ME2720 Macroeconomics for Business

Lecture 5

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Outline

1. A Quick Look at the Labor Market
2. A Simplistic Labor Market Model
3. The Natural Rate of Unemployment
4. Lowering Unemployment
5. A Quick Look at the Data
6. Assignments
   - Assumptions
   - Missing values
7. Students' presentations

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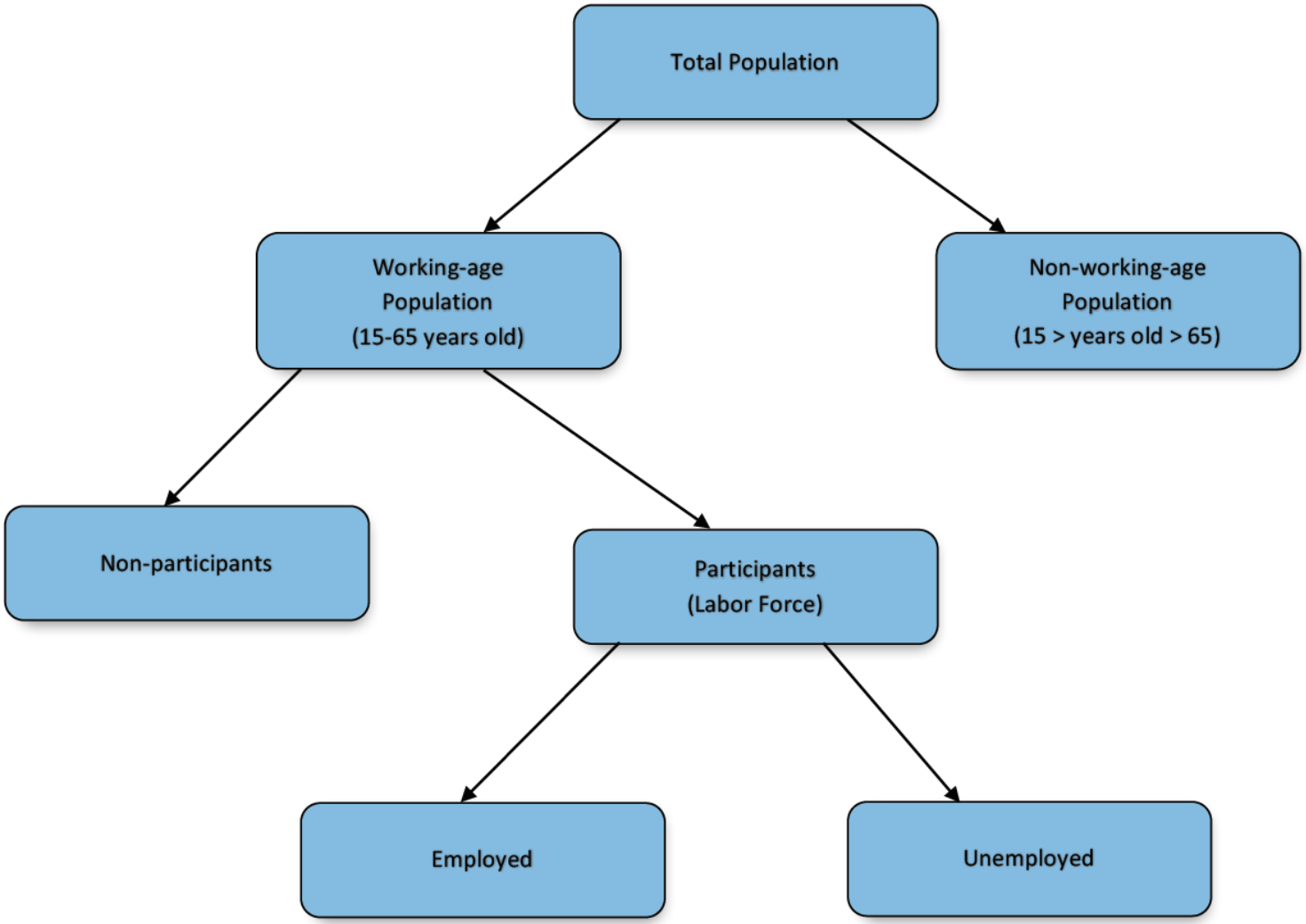
A Quick Look at the Labor Market

- Labor force as a key determinant of output



Some Useful Ratios

- **Participation rate**

$$\text{Participation rate} = \frac{\text{Labor force}}{\text{Working-age population}}$$

- **Unemployment rate**

$$\text{Unemployment rate} = \frac{\text{Unemployed}}{\text{Labor force}}$$

- **Employment rate**

$$\text{Employment rate} = \frac{\text{Employed}}{\text{Labor force}}$$

- Most-reliable measures obtained from survey data
- Equivalence of definitions and methods is key for cross-country comparisons

The Importance of the Two Ratios

$$\text{GDP pc} = \frac{GDP}{Population}$$

$$= \underbrace{\frac{\text{GDP}}{\text{Hours}}}_{\text{Labor Productivity}} \times \underbrace{\frac{\text{Hours}}{\#\text{ Employed}}}_{\text{Avg. Hours Worked}} \times \underbrace{\frac{\#\text{ Employed}}{\text{Labor Force}}}_{\text{Employment Rate}} \times \underbrace{\frac{\text{Labor Force}}{\text{Population}}}_{\text{Participation Rate}}$$

The US Labor Market, October 2017

Data from the Bureau of Labor Statistics

- **Participation rate**

$$\text{Participation rate} = \frac{160,381,000}{255,766,000} = 62.7\%$$

- **Unemployment rate**

$$\text{Unemployment rate} = \frac{6,520,000}{160,381,000} = 4.07\%$$

- **Employment rate**

$$\text{Employment rate} = \frac{153,861,000}{160,381,000} = 95.93\%$$

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A Simplistic Labor Market Model I

- Recall: $Y = f(A, K, L)$

Marginal product of labor

The marginal product of labor (MPL) is the amount of extra output Y that one additional worker can produce keeping other factors of production (K, A) fixed.

- Most models assume decreasing MPL
- Key role of MPL in firms' decision to hire employees
- You can think of the MPL curve as the "labor demand" (LD) curve
- Extra revenue (ER) by hiring 1 additional worker

$$ER = P \times MPL$$

A Simplistic Labor Market Model II

- Extra cost of hiring 1 additional worker: $EC = W$
- Profitable to hire that (additional) worker?

$$P \times MPL > W \quad \Leftrightarrow \quad MPL > \frac{W}{P}$$

- Real wage, W/P: relative to the price of output
- Firms' profit-maximizing behavior

