives workers more time to find a good match to their taste and skill level.

Should we make sure people don't get paid "too little"?

- **Minimum Wage-laws**
  - Decrease the amount of labor firms are willing to hire, and increase the amount of labor supplied
  - How much this effects unemployment depends on how many people are working at minimum wage
  - In the USA, the number of people working at minimum wage has declined over time.

Should we let workers bargain over wages as a group?

- Unions
  - Set higher wages – probably bad if it means fewer workers are hired
  - Make rules about job description (e.g. even if worker knows how to repair machine, have to wait for the repair guy to come) – slows down production
  - Undermine monopolies sometimes – good!
    - Transfers monopoly rents from CEO to worker

Distorting wages isn't just something government does

- **Efficiency Wages**
  - When firms set wages artificially high to increase worker productivity.
  - If wages are "too high" more workers than slots, and the firm can afford to be picky in who it hires.
  - Firms do this in the "start-up" phase before they're focused on making a profit

Key Ideas and Things To Think About

Note: This is NOT a study guide – i.e. do not limit yourself to these items when studying

Key Ideas

- GDP and how we measure it
  - What's included and what isn't
- Calculating GDP in our model
- Nominal GDP vs Real GDP
  - Why choose one over the other?
  - GDP Deflator and Inflation

Key Ideas

- Unemployment – defining and measuring
- Criticisms of measures
- Natural rate of unemployment
  - Why it isn't zero
- Effect of policies on unemployment

Things To Think About

- Has the economy improved under the current presidential administration?
  - As measured by GDP (nominal and real)
  - As measured by unemployment
- Is it reasonable to use unemployment rate only to describe the economy?
- Unemployment analysis