Economics 152, Lecture 1: Course Overview

Chris Walters, UC Berkeley

January 11, 2019

Economics 152: Wage Theory and Public Policy

- This is an advanced undergraduate course in labor economics
- We will study wage and employment determination through the lens of modern applied microeconomics
- Approach: Theoretical models and empirical evidence on wage and employment determination
- In other words: Why are people paid what they're paid?
- Note: ECON152 is an alternative to ECON151 – don't take both

Logistics

- **Instructor:** Professor Chris Walters
  - **E-mail:** crwalters@econ.berkeley.edu
  - **Office hours:** Thursdays, 10:00am-12:00pm, 657 Evans
- **Readers:** Andrew Tai (atai1@berkeley.edu) and Andrea Cerrato (andrea_cerrato@berkeley.edu)
  - **Andrew's OH:** Tuesday, 1-3pm
  - **Andrea's OH:** Wednesday, 8-10am
- **Website:** https://bcourses.berkeley.edu/courses/1478535
- **Lectures:** T/Th 3:30-5:00pm, 390 Hearst Mining. No lecture 3/19, 3/26, or 3/28.

Logistics

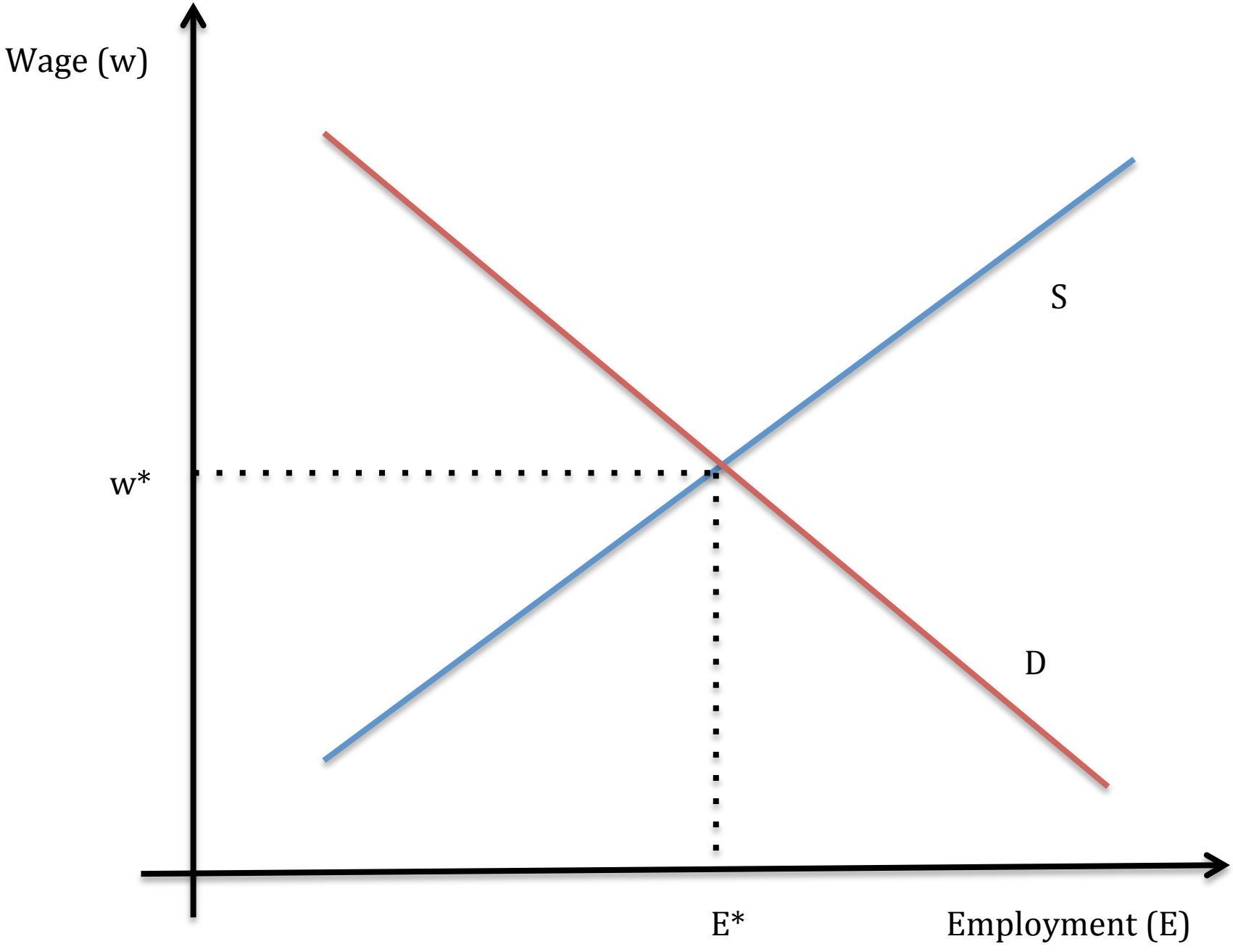
- **Prerequisites:** Intermediate microeconomics (100A or 101A) is a prequisite; Econometrics (140 or equivalent) is strongly encouraged as knowledge of basic econometrics will be assumed. Knowledge of calculus will also be assumed.
- **Textbook:** George Borjas, *Labor Economics*, 7th edition
- **Additional readings:** Selected empirical research papers, available on course website
- **Grades:**
  - Problem sets (30%): Six due throughout the semester, lowest grade dropped
  - Midterm (30%): Tuesday, March 5th, in class
  - Final (40%): Friday, 5/17, 7:00-10:00pm, location TBA
  - Regrade policy: Submit statement explaining your objection to grading to the head reader within one week of the day assignment initially returned to class. All parts of assignment will be regraded.

Why Study Labor Economics?

- Why does labor get its own class?
- Labor is about people: We all sell our labor in the market
- Developments in the labor market are therefore tightly linked to people's well-being
- Questions addressed in labor economics include:
  - How do minimum wages affect earnings and employment?
  - How does immigration affect wages for native-born and immigrant workers?
  - How does education affect earnings?
  - What explains wage gaps between demographic groups?
  - Why does unemployment increase in recessions?
  - What explains the rapid growth of inequality in the US since 1980?

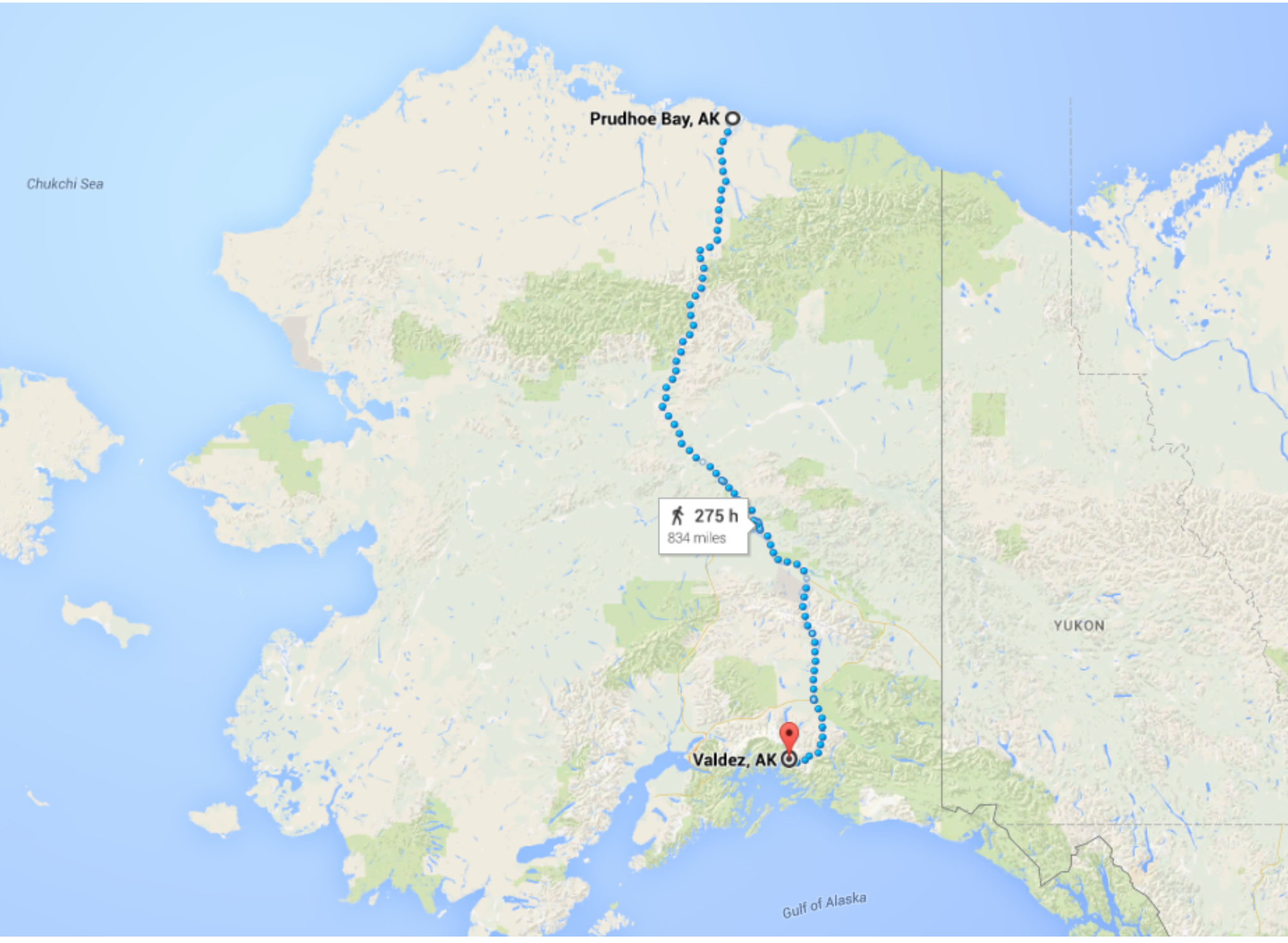
Supply and Demand Framework

- Starting point: Labor supply, and labor demand
- Workers supply labor, and firms demand it
- Each actor is assumed to maximize an objective subject to constraints
  - Workers maximize utility, and face constraints on both time and money. Working generates income that can be used to purchase goods, but workers care about leisure time too
  - Firms maximize profits, and must hire workers for production
- Interaction of supply and demand leads to market outcomes: wages (price) and employment (quantity)
- Government may step in and change the rules of the game


Wage (w)
S
w*
D
E*
Employment (E)

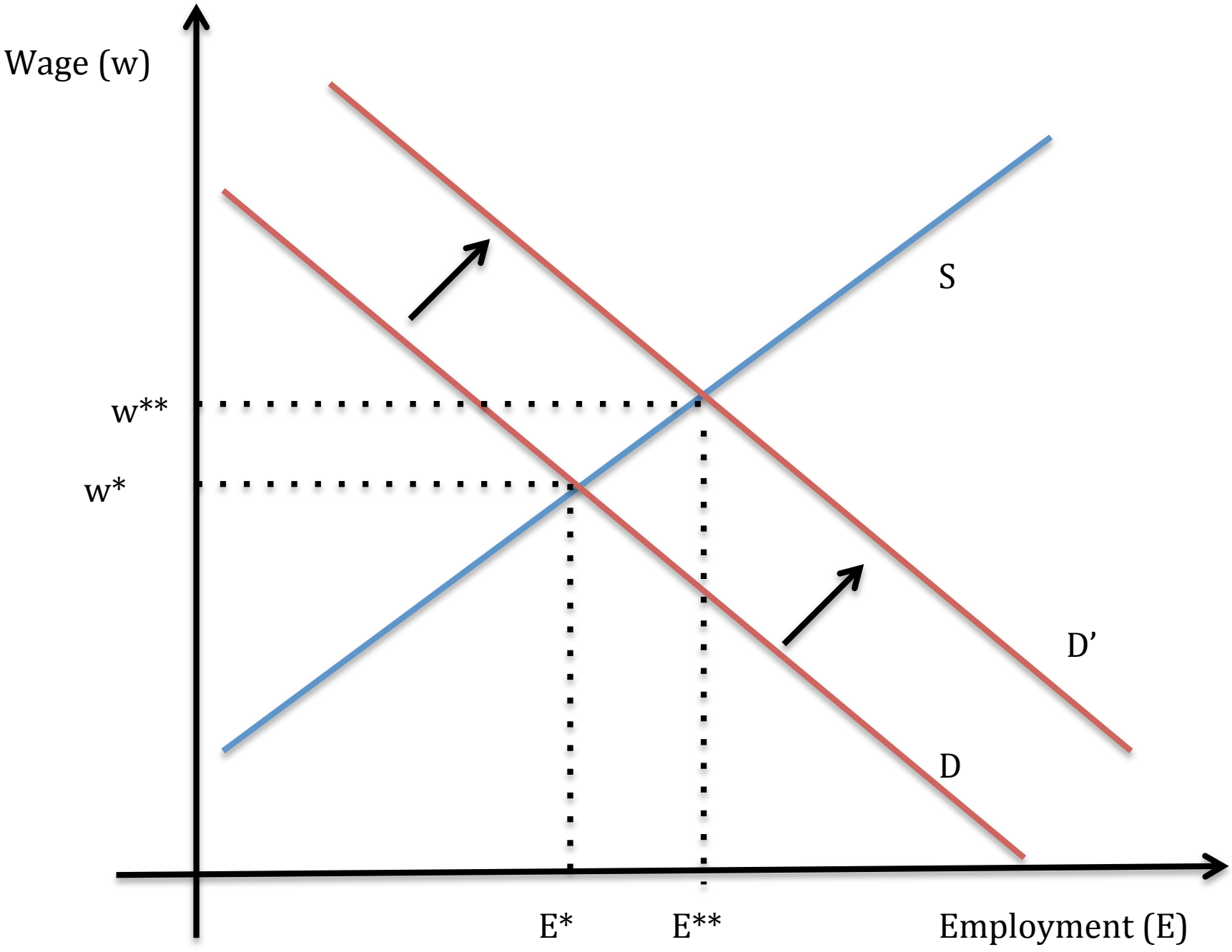
Supply/Demand Example: The Trans-Alaska Oil Pipeline

- Illustrative example: Discovery of oil in Prudhoe Bay, northern Alaska in 1968
- Prudhoe bay is remote and too icy for shipping
- Oil companies hoped to build a pipeline from Prudhoe Bay to Valdez, southern Alaska
- At first, opposition from environmental groups blocked pipeline construction
- 1973 oil crisis led Congress to authorize construction
- Trans-Alaska pipeline was built between 1974 and 1977


Prudhoe Bay, AK
Chukchi Sea
275 h
834 miles
YUKON
Valdez, AK
Gulf of Alaska

Supply/Demand Example: The Trans-Alaska Oil Pipeline

- Several interesting questions to ask about the pipeline
  - Impacts on oil prices, current and future
  - Impact on the environment
  - Impact on consumer behavior
- Labor economists ask: what is the effect of pipeline construction on the market for Alaskan construction workers?
  - How do we think about this in the supply/demand framework?
  - What does the framework predict about effects on wages and employment?