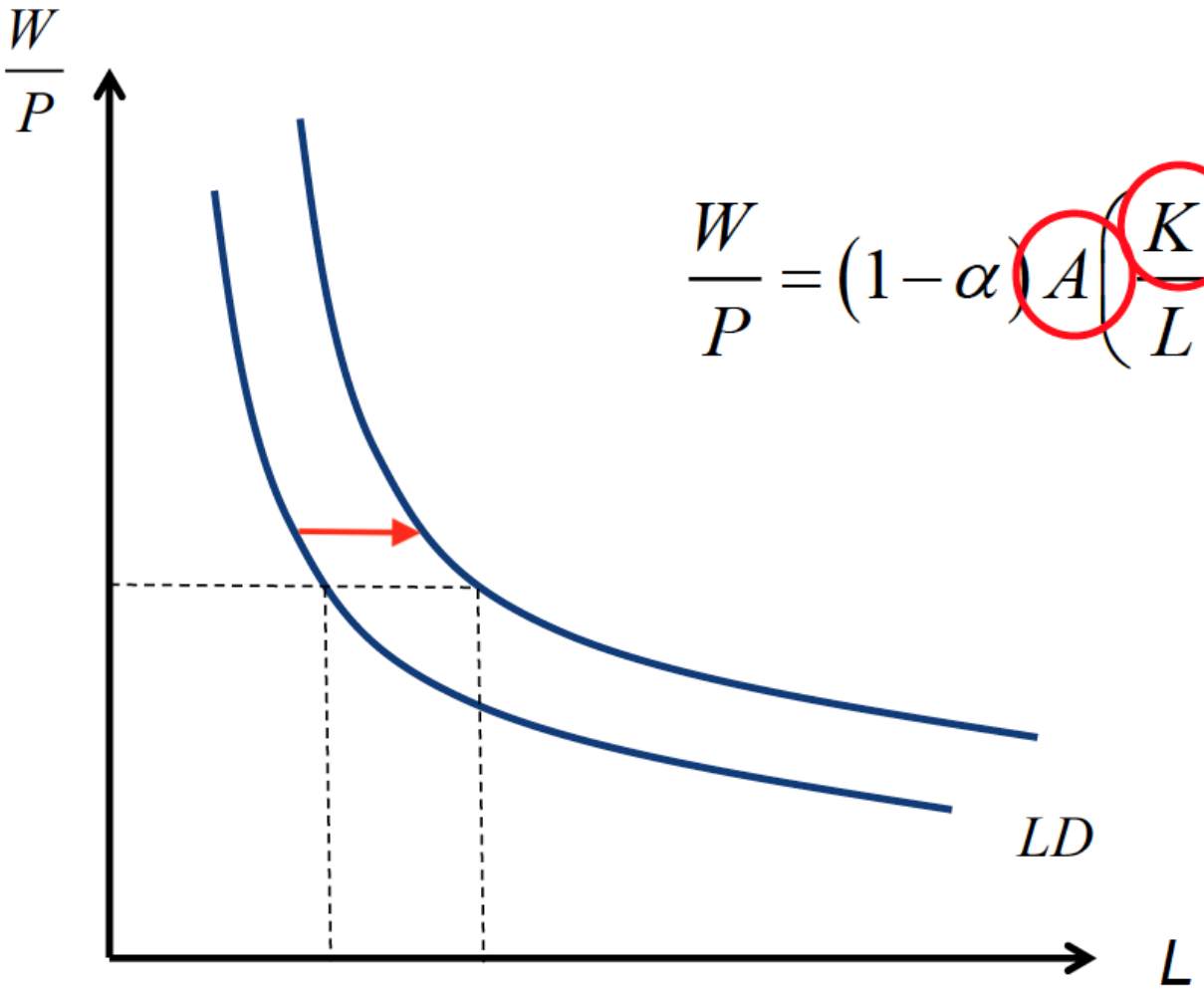
$$MPL = \frac{W}{P}$$

- Assuming a Cobb-Douglas production function

$$\frac{W}{P} = (1-\alpha)A\left(\frac{K}{L}\right)^{\alpha}, \quad \alpha \in (0,1)$$

A Simplistic Labor Market Model III

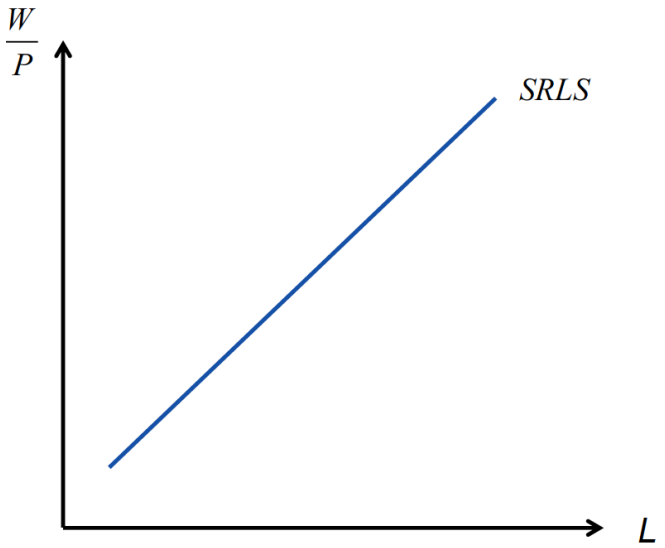
- Increases in either A or K shifts the *MPL* (LD) curve outwards



$$\frac{W}{P} = (1-\alpha) A \left(\frac{K}{L}\right)^{\alpha}, \quad \alpha \in (0,1)$$

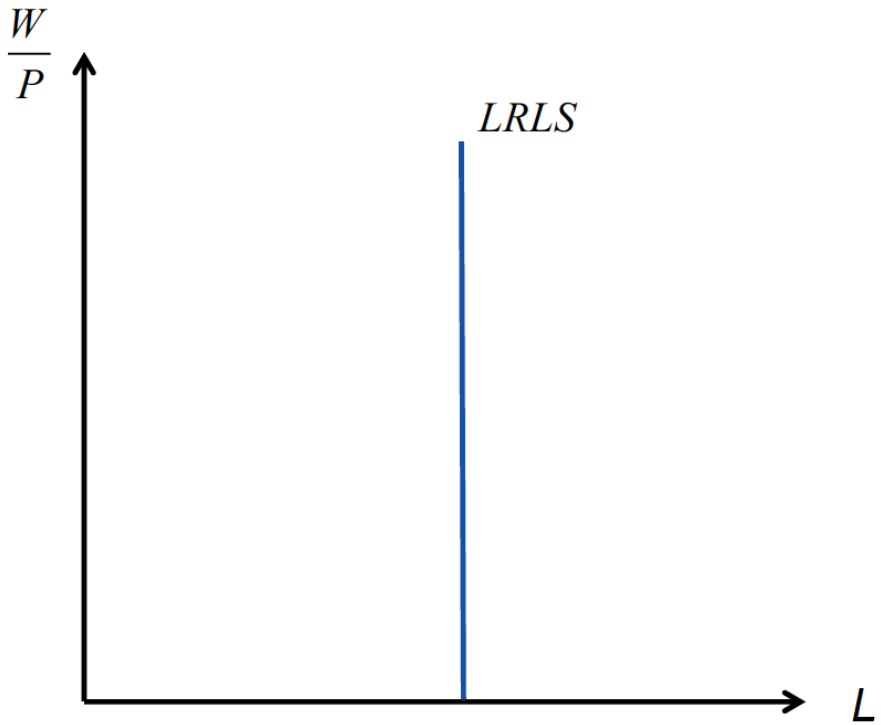
A Simplistic Labor Market Model IV

- Two effects of a higher real wage on SRLS
  1. Substitution effect $\Rightarrow$ work more
  2. Income effect $\Rightarrow$ work less
- What happens to SRLS depends on the relative strength of substitution- and income- effects!
- Data suggest that substitution effect dominates in the short-run