Wage (w)
S
w**
w*
D'
D
E*
E**
Employment (E)

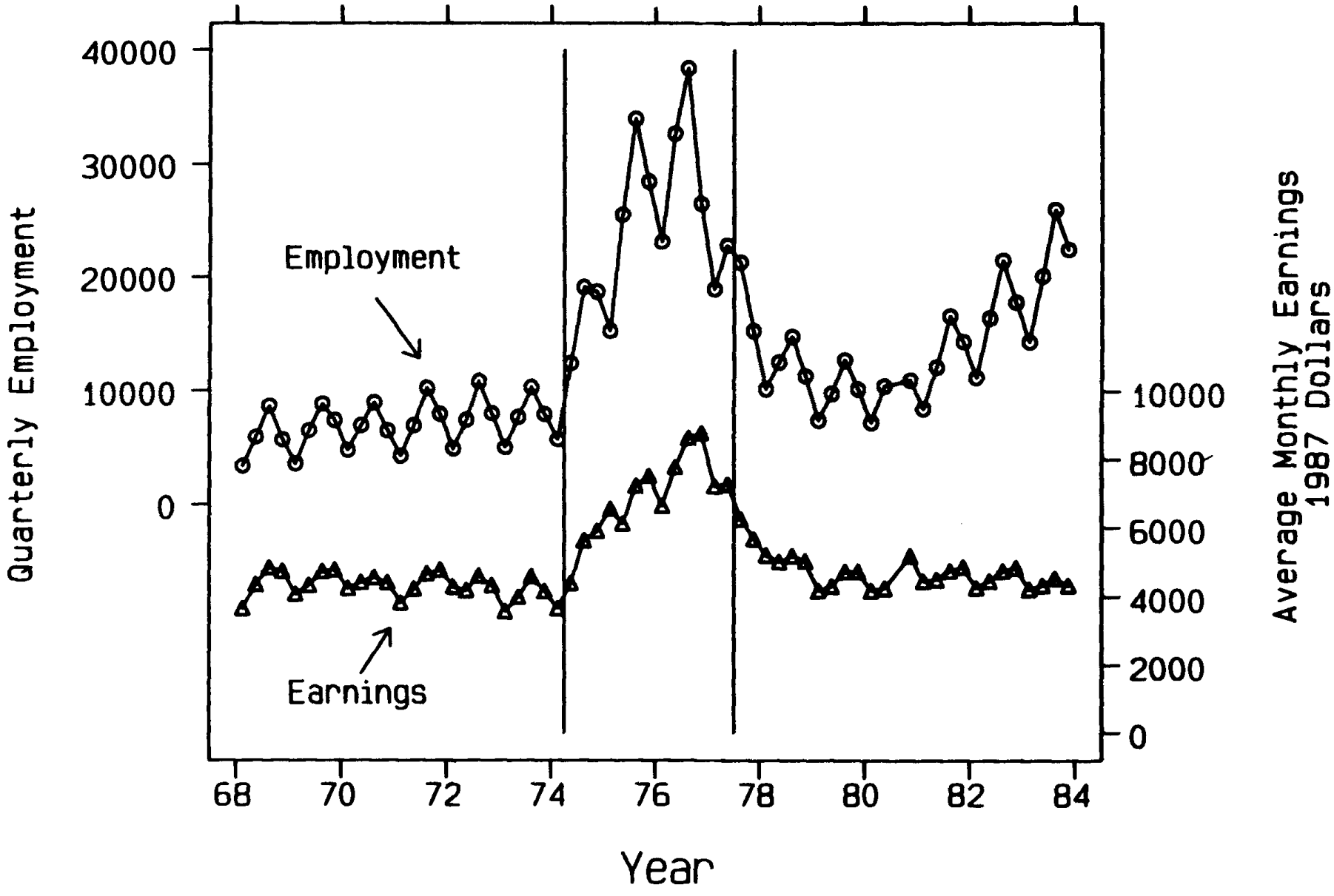


FIG. 7.—Employment and earnings: construction

Supply/Demand Example: Conclusions

- In this case, the basic supply/demand framework successfully predicts the effects of pipeline construction
- Empirically testing theoretical predictions will be a central theme of this course
- Note the distinction between this **positive** prediction, and **normative** judgements (should the pipeline be built?)
- In the next few lectures we will develop theories of worker and firm behavior that give rise to market supply/demand
- But first: Basic facts about the labor market

Definitions

- The Bureau of Labor Statistics (BLS) measures key labor market statistics
- Each person aged 16+ is classified into one of three categories:
  - **Employed:** Working at a paid job
  - **Unemployed:** No job, but looking for work
  - **Out of labor force:** Neither working nor looking for work
- A person is in the **labor force** if s/he is either employed or unemployed

Labor Market Statistics

- Let E be the number of employed workers, U the number of unemployed, and P the total population
- The size of the labor force, LF, is:

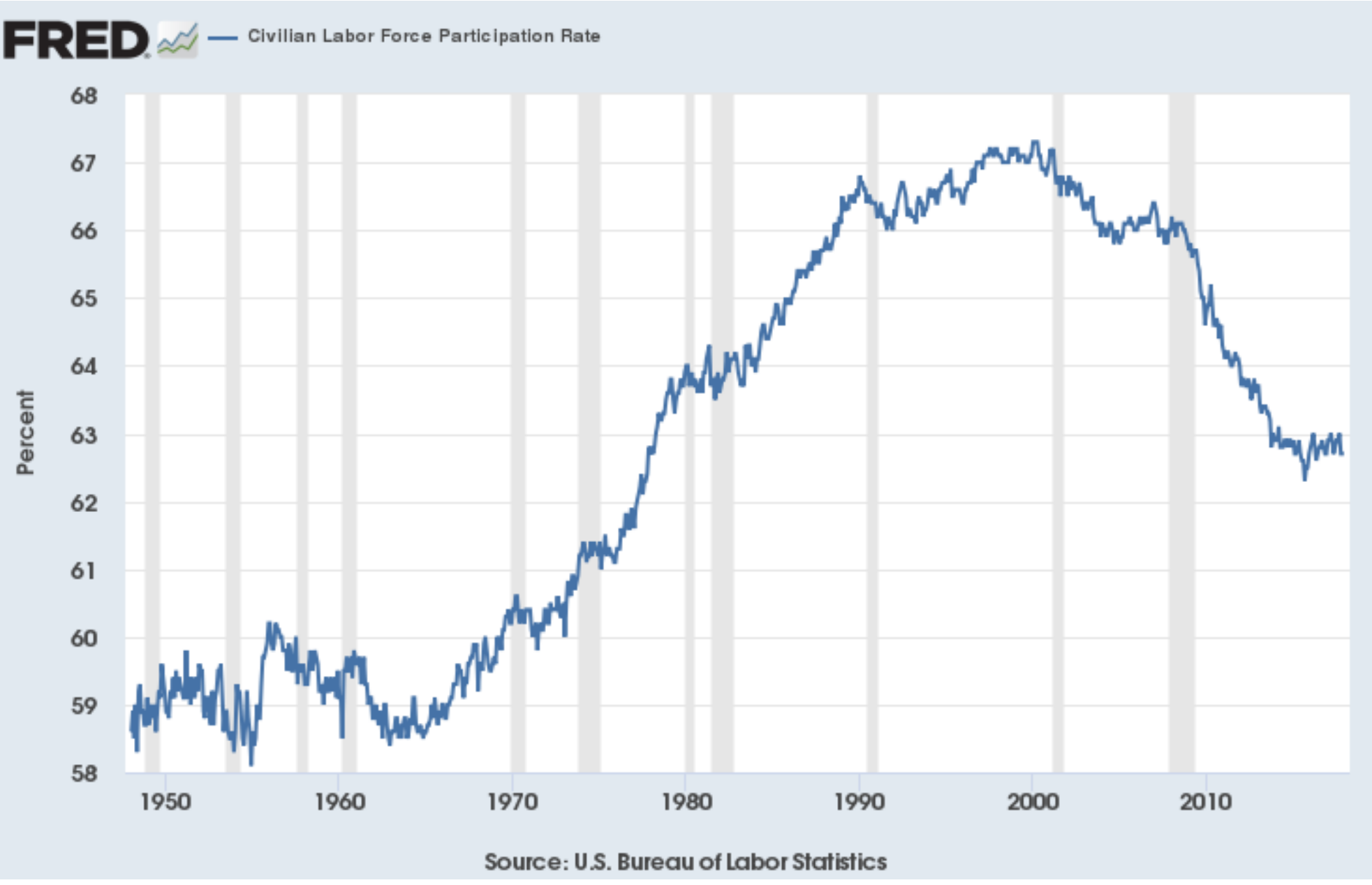
$$LF = E + U$$

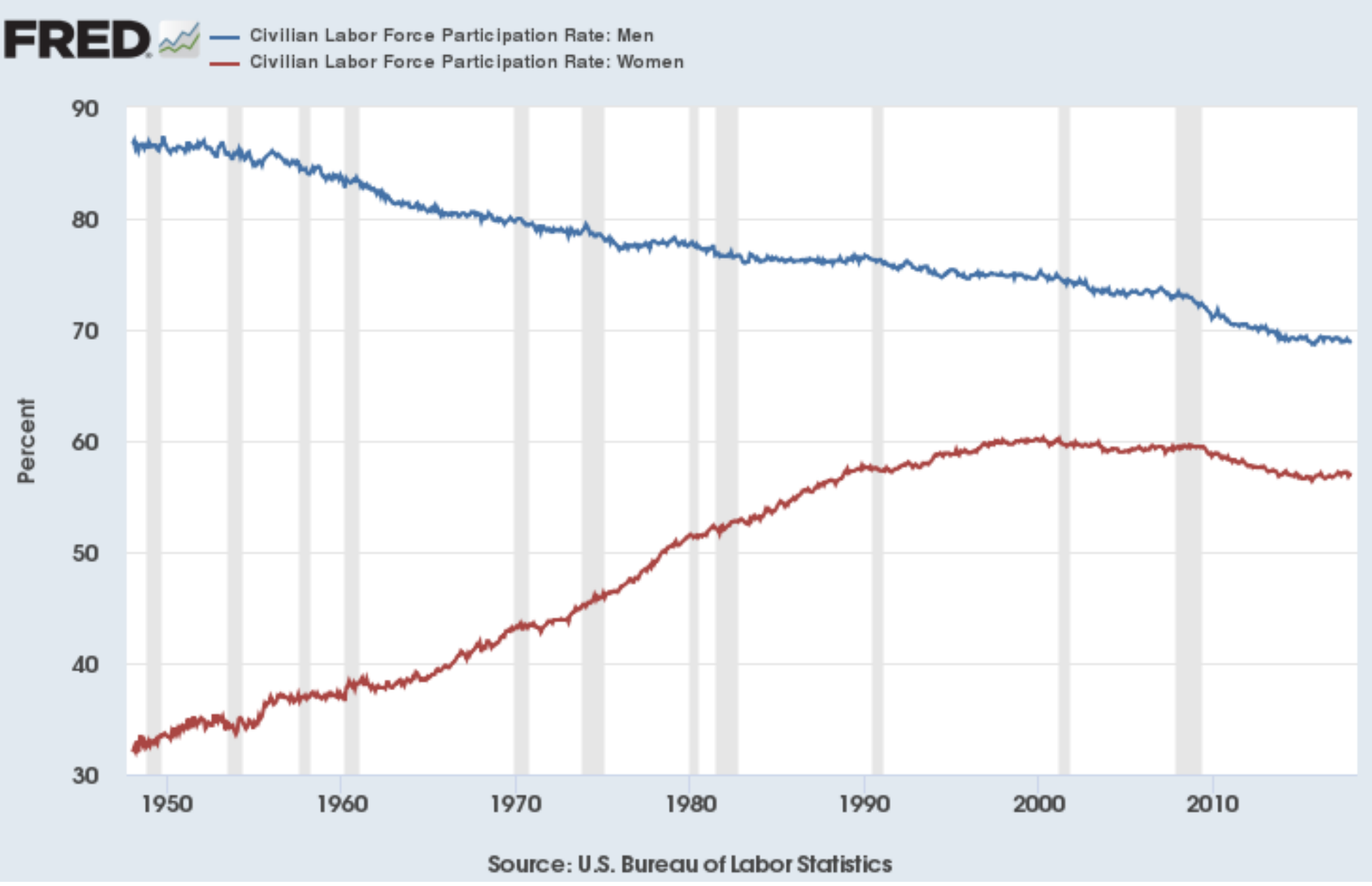
- Three key labor market statistics:

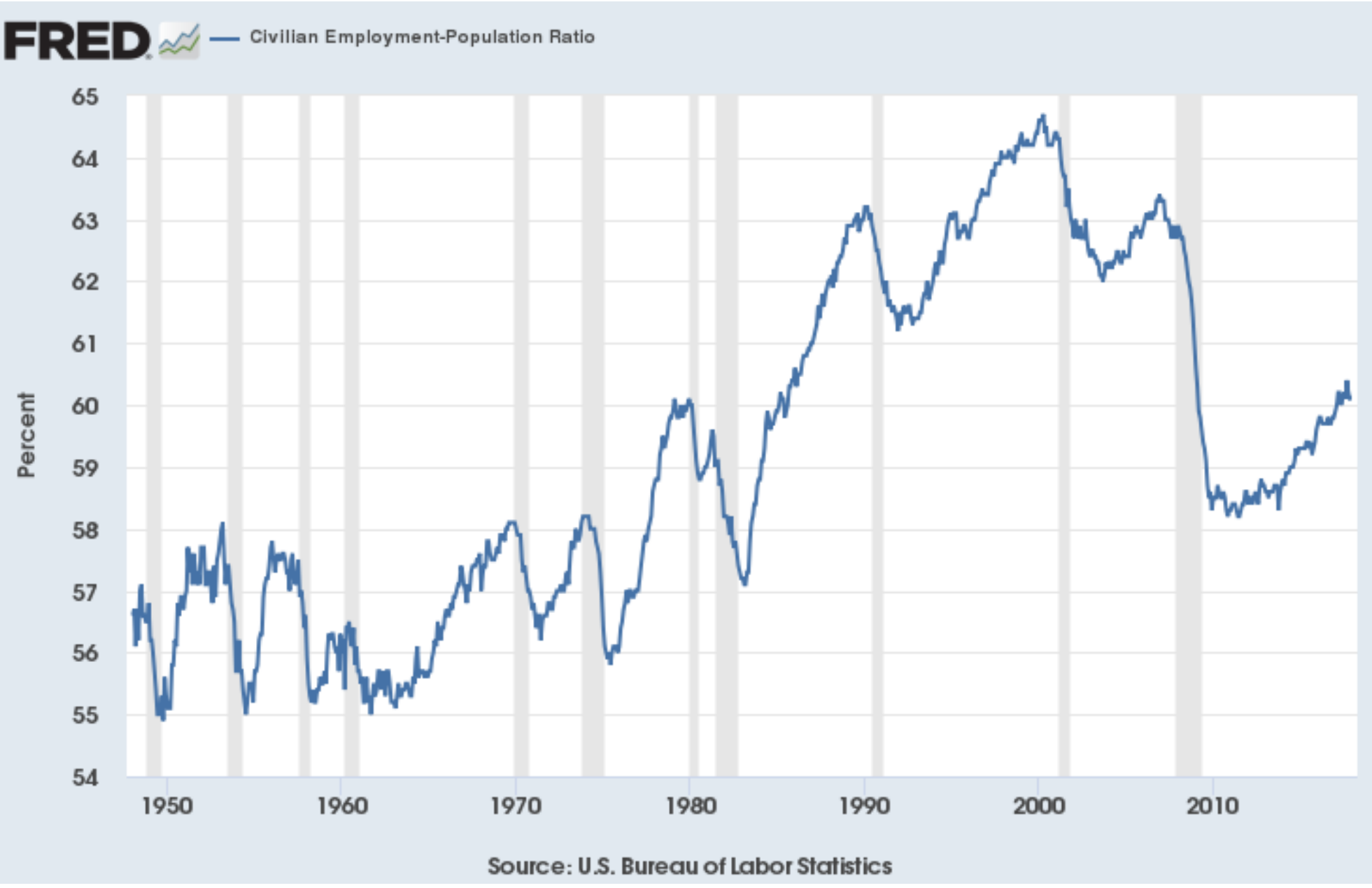
$$\text{Labor force participation rate} = \frac{LF}{P}$$

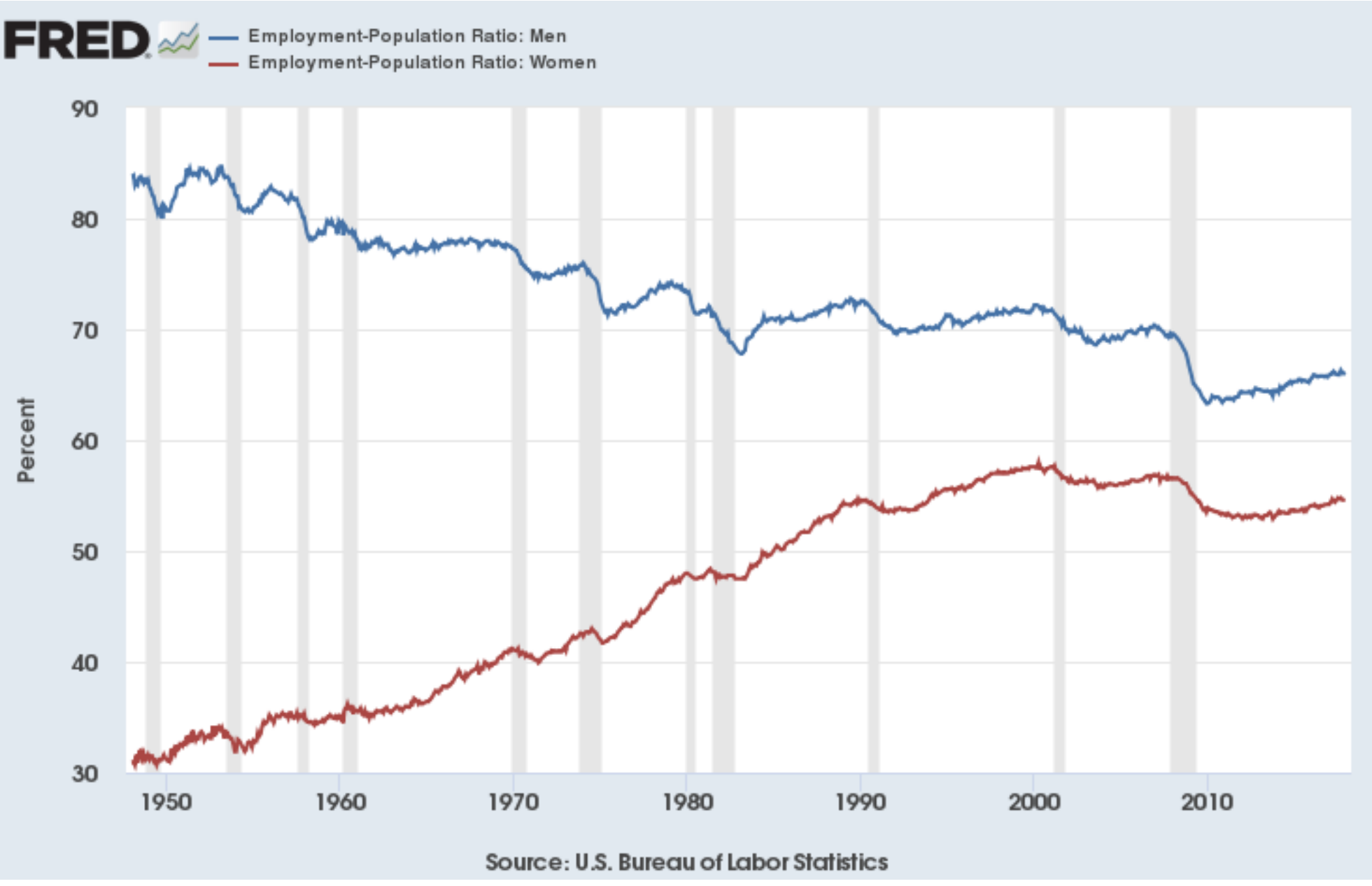
$$\text{Employment rate} = \frac{E}{P}$$

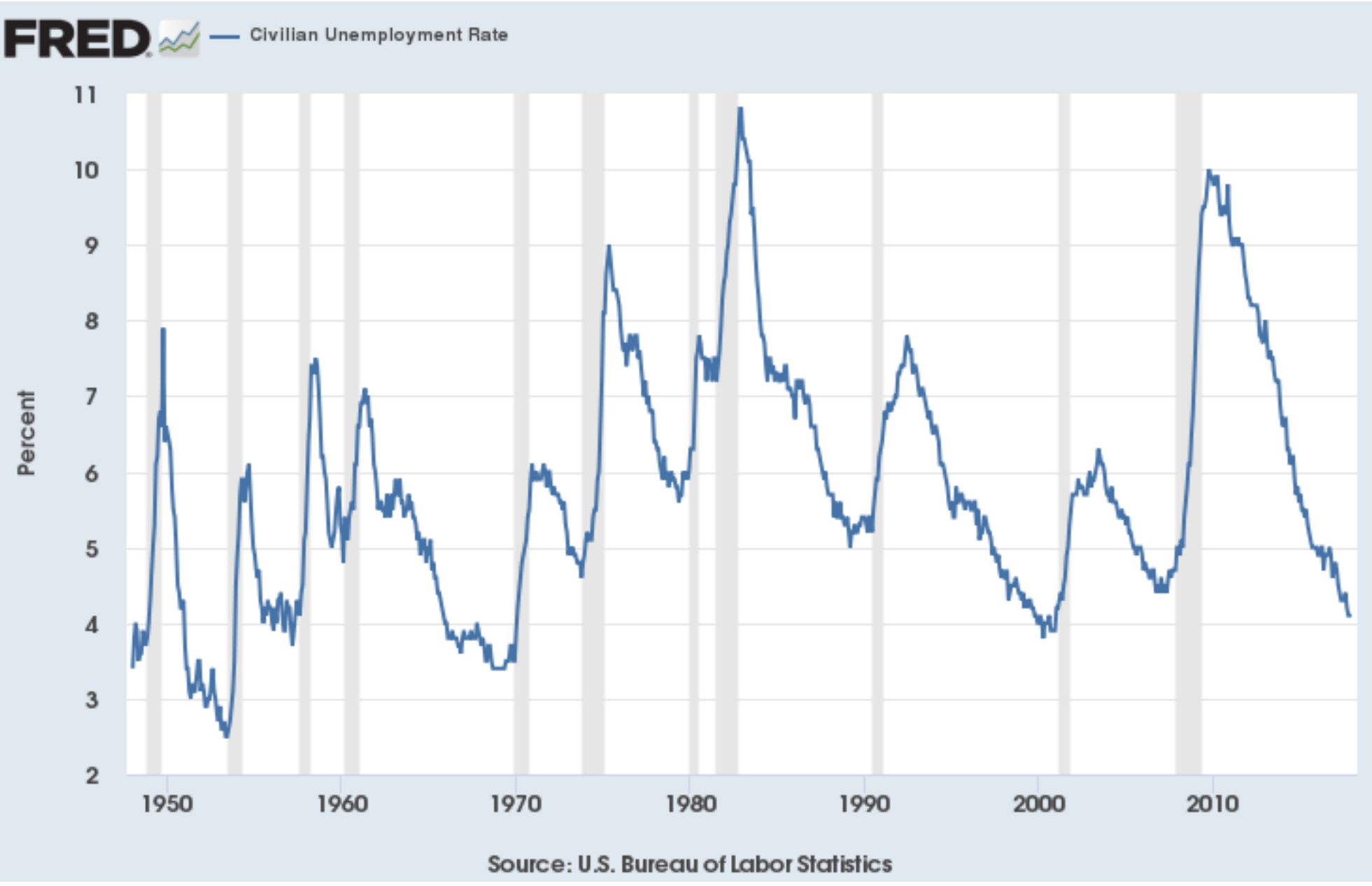
$$\text{Unemployment rate} = \frac{U}{LF}$$

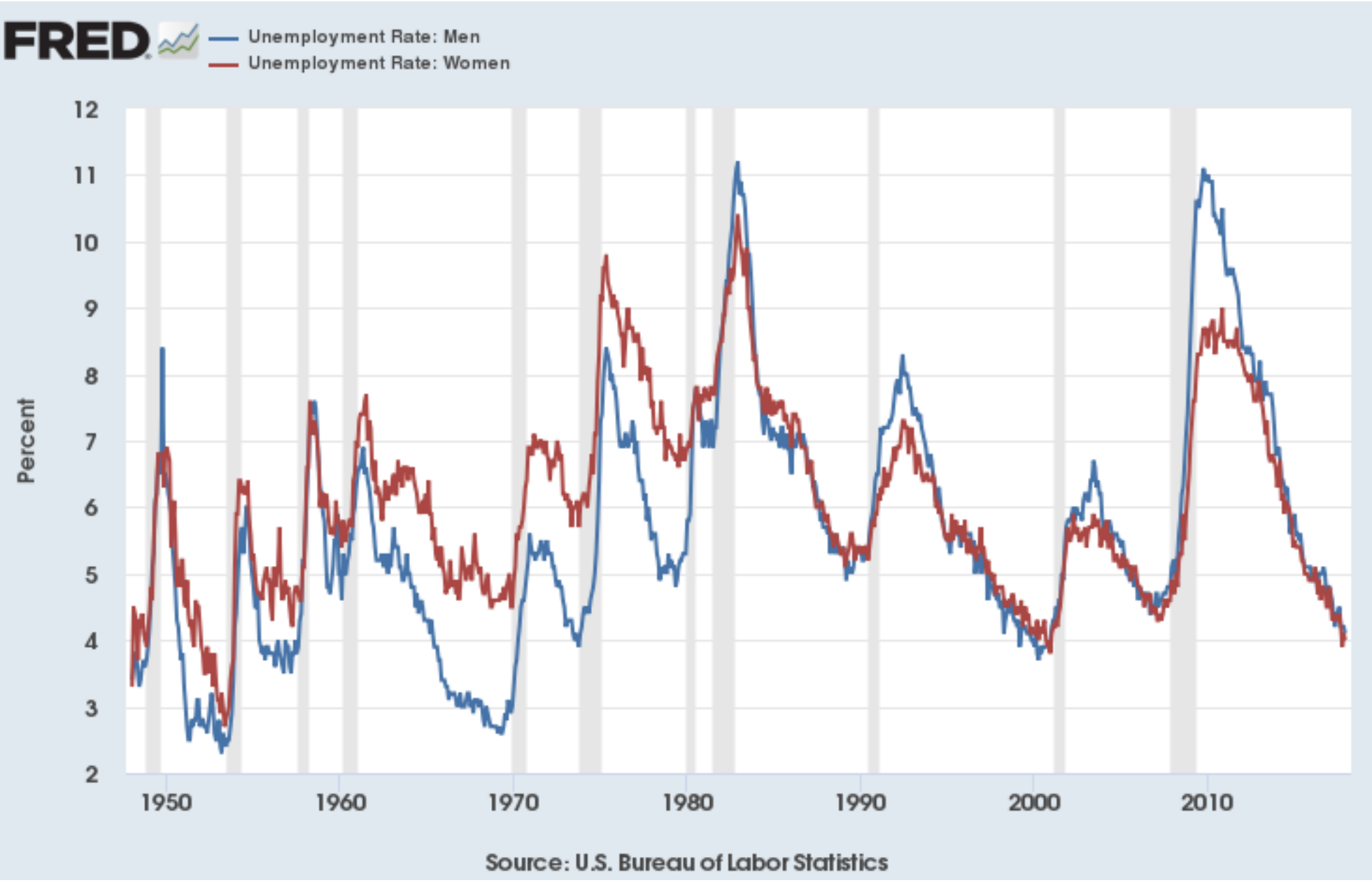

FRED
Civilian Labor Force Participation Rate
Percent
68
67
66
65
64
63
62
61
60
59
58
1950
1960
1970
1980
1990
2000
2010
Source: U.S. Bureau of Labor Statistics


FRED
Civilian Labor Force Participation Rate: Men
Civilian Labor Force Participation Rate: Women
Percent
90
80
70
60
50
40
30
1950
1960
1970
1980
1990
2000
2010
Source: U.S. Bureau of Labor Statistics


FRED
Civilian Employment-Population Ratio
Percent
65
64
63
62
61
60
59
58
57
56
55
54
1950
1960
1970
1980
1990
2000
2010
Source: U.S. Bureau of Labor Statistics


FRED
Employment-Population Ratio: Men
Employment-Population Ratio: Women
90
80
70
60
50
40
30
Percent
1950
1960
1970
1980
1990
2000
2010
Source: U.S. Bureau of Labor Statistics


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


FRED
Unemployment Rate: Men
Unemployment Rate: Women
Percent
12
11
10
9
8
7
6
5
4
3
2
1950
1960
1970
1980
1990
2000
2010
Source: U.S. Bureau of Labor Statistics

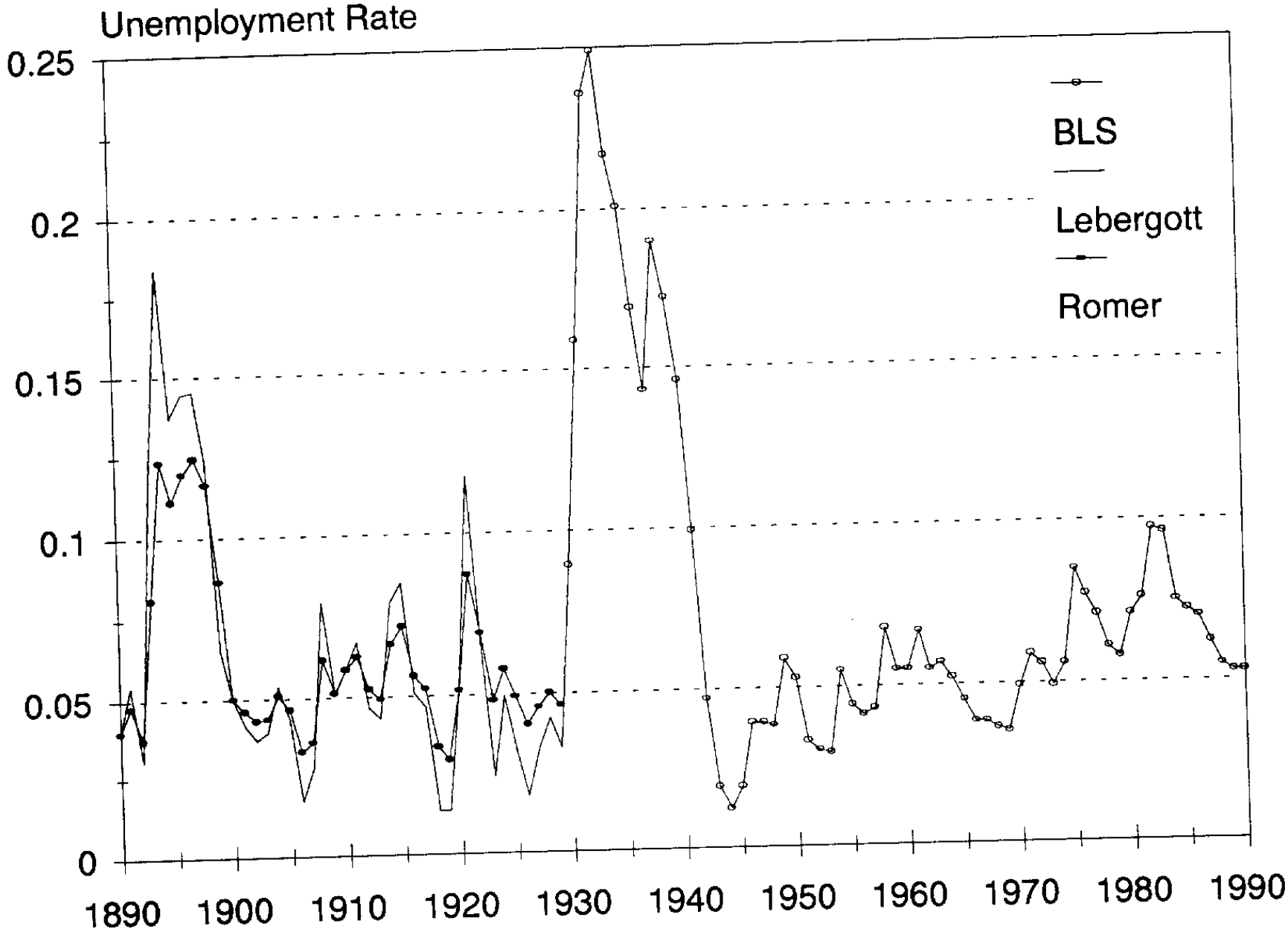
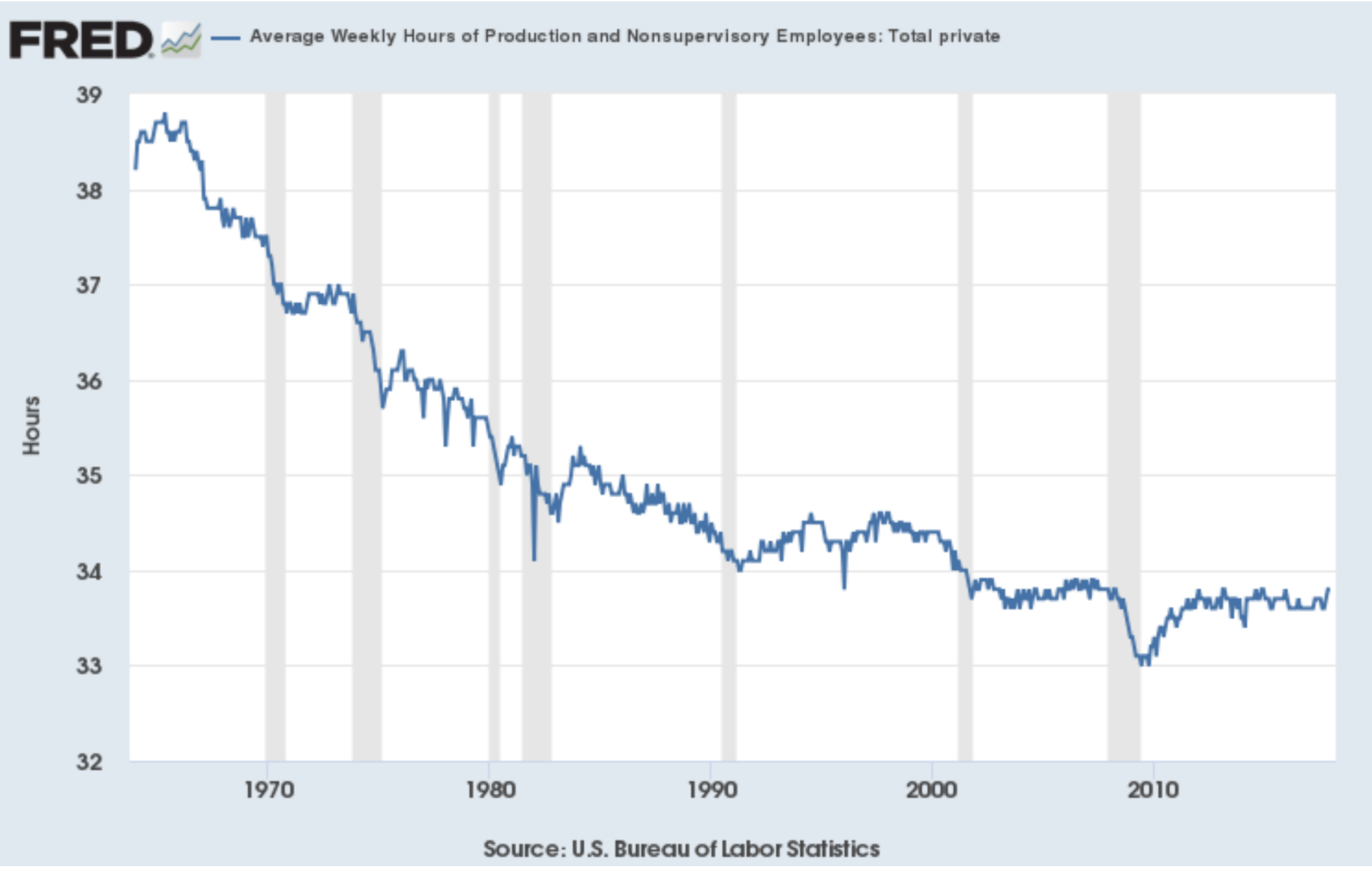


Figure 10: The Aggregate Unemployment Rate, 1890 to 1990


FRED
Average Weekly Hours of Production and Nonsupervisory Employees: Total private
Hours
39
38
37
36
35
34
33
32
1970
1980
1990
2000
2010
Source: U.S. Bureau of Labor Statistics

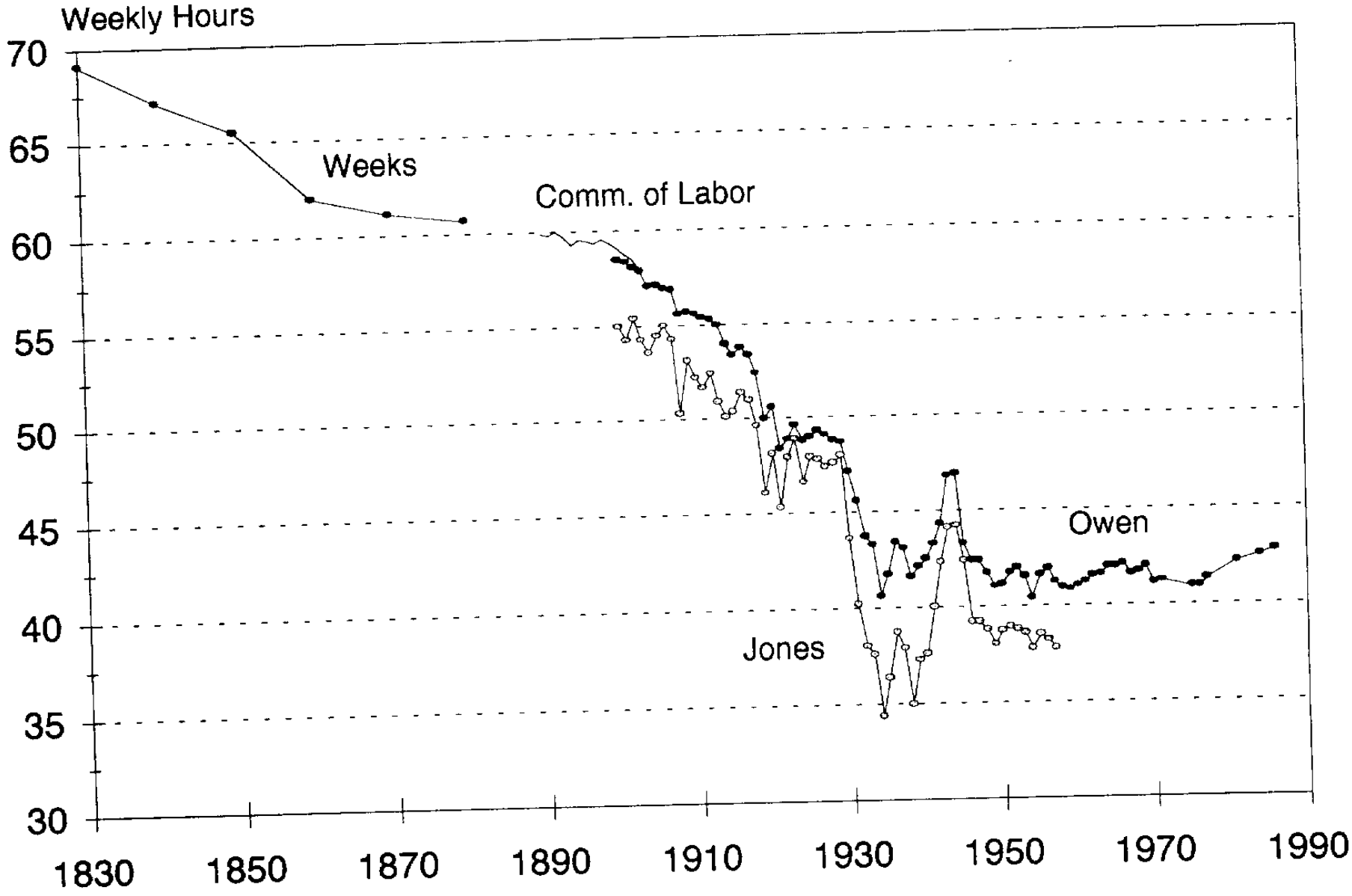


Figure 5: Hours of Work, 1830-1986

Other Key Statistics

- Wage gaps between subgroups:
  - Education
  - Age/experience
  - Demographics
- Overall wage inequality: 90/10, 90/50, 50/10 percentile ratios