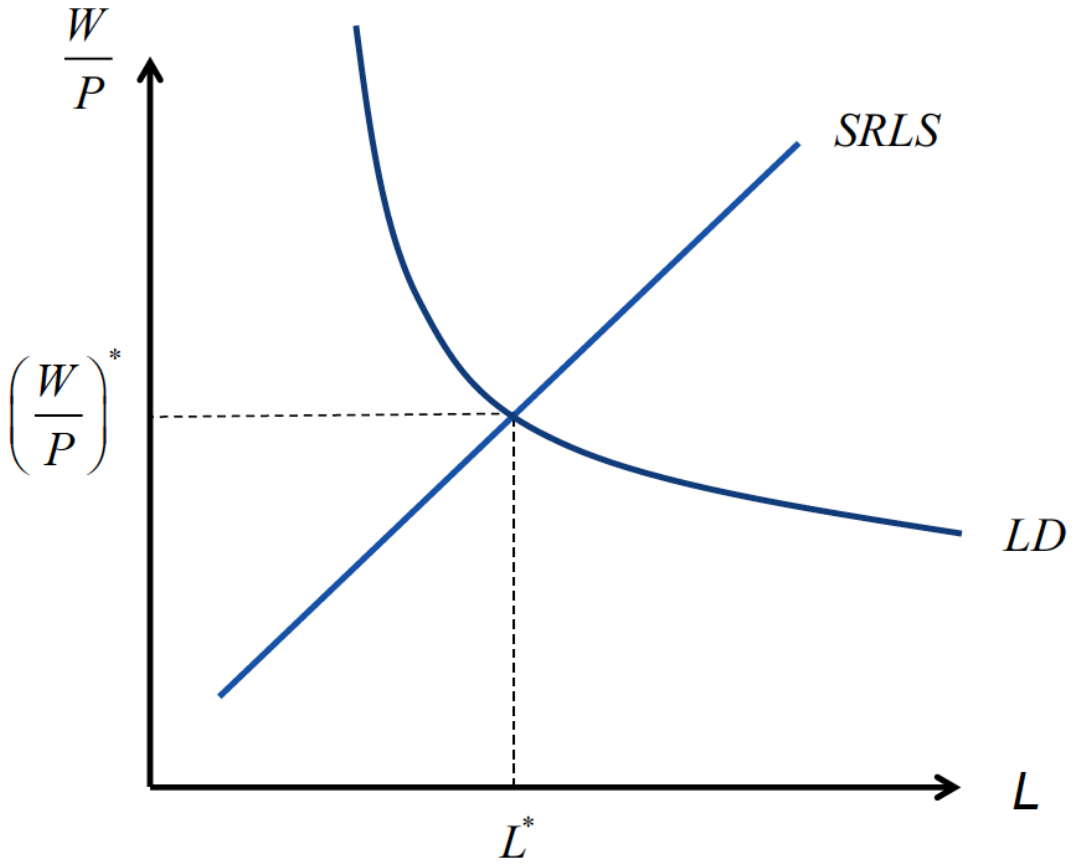
A Simplistic Labor Market Model V

- In the long-run the data shows:
  - ⋆ No trend in unemployment
  - ⋆ Higher real wages
  - ⋆ Vertical LRLS



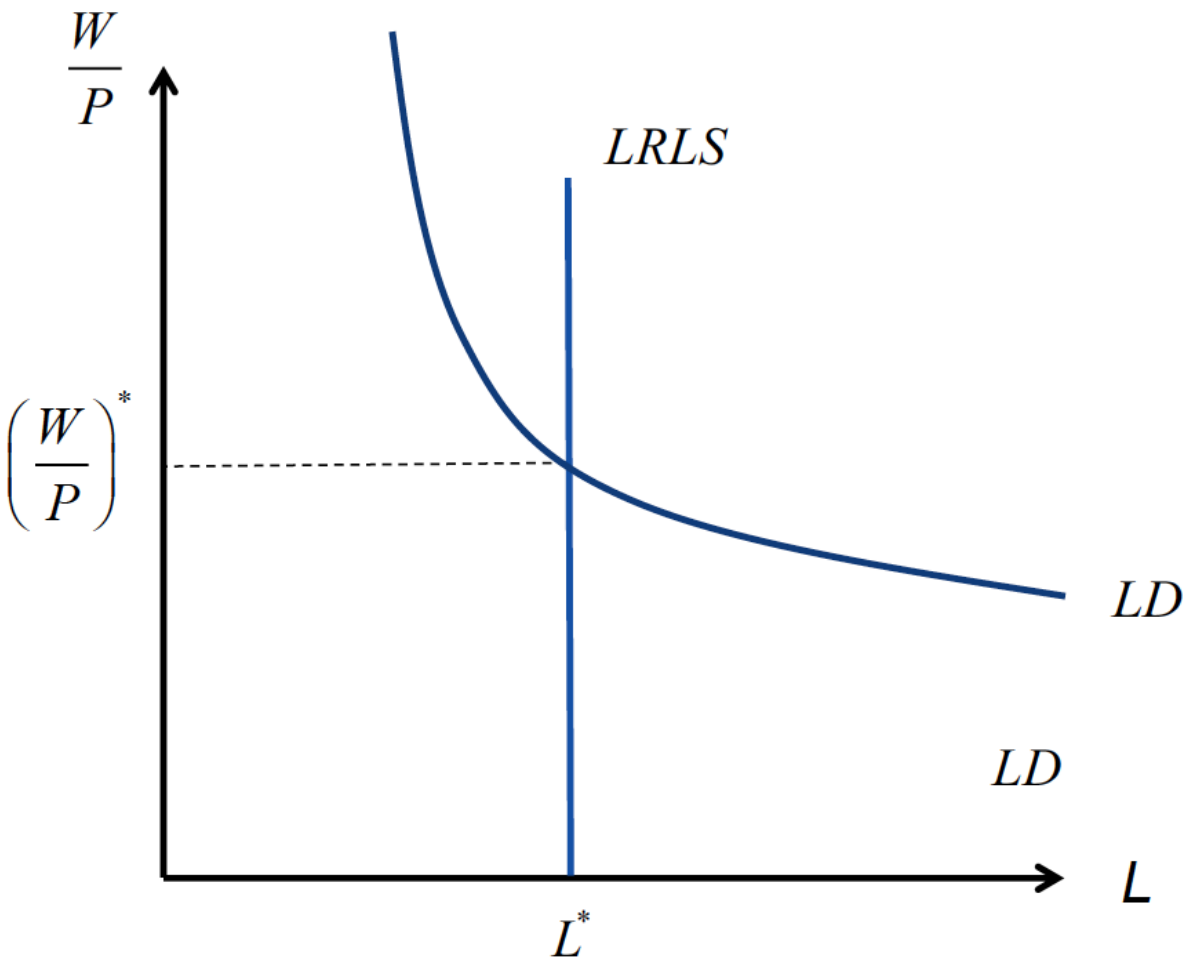
A Simplistic Labor Market Model VI

- Two equilibria:
  1. Short-run equilibrium



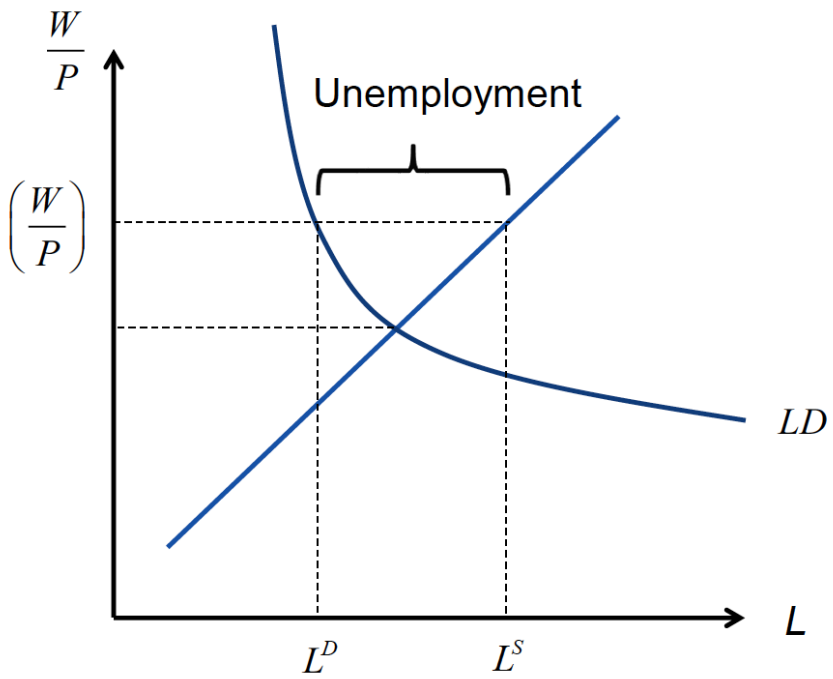
A Simplistic Labor Market Model VII

2. Long-run equilibrium



A Simplistic Labor Market Model VIII

- So, 2 types of unemployment:
  1. Short-run unemployment varies with the BC
  2. Long-run unemployment, i.e. **natural rate of unemployment**
     - ⋆ "Average" unemployment over the BC
     - ⋆ Not dependent on the BC



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The Natural Rate of Unemployment I

- Long-run unemployment theories emphasize:
  - ⋆ Minimum wages
  - ⋆ Efficiency wages
  - ⋆ Contracts
  - ⋆ Insider-outsider models
  - ⋆ Search and matching models
- Variations in natural rate of unemployment reflect structural differences and different government policies
- A cool, important concept the book forgets to mention:

NAIRU

The non-accelerating inflation rate of unemployment (NAIRU), also referred to as the long-run Phillips curve, is the unemployment consistent with maintaining stable inflation.