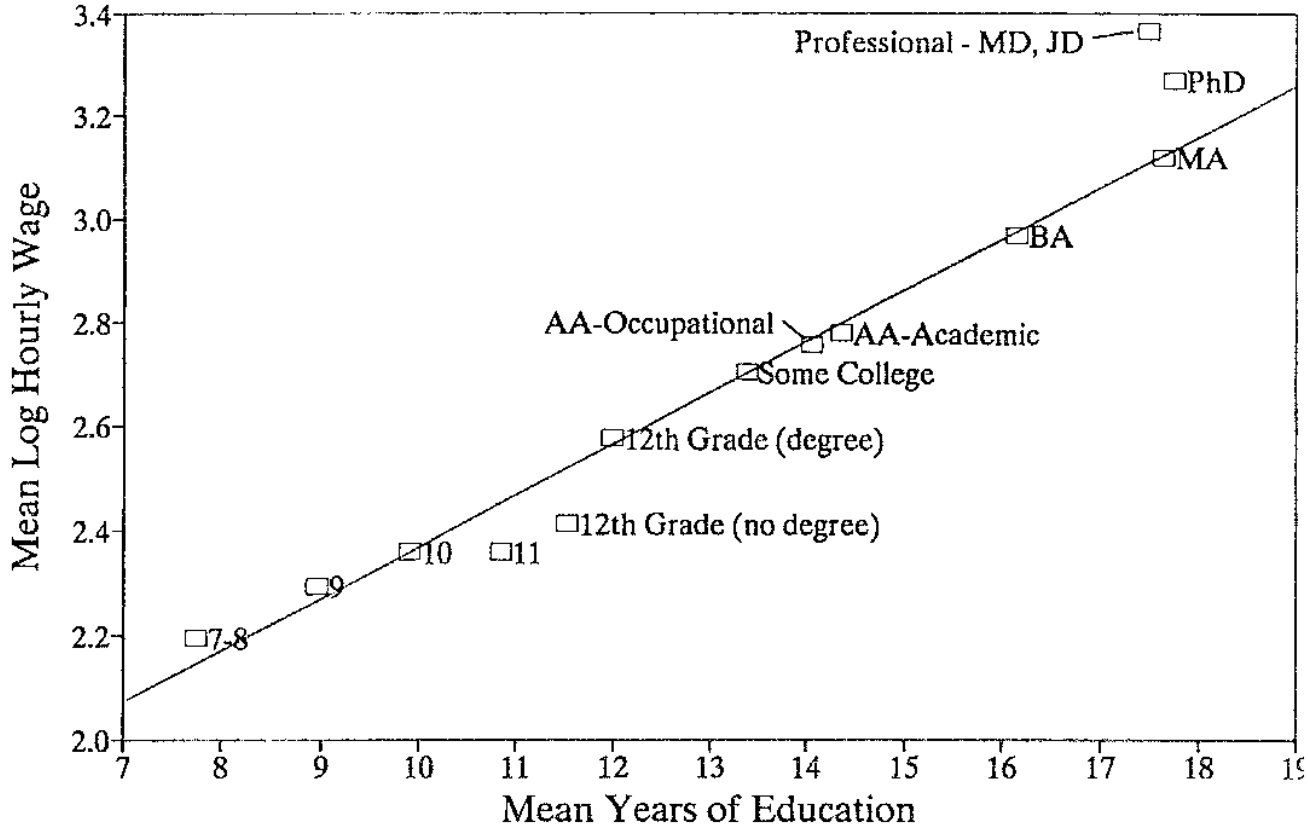
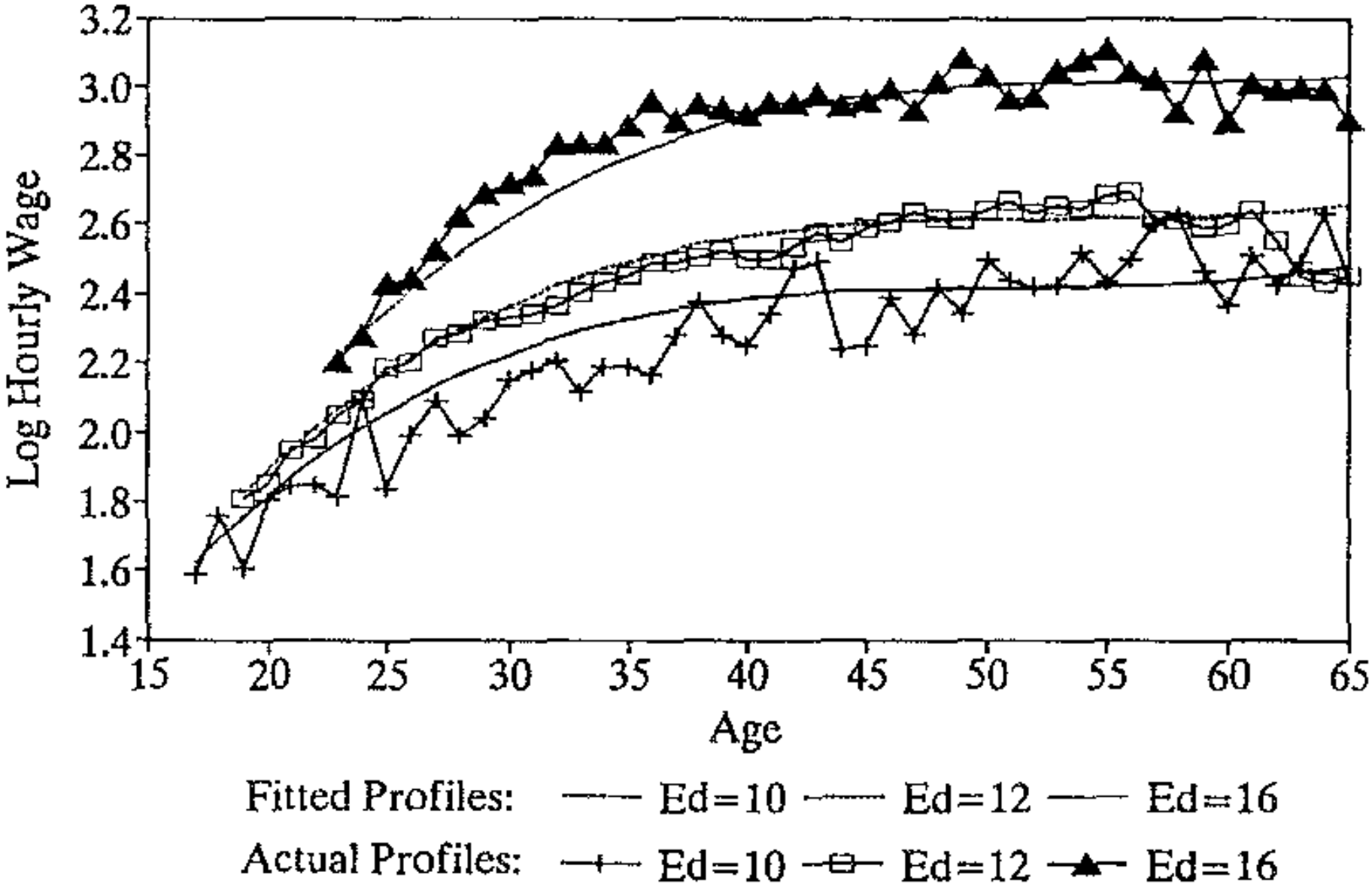
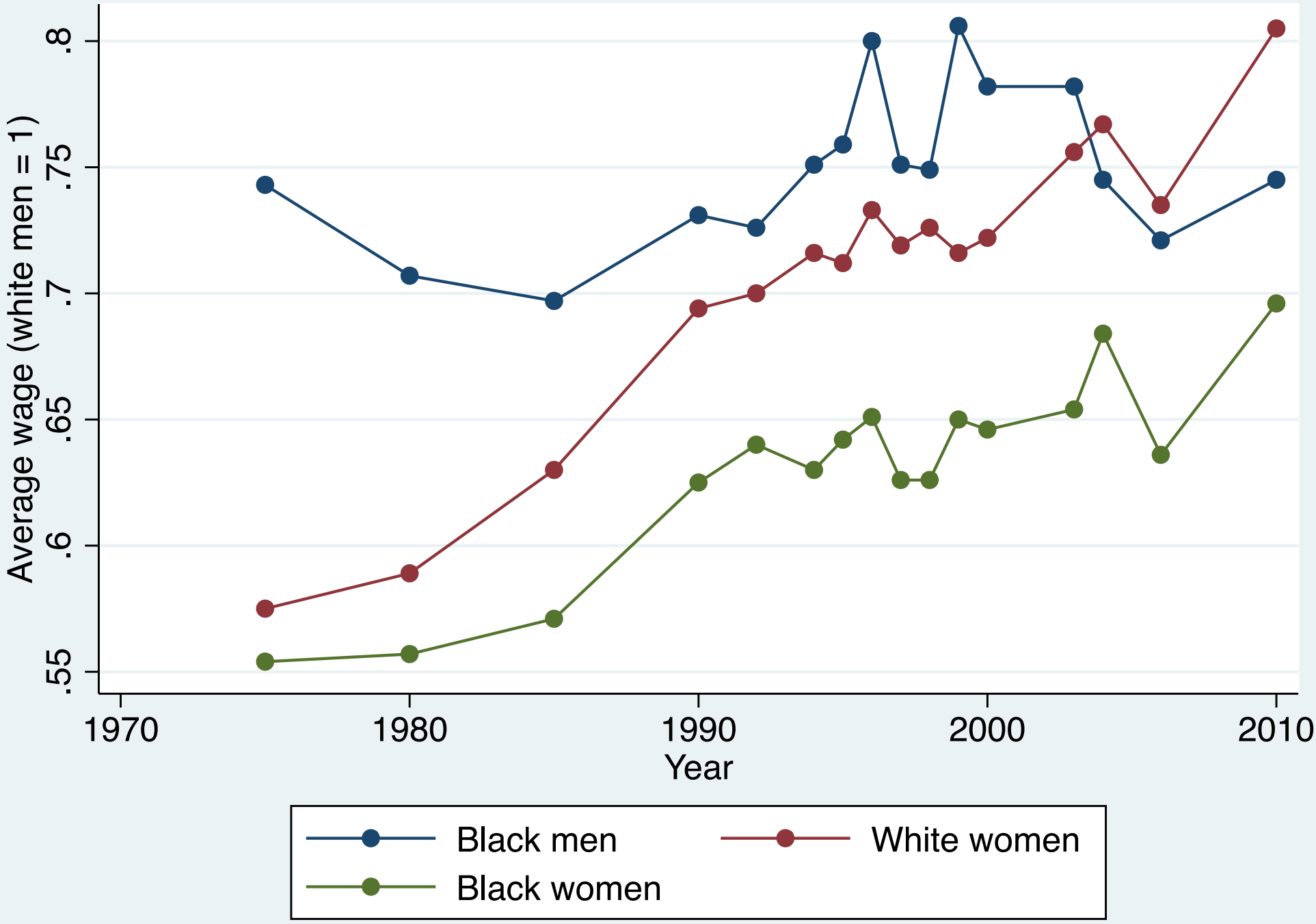


Fig. 2. Relationship between mean log hourly wages and completed education, men aged 40–45 in 1994–1996 Current Population Survey. Mean education by degree category estimated from February 1990 CPS.

a. Hourly Wage Profiles for Men




Average wage (white men = 1)
.55
.6
.65
.7
.75
.8
1970
1980
1990
2000
2010
Year
Black men
White women
Black women

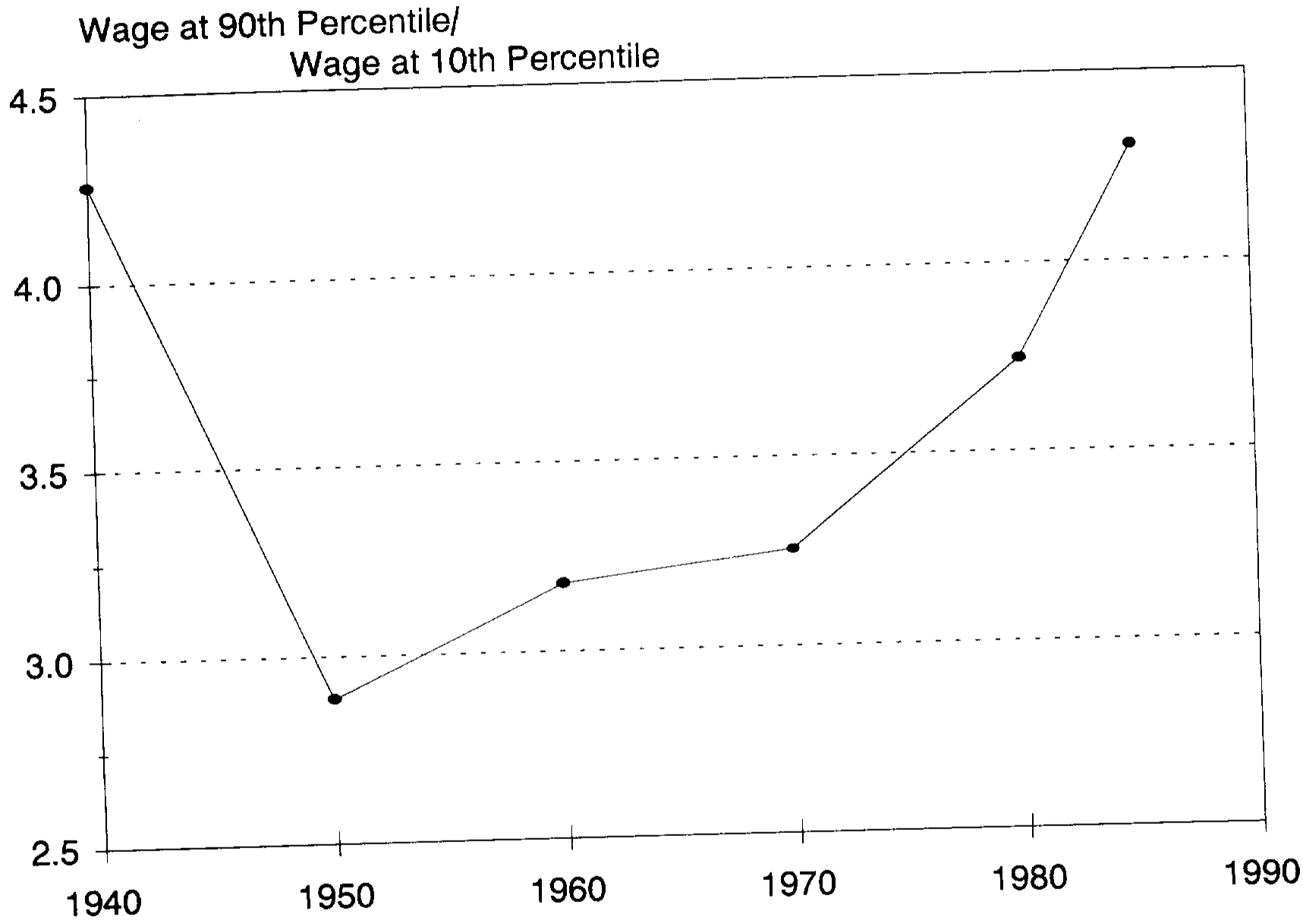
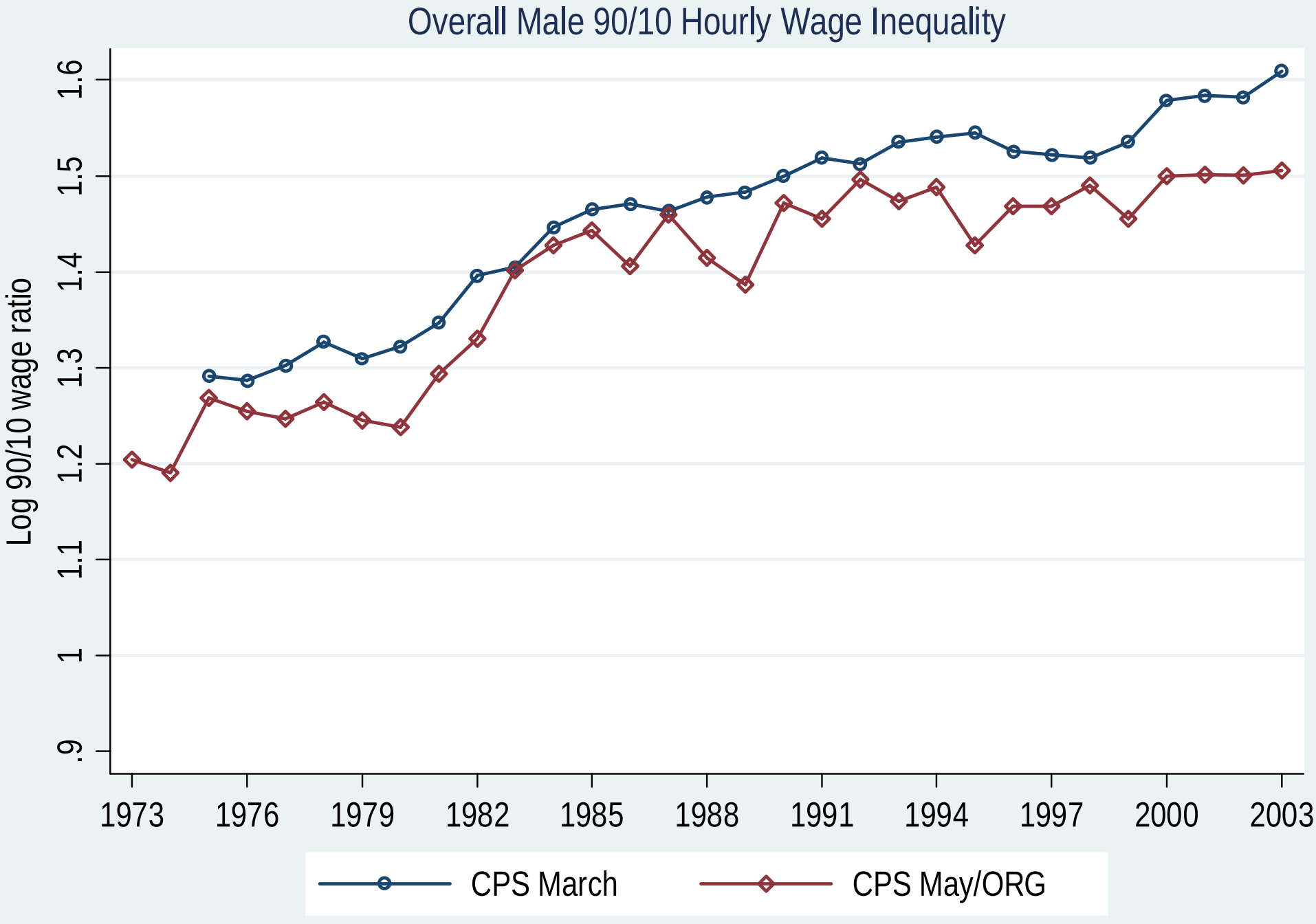
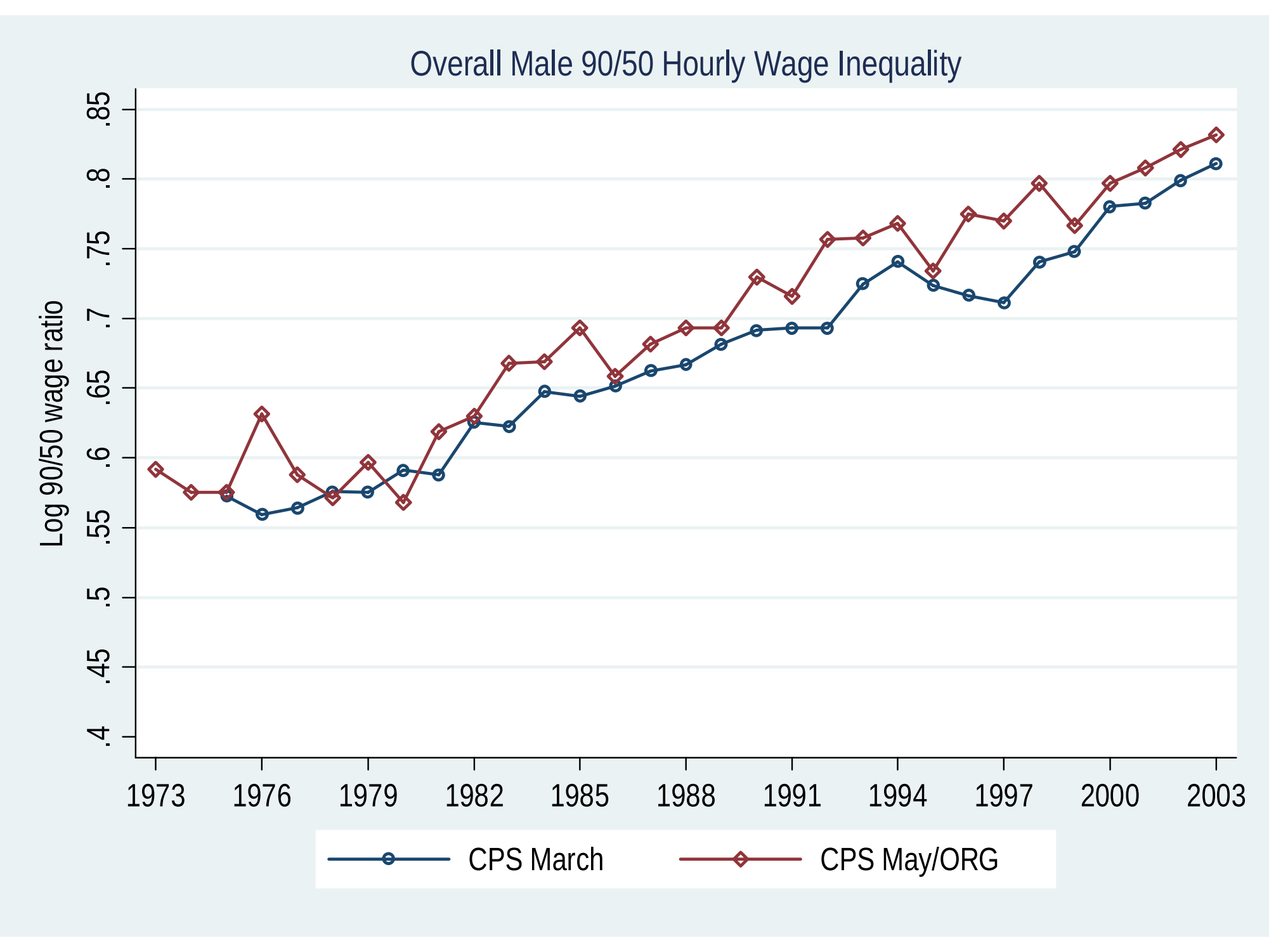
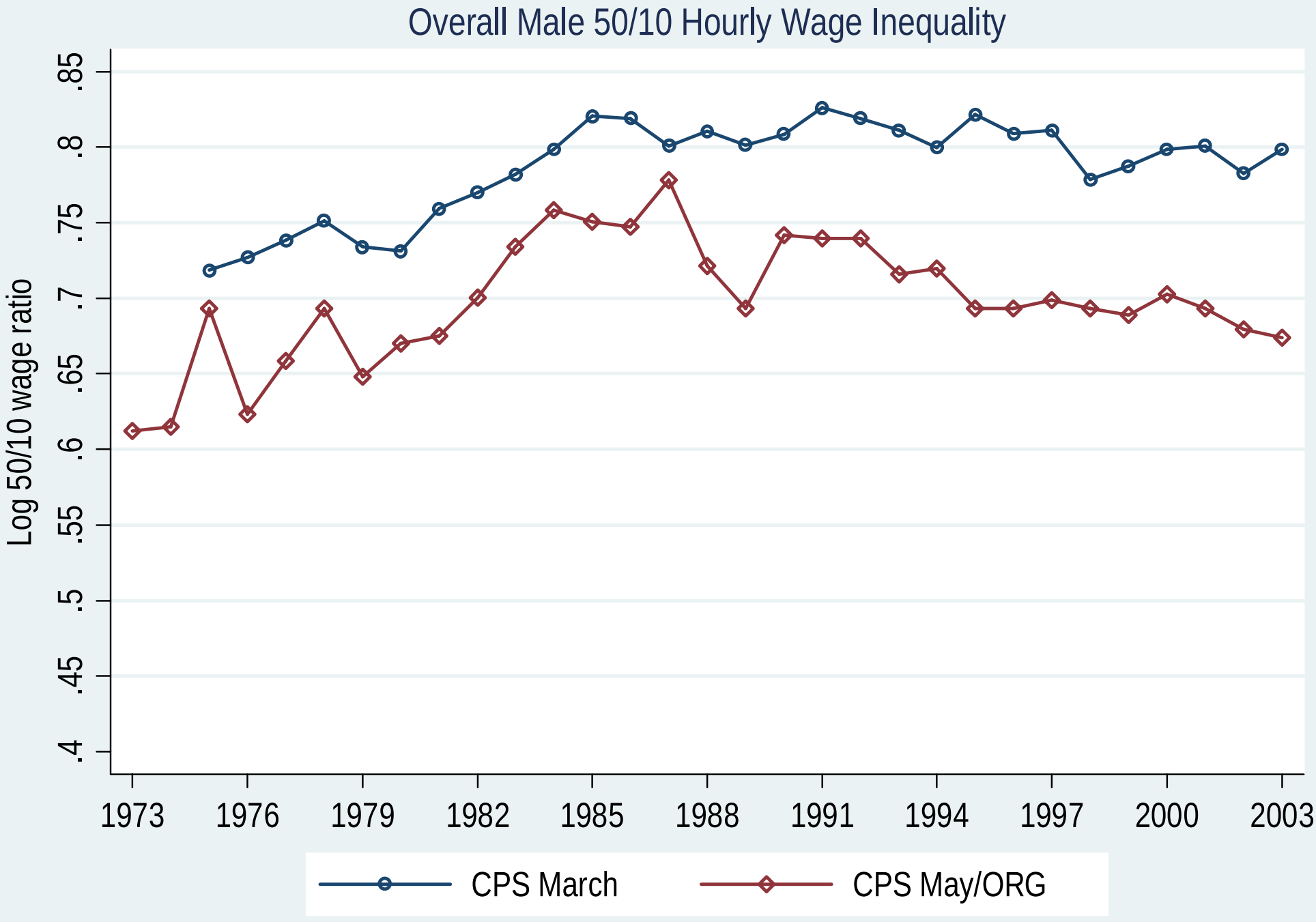