The Natural Rate of Unemployment II

- A model in which both firms and workers have monopoly power
- The more monopoly power either party has, the higher the natural rate of unemployment will be
- Firms' price-setting behavior: price larger than MC

$$P = \left(1 + \frac{x}{100}\right) W \quad \Leftrightarrow \quad \frac{W}{P} = \frac{1}{1 + x/100}, \quad x > 0$$

- Workers' wage-setting behavior through labor unions:

$$\frac{W}{P} = A - bu, \quad A, b > 0$$

- Higher unemployment (u) implies lower wage demands as it is both more likely and more costly to become unemployed

The Natural Rate of Unemployment III

- Equilibrium where firms' price-setting behavior equals unions' wage-setting behavior:

$$\frac{1}{1 + x/100} = A - bu^*$$

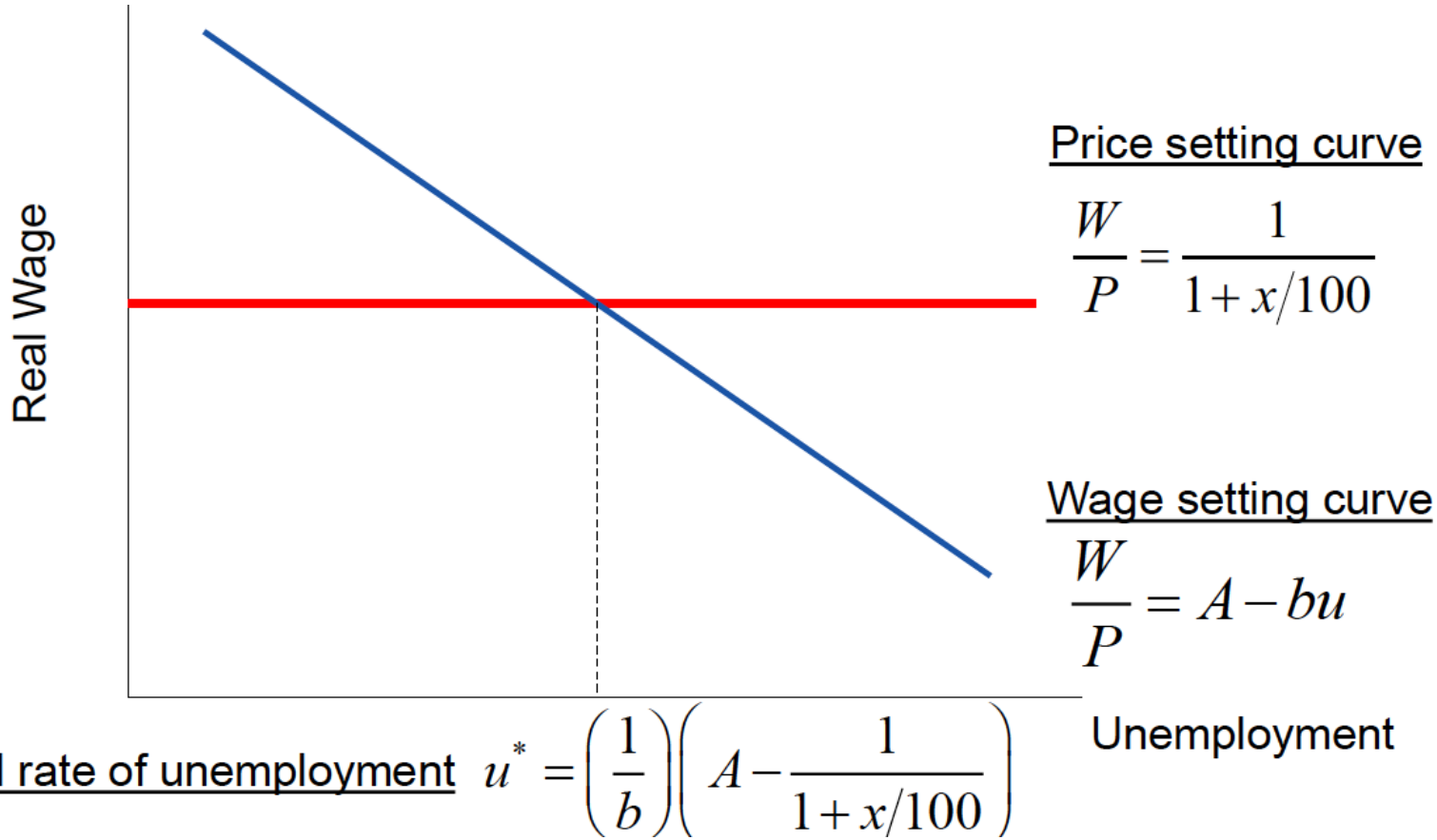
- Solving for u^*:

$$u^* = \left(\frac{1}{b}\right)\left(A - \frac{1}{1 + x/100}\right)$$

- Natural rate depends on
  - ⋆ Firms' market power, x
  - ⋆ Trade unions' strength, A
  - ⋆ Sensitivity of wage demands, b

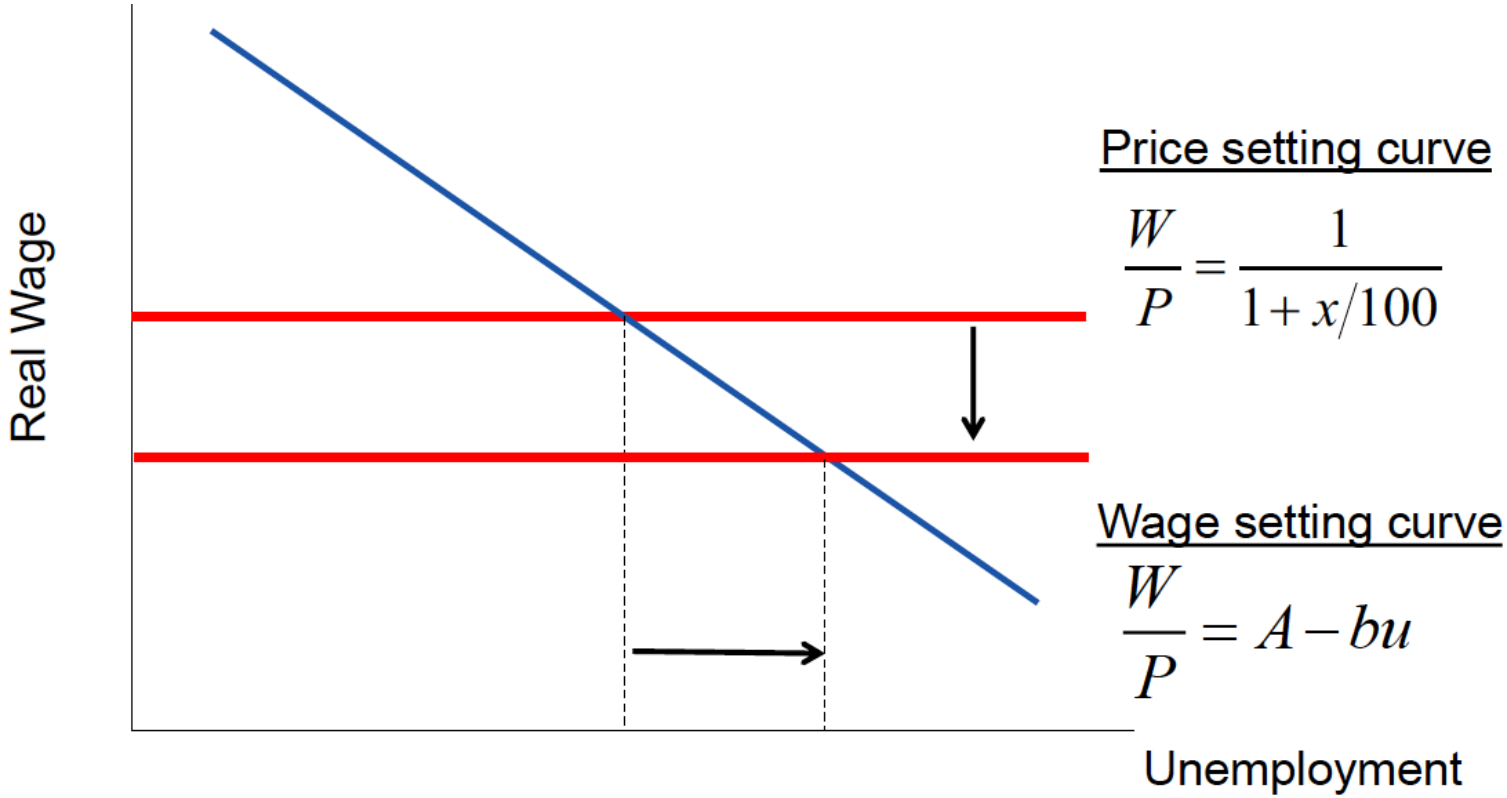
The Natural Rate of Unemployment IV

- Graphically:



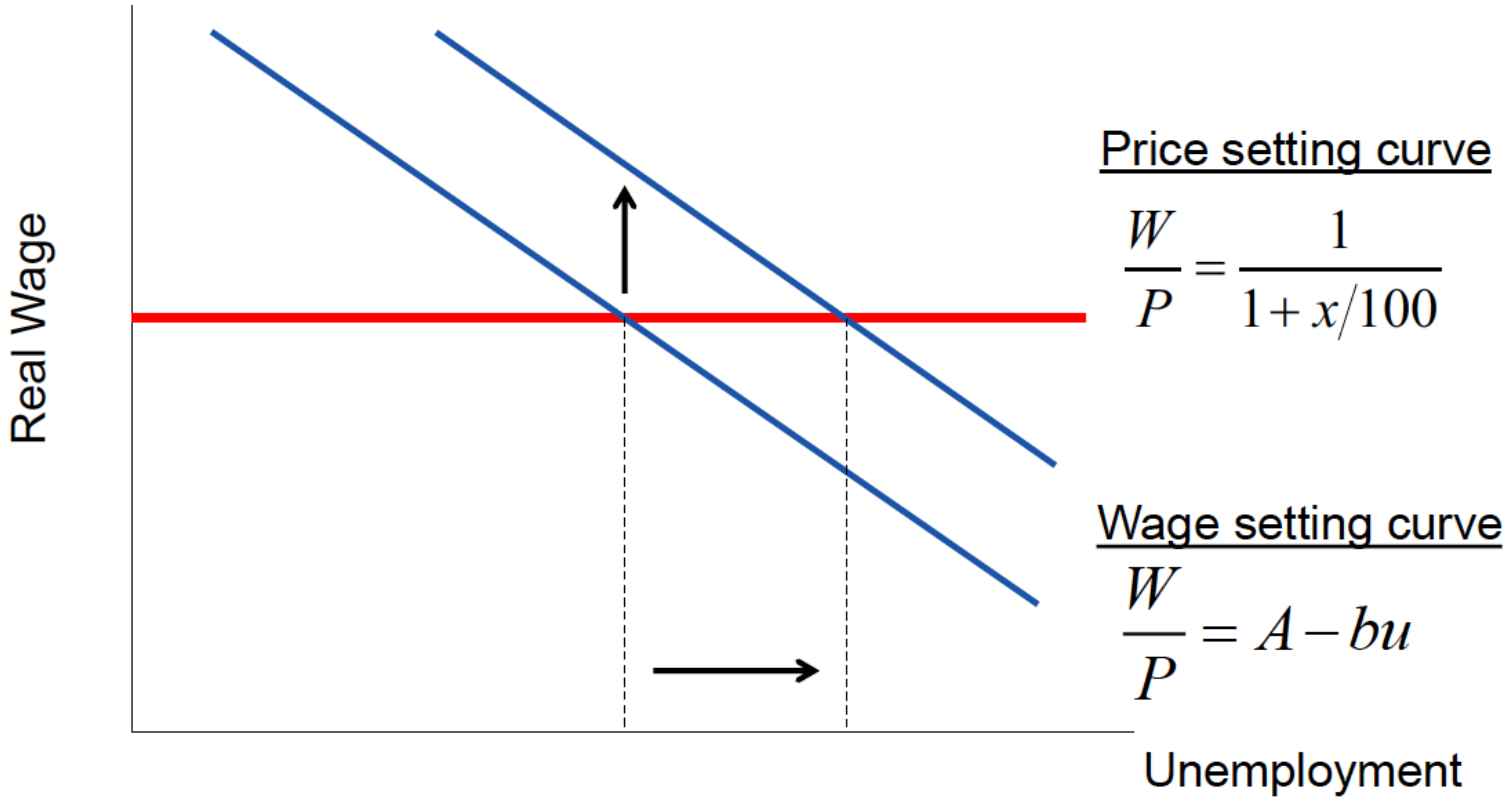
The Natural Rate of Unemployment V

- More (*firm*) monopoly power associated with higher mark-ups (x) and, thus, lower real wages and higher unemployment



The Natural Rate of Unemployment VI

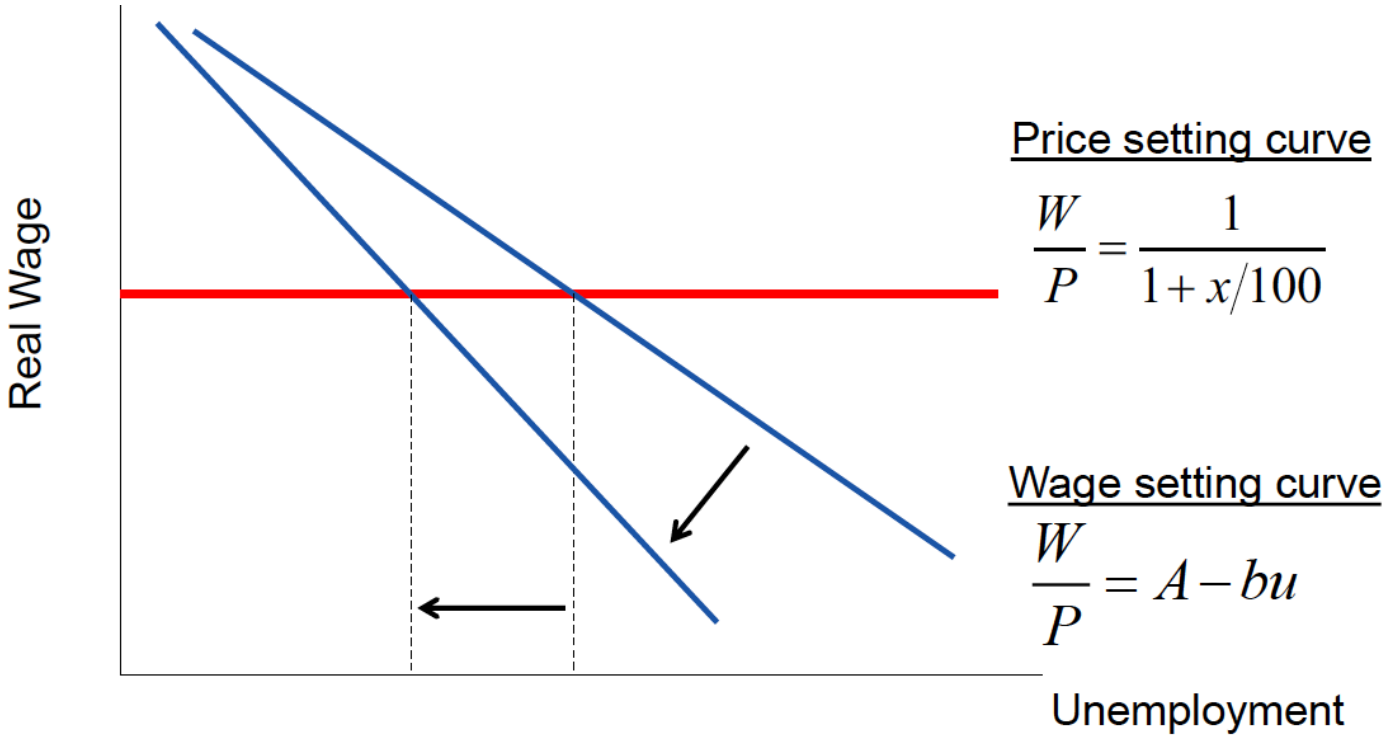
- More (*workers*) monopoly power associated with stronger trade unions (A), which demand higher wages. This leads to higher unemployment.



The Natural Rate of Unemployment VII

- The more sensitive (b) wage demands are to unemployment, the stepper the wage-setting curve, and the lower unemployment!

$$u = \frac{A - W/P}{b}, \quad b > 0$$



The Natural Rate of Unemployment VIII

Conclusions

To understand the natural rate of unemployment:

- Firms' market power
- Workers' market power:
  - ⋆ Extent of union membership
  - ⋆ Unemployment benefits
  - ⋆ Long-term unemployment: > 12 months (OECD)
  - ⋆ Skills mistmatch
  - ⋆ Payroll- and income- taxes

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Lowering Unemployment

- Active labor market spending (specialized job sites, matching, training, loans to entrepreneurs, subsidize job creation,. . .)
- Wage bargaining: centralized vs. decentralized
- Employment protection legislation (EPL)
- Labor market reform: liberalist (US) vs. interventionist (Sweden)
  - ⋆ UK lowered unemployment through market-based approach
  - ⋆ Netherlands lower unemployment through labor market spending

Lowering Unemployment

Employment protection legislation (EPL)

- EPL aims to reduce unemployment by restricting firms' ability to hire workers
- Some people lose their jobs, either voluntarily or involuntarily
- Some people stop being unemployed: exit labor force or find a job
- Thus, **inflows** into and **outflows** from unemployment
- Inflows into unemployment:

$$\text{inflow} = pL$$

  where p is the prob. of losing a job

- Outflows from unemployment:

$$\text{outflow} = sU$$

  where s is the prob. of finding a job

Lowering Unemployment

Employment protection legislation (EPL)

- In equilibrium: inflows = outflows

$$pL = sU$$

- Knowing that $LF = L + U$, we can rearrange,

$$p(LF - U) = sU$$

- Dividing by LF,

$$p\left(\frac{LF}{LF} - \frac{U}{LF}\right) = \frac{sU}{LF} \quad \Leftrightarrow \quad p(1-u) = su$$

- Solving for u

$$u^* = \frac{p}{p+s}$$

Lowering Unemployment

Employment protection legislation (EPL)

- NR of unemployment, u^*, depends positively on p the probability of losing a job, and negatively on s the probability of finding a job
- EPL seeks to lower p...
- ...although it also affects s: firing is costly!
- Overall, *EPL* has offsetting effects on u^*: it lowers job destruction but reduces job creation
- EPL benefits the employed at the cost of the unemployed!