Figure 11: Wage Dispersion across the Past Half Century: The Ratio of the Weekly Wage at the Ninetieth and Tenth Percentiles, 1940 to 1985


Overall Male 90/10 Hourly Wage Inequality
Log 90/10 wage ratio
.9
1
1.1
1.2
1.3
1.4
1.5
1.6
1973
1976
1979
1982
1985
1988
1991
1994
1997
2000
2003
CPS March
CPS May/ORG


Overall Male 90/50 Hourly Wage Inequality
Log 90/50 wage ratio
.4
.45
.5
.55
.6
.65
.7
.75
.8
.85
1973
1976
1979
1982
1985
1988
1991
1994
1997
2000
2003
CPS March
CPS May/ORG


Overall Male 50/10 Hourly Wage Inequality
Log 50/10 wage ratio
.4
.45
.5
.55
.6
.65
.7
.75
.8
.85
1973
1976
1979
1982
1985
1988
1991
1994
1997
2000
2003
CPS March
CPS May/ORG

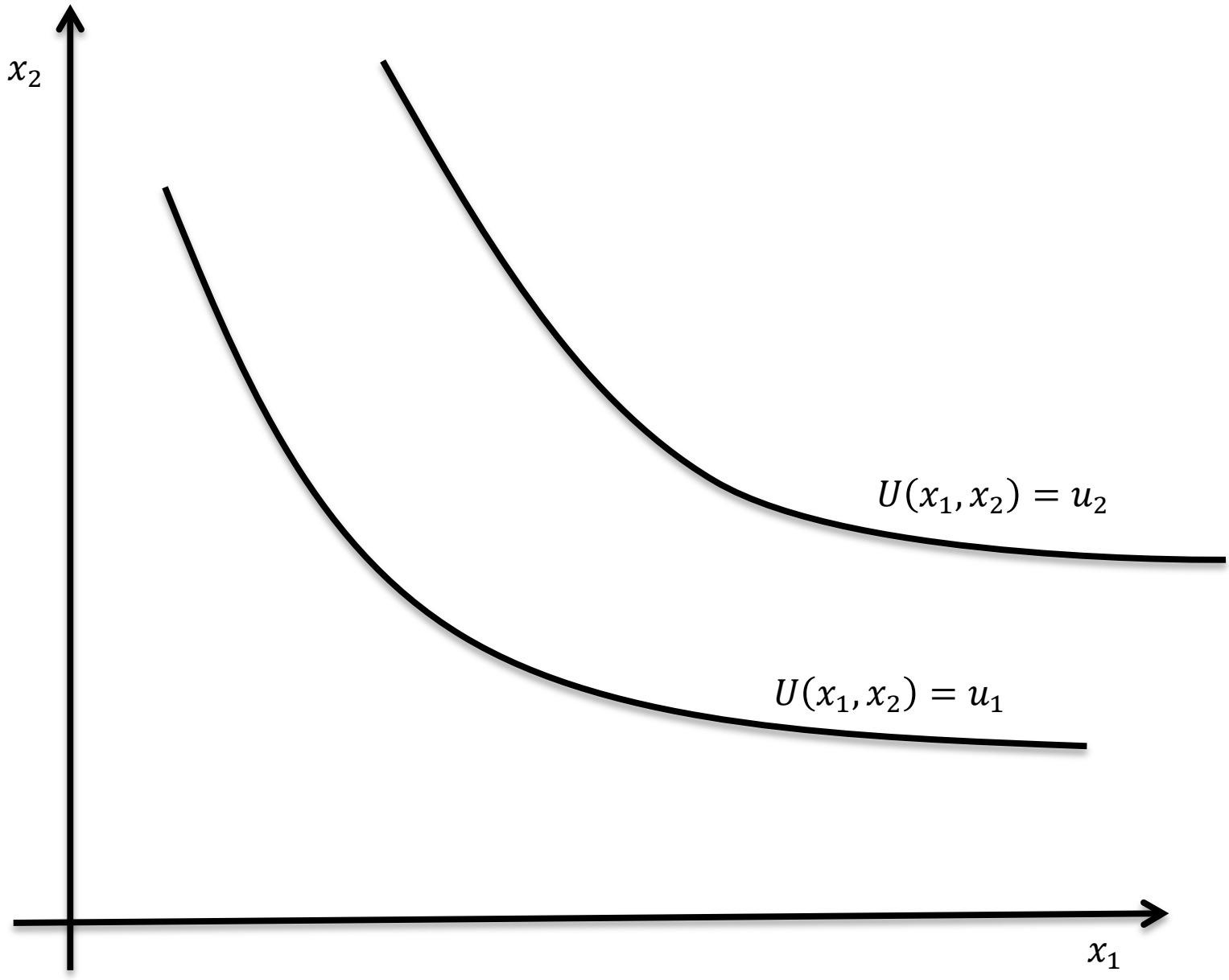
Micro Review

- We will analyze labor supply and demand using tools from microeconomic theory
- Today, we'll briefly review some of these tools

Consumer Theory: The Utility Function

- Consider a consumer choosing quantities of two goods, x_1 and x_2
- The **utility function**, $U(x_1, x_2)$, is the basis for our theory of consumer choice
- The utility function tells us how "happy" the consumer will be given a particular amount of the two goods
- The utility function is represented graphically with a set of **indifference curves**
- An indifference curve is a set of points that all yield the same utility:

$$U(x_1, x_2) = \bar{u}$$


x_2
$U(x_1, x_2) = u_2$
$U(x_1, x_2) = u_1$
x_1

Indifference Curves

- Indifference curves have four key properties:
  1. Indifference curves are downward sloping
  2. Higher indifference curves indicate higher utility
  3. Indifference curves do not intersect
  4. Indifference curves are convex to the origin
- These properties come from assumptions about the shape of the utility function

Marginal Utilities

- The **marginal utility** of good 1, $MU1$, is the utility gained by consuming one more unit of this good
- Mathematically, MU_1 is the partial derivative of $U(x_1, x_2)$ with respect to x_1:

$$MU_1 = \frac{\partial U}{\partial x_1}$$

- We assume that marginal utilities are positive, but decreasing. This is known as **diminishing marginal utility**
- This assumption gives rise to the key properties of indifference curves

The Marginal Rate of Substitution

- The **marginal rate of substitution**, MRS_{12}, is the ratio of marginal utilities for goods 1 and 2:

$$MRS_{12} = \frac{MU_1}{MU_2}$$

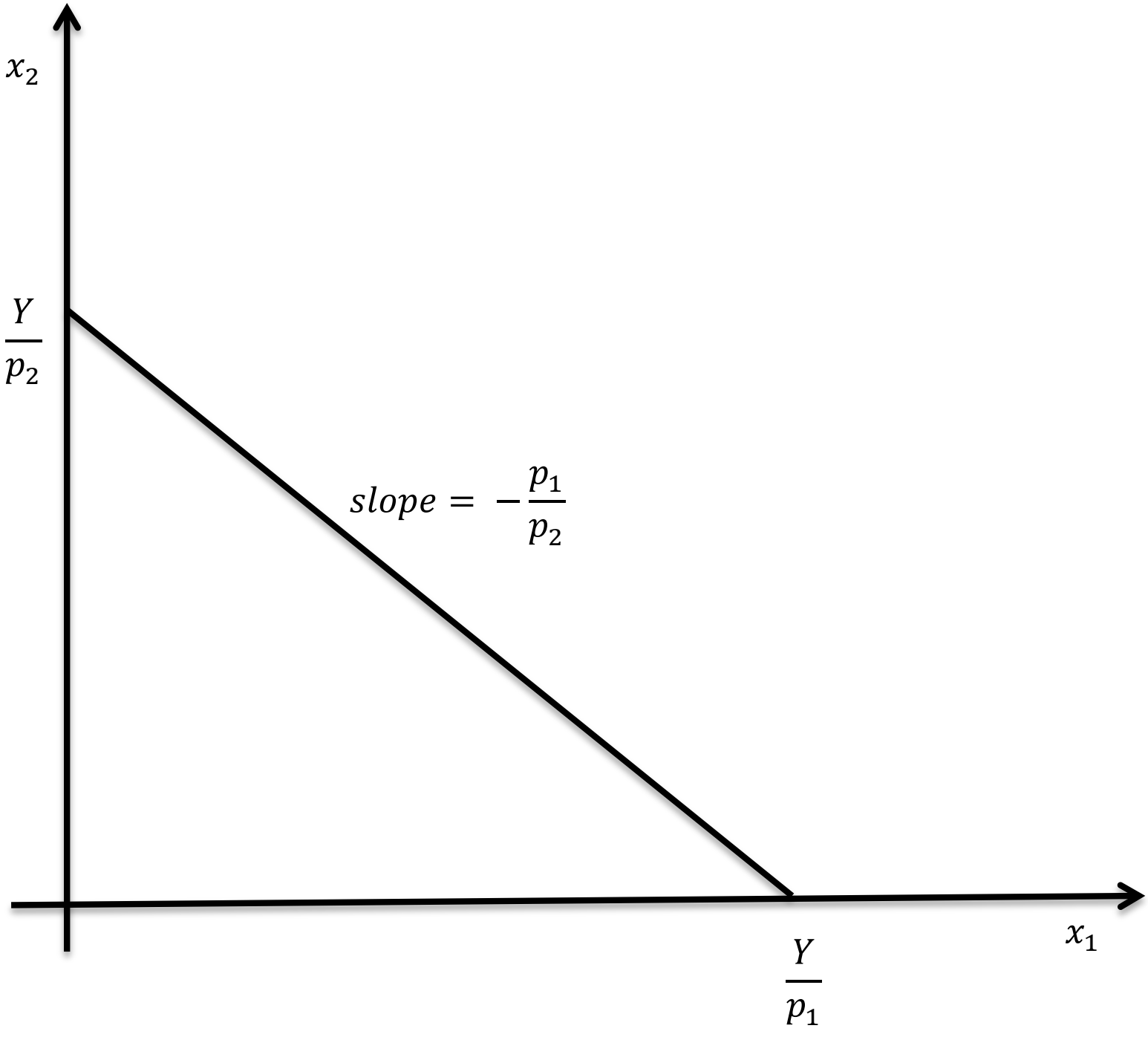
- The MRS_{12} is the amount of good 2 the consumer would be willing to give up to get another unit of good 1
- The slope of an indifference curve is equal to $-MRS_{12}$
- Convexity to the origin means a diminishing marginal rate of substitution
- If the consumer has more x_2, s/he is willing to give up more of it to get another x_1

The Budget Constraint

- The consumer wants to maximize utility, but faces a **budget constraint**
- The budget constraint says that the consumer cannot spend more than her income, Y:

$$p_1 x_1 + p_2 x_2 \leq Y$$

- The budget constraint is represented graphically as a line with intercept Y/p_2 and slope $-p_1/p_2$


x_2
$\frac{Y}{p_2}$
$slope = -\frac{p_1}{p_2}$
x_1
$\frac{Y}{p_1}$

The Utility Maximization Problem

- Putting the utility function and budget constraint together, the consumer's utility maximization problem can be written:

$$\max_{x_1, x_2} U(x_1, x_2)$$

$$\text{s.t.}$$

$$p_1 x_1 + p_2 x_2 \leq Y$$

- We can solve this mathematically, or graphically

Lagrangean

- To solve the utility maximization problem mathematically, write down a Lagrangean, with multiplier λ:

$$\mathcal{L} = U(x_1, x_2) + \lambda (Y - p_1 x_1 - p_2 x_2)$$

- At an interior solution, partial derivatives of $\mathcal{L}$ with respect to x_1, x_2, and λ are zero:

$$\begin{aligned} MU_1 &= \lambda p_1 \\ MU_2 &= \lambda p_2 \\ Y &= p_1 x_1 + p_2 x_2 \end{aligned}$$

Solution

- At the consumer's optimal choice, we must have

$$\frac{MU_1}{MU_2} = \frac{p_1}{p_2}$$

- In other words:

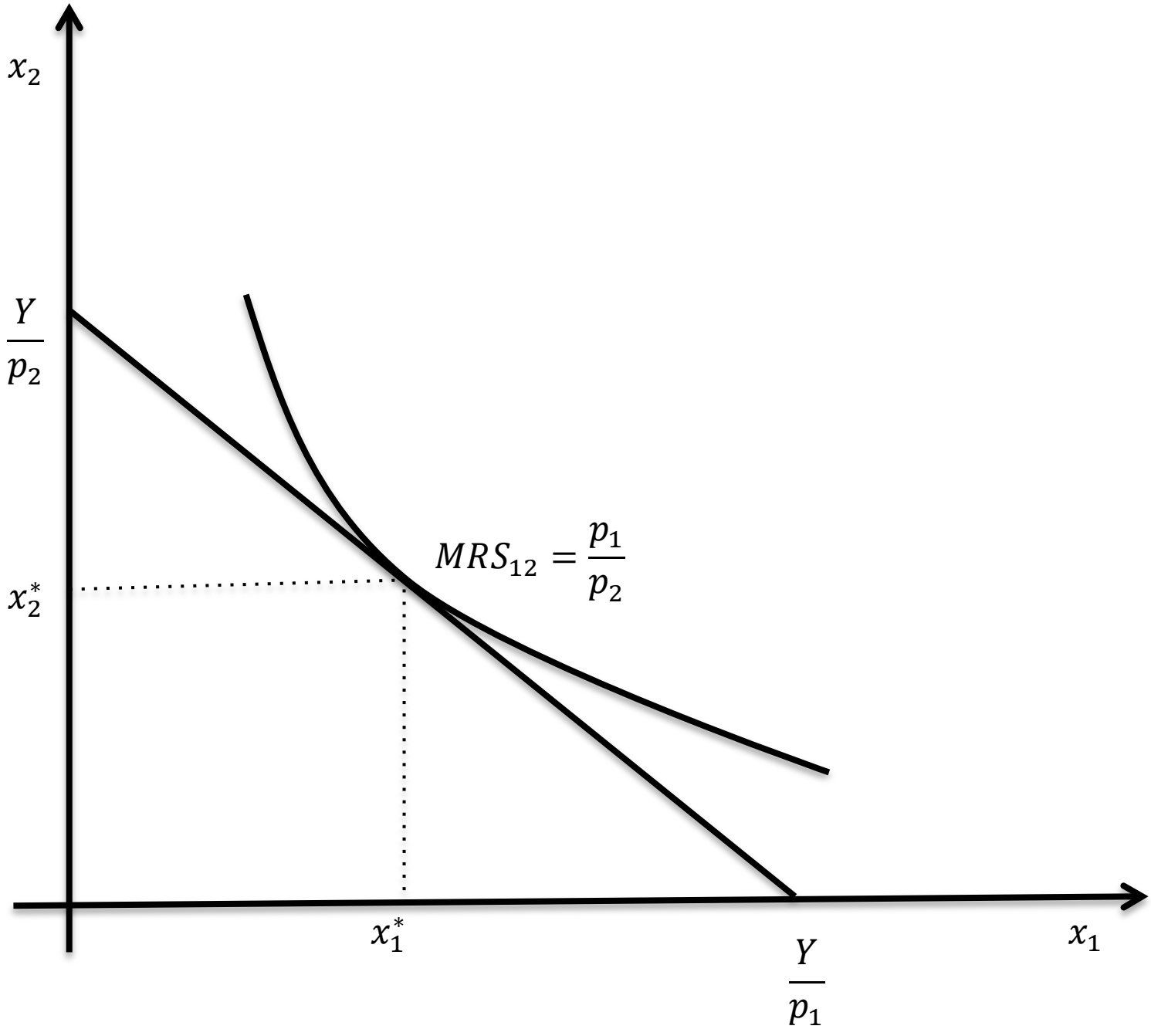
$$MRS_{12} = \frac{p_1}{p_2}$$

- MRS_{12} is the consumer's valuation of x_1 in terms of x_2, while p_1/p_2 is the market price of x_1 in terms of x_2
- How do we represent this condition graphically?

Solution

$$MRS_{12} = \frac{p_1}{p_2}$$

- $-MRS_{12}$ is the slope of an indifference curve, while $-p_1/p_2$ is the slope of the budget line
- The consumer's optimal choice occurs where the indifference curve is tangent to the budget line

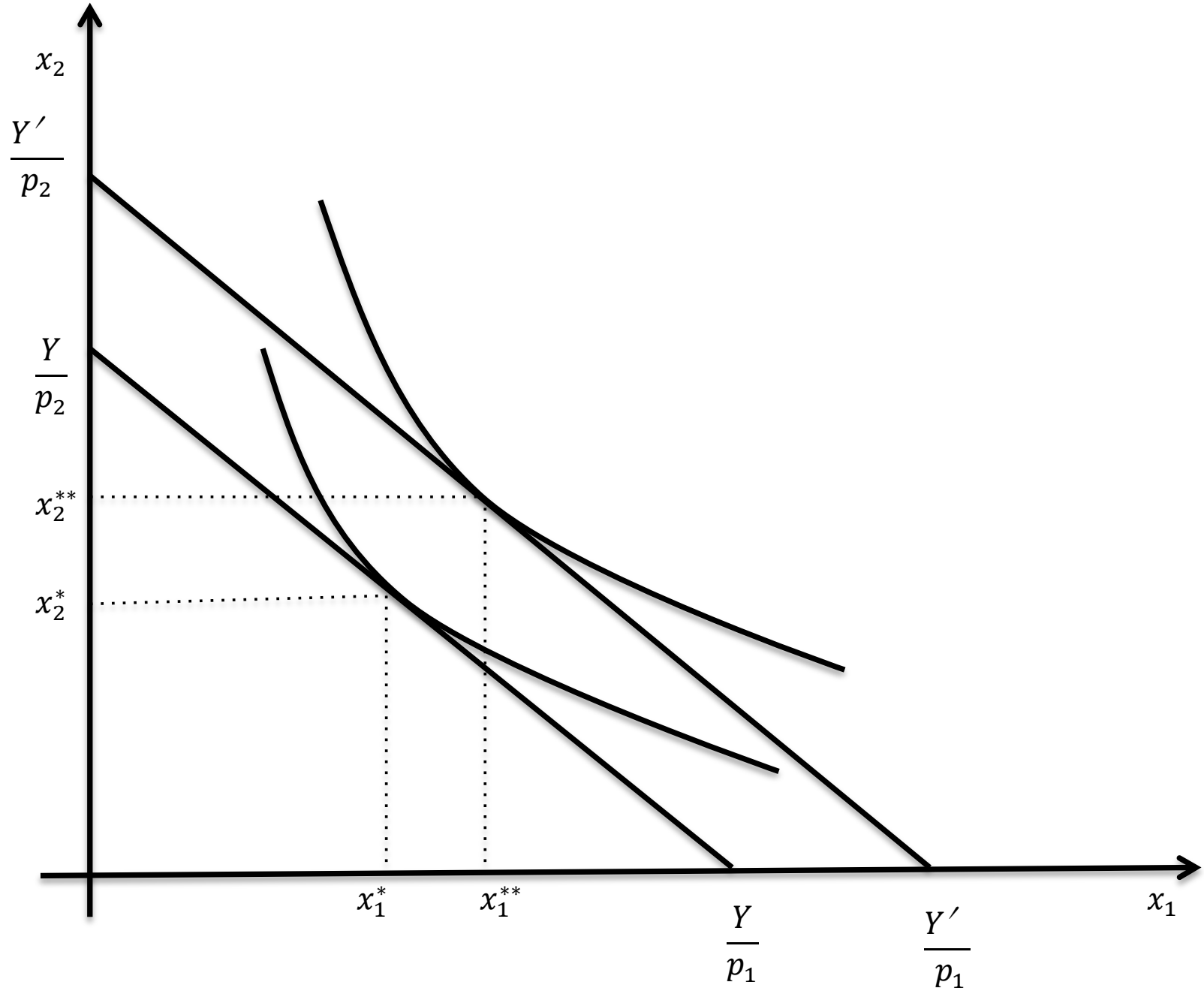

x_2
$\frac{Y}{p_2}$
x_2^*
$MRS_{12} = \frac{p_1}{p_2}$
x_1^*
$\frac{Y}{p_1}$
x_1

Comparative Statics

- We can use this framework to ask how changes in the consumer's opportunity set affect choices of x_1 and x_2
- For example:
  1. An increase in Y
  2. An increase in p_1
- Such exercises are called **comparative statics**

Changes in Income

- An increase in Y induces a parallel shift in the budget line
- The effects on consumption of x_1 and x_2 depend on whether they are normal or inferior
- **Normal goods** are goods for which consumption increases when income increases
- **Inferior goods** are goods for which consumption decreases when income increases
- In most cases we'll assume goods are normal

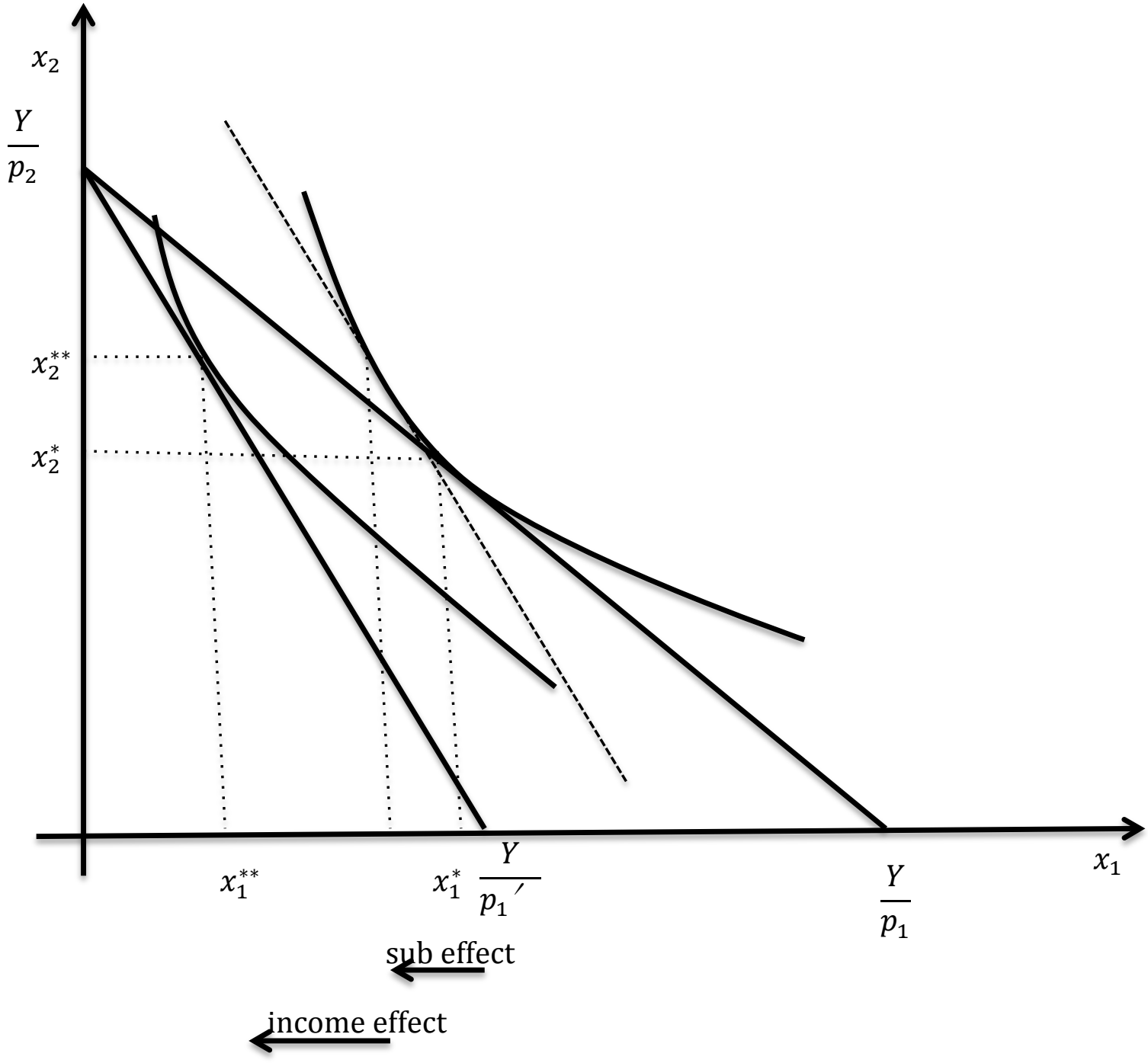

x_2
$\frac{Y'}{p_2}$
$\frac{Y}{p_2}$
x_2^{**}
x_2^{*}
x_1^{*}
x_1^{**}
$\frac{Y}{p_1}$
$\frac{Y'}{p_1}$
x_1

Changes in Prices

- An increase in p_1 induces a rotation of the budget line
- We can break the response to this change into two parts:
  1. **Income effect:** The consumer is now effectively poorer – her real income has fallen
  2. **Substitution effect:** x_1 is now more expensive in units of x_2
- For normal goods, the income effect reduces consumption of both
- The substitution effect reduces consumption of x_1 and increases x_2
- Income and substitution effects go in the same direction for x_1 – consumption falls
- The two effects offset for x_2 – consumption may go up or down

Income and Substitution Effects

- Graphically, represent the substitution effect with a line parallel to the *new* budget line, tangent to the *old* indifference curve
- Then represent the income effect as a parallel shift to the new budget line


x_2
$\frac{Y}{p_2}$
x_2^{**}
x_2^*
x_1^{**}
x_1^*
$\frac{Y}{p_1'}$
$\frac{Y}{p_1}$
x_1
sub effect
income effect

Labor Supply

- Next lecture, we'll apply these tools to the analysis of labor supply