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A Quick Look at the Data I

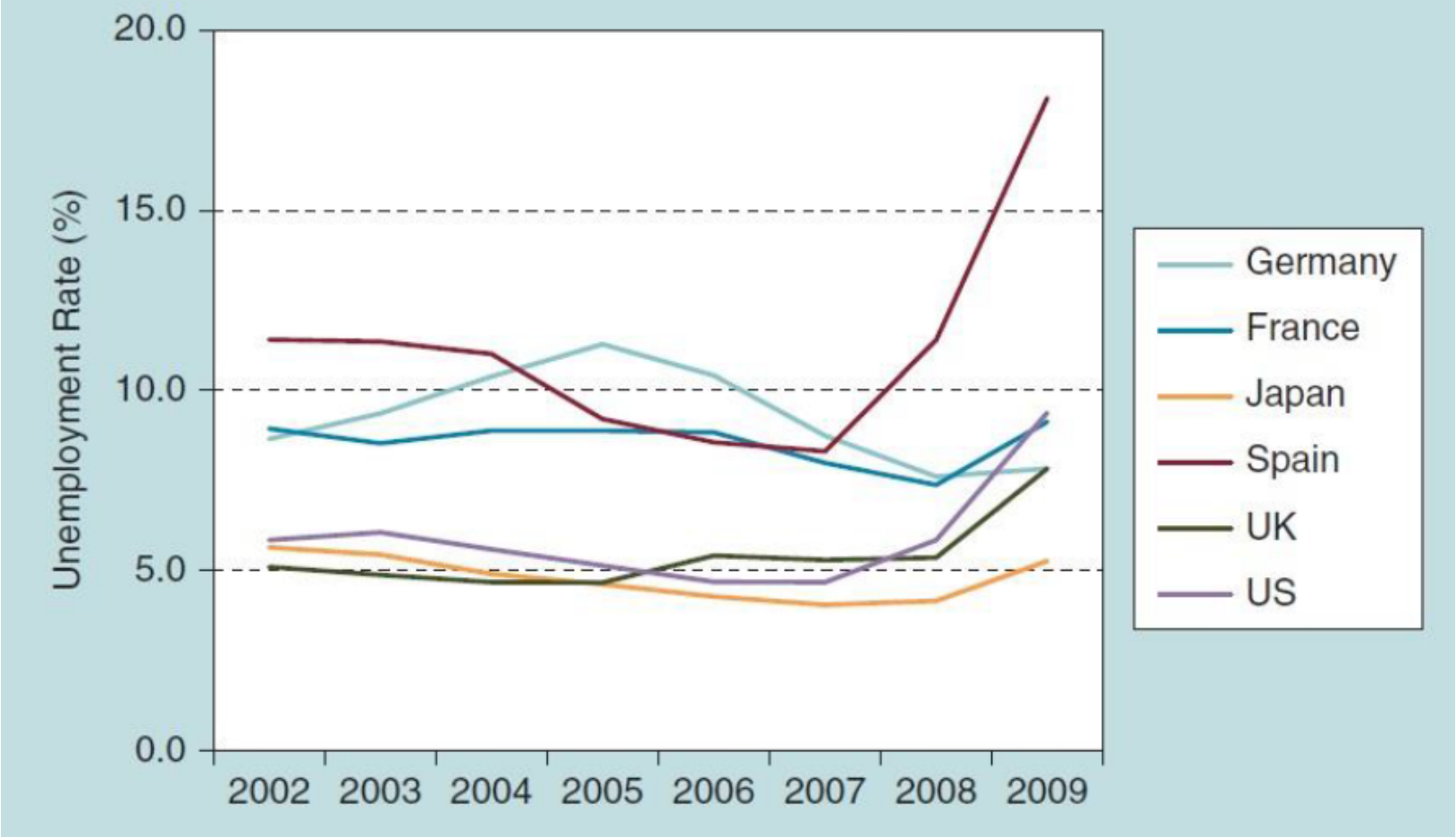

Figure: Estimates of the natural rate of unemployment

A Quick Look at the Data II

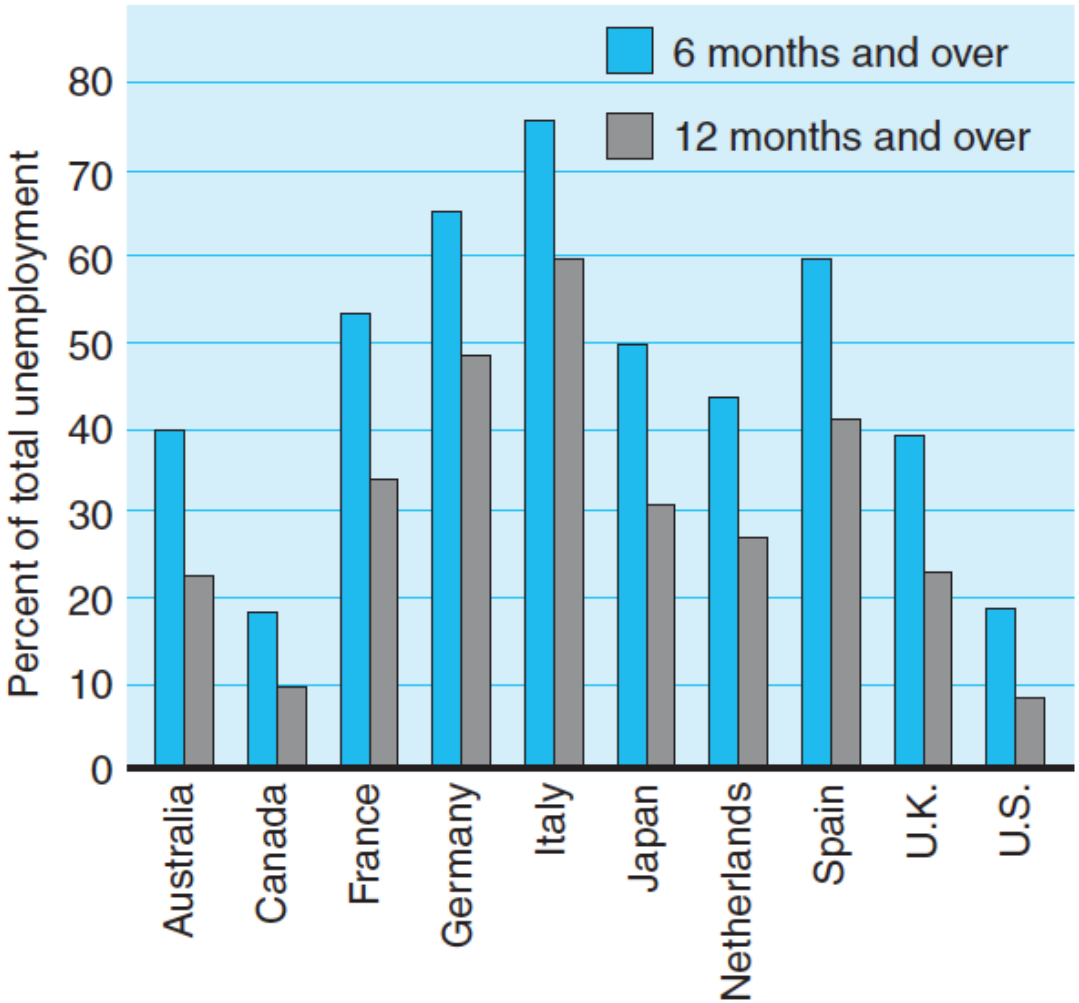

Figure: Long-term unemployment, 2002

A Quick Look at the Data III

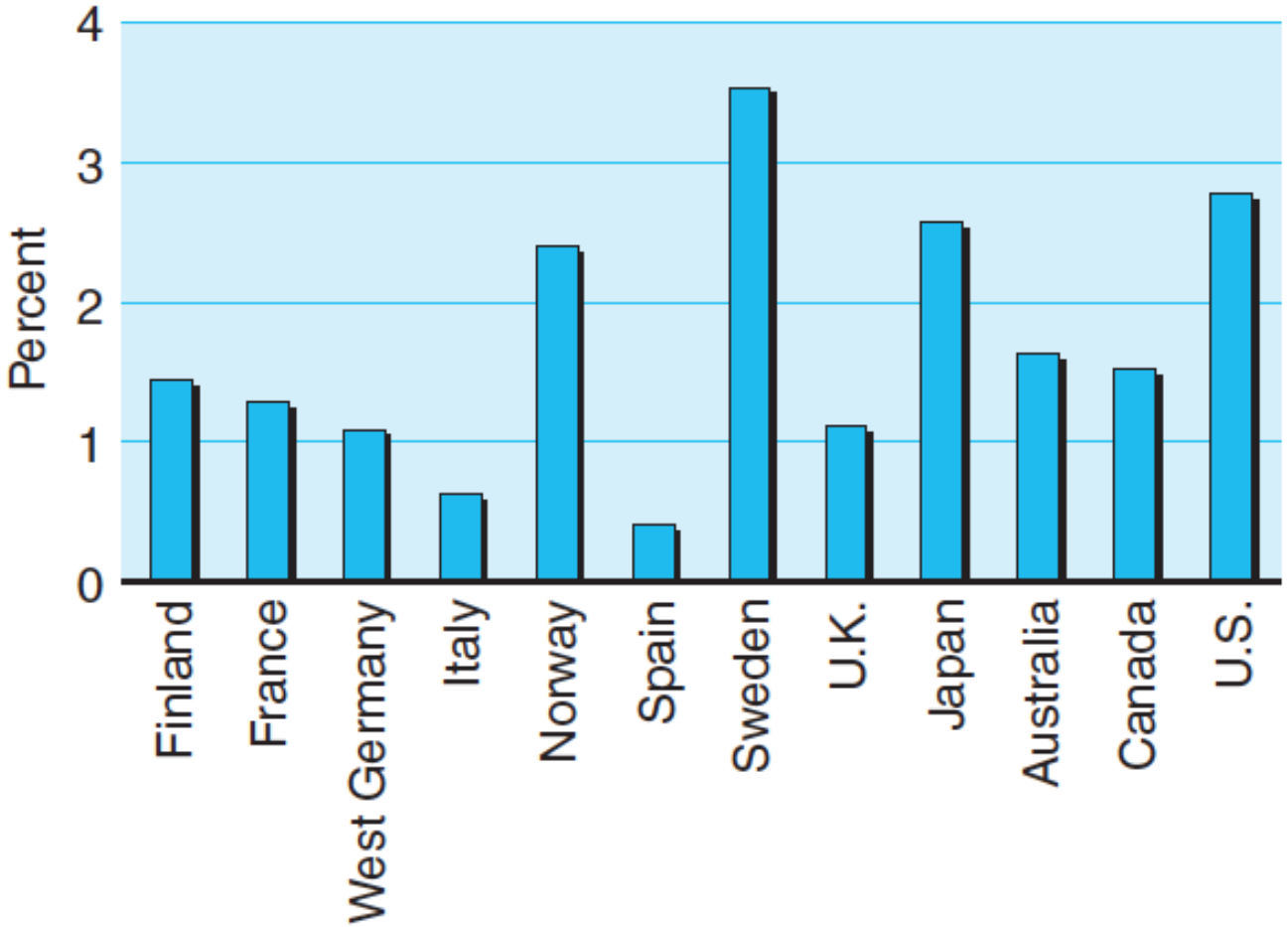

Figure: Population mobility, 1980-1987

A Quick Look at the Data IV

Stricter EPL associated with lower unemployment inflows

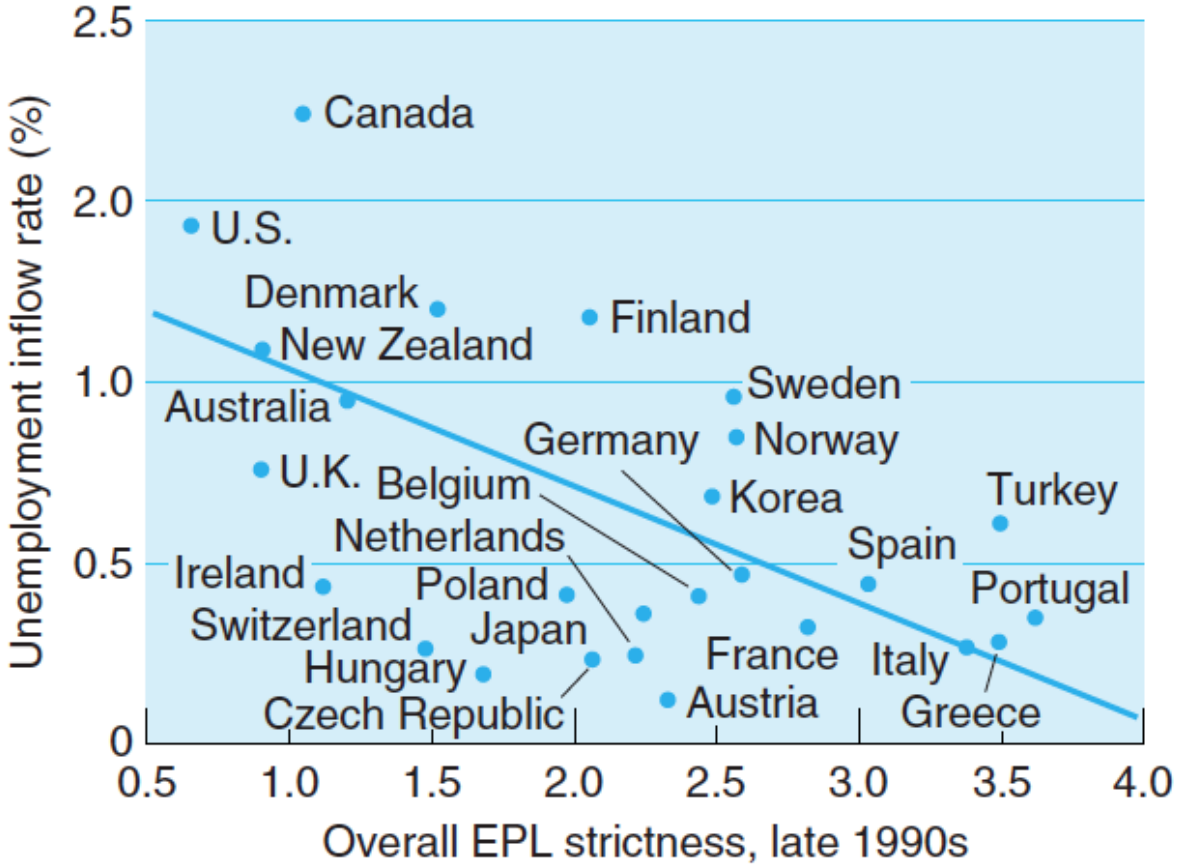

Figure: Unemployment inflows OECD

A Quick Look at the Data V

Stricter EPL associated with lower unemployment outflows

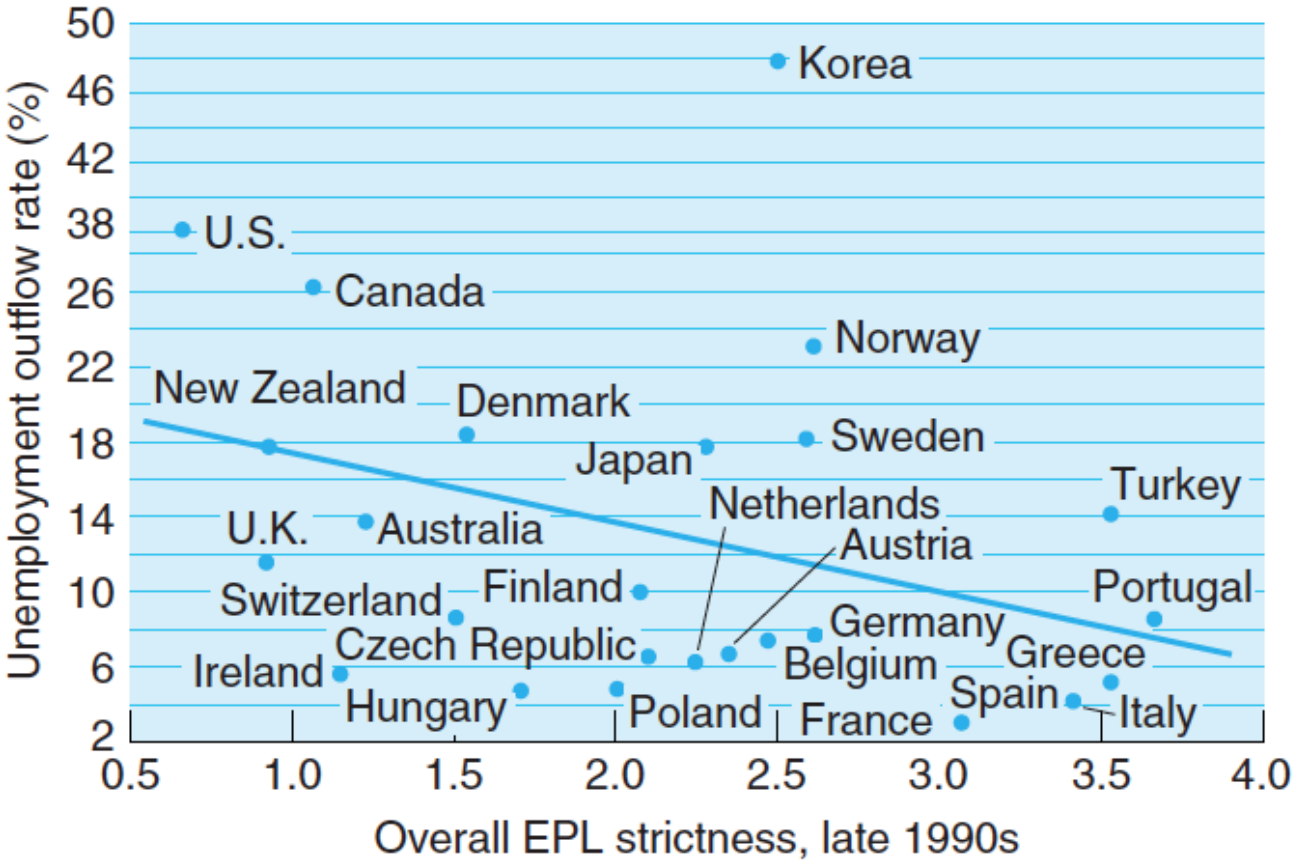

Figure: Unemployment outflows OECD

A Quick Look at the Data VI

Overall, EPL doesn't seem to affect unemployment rates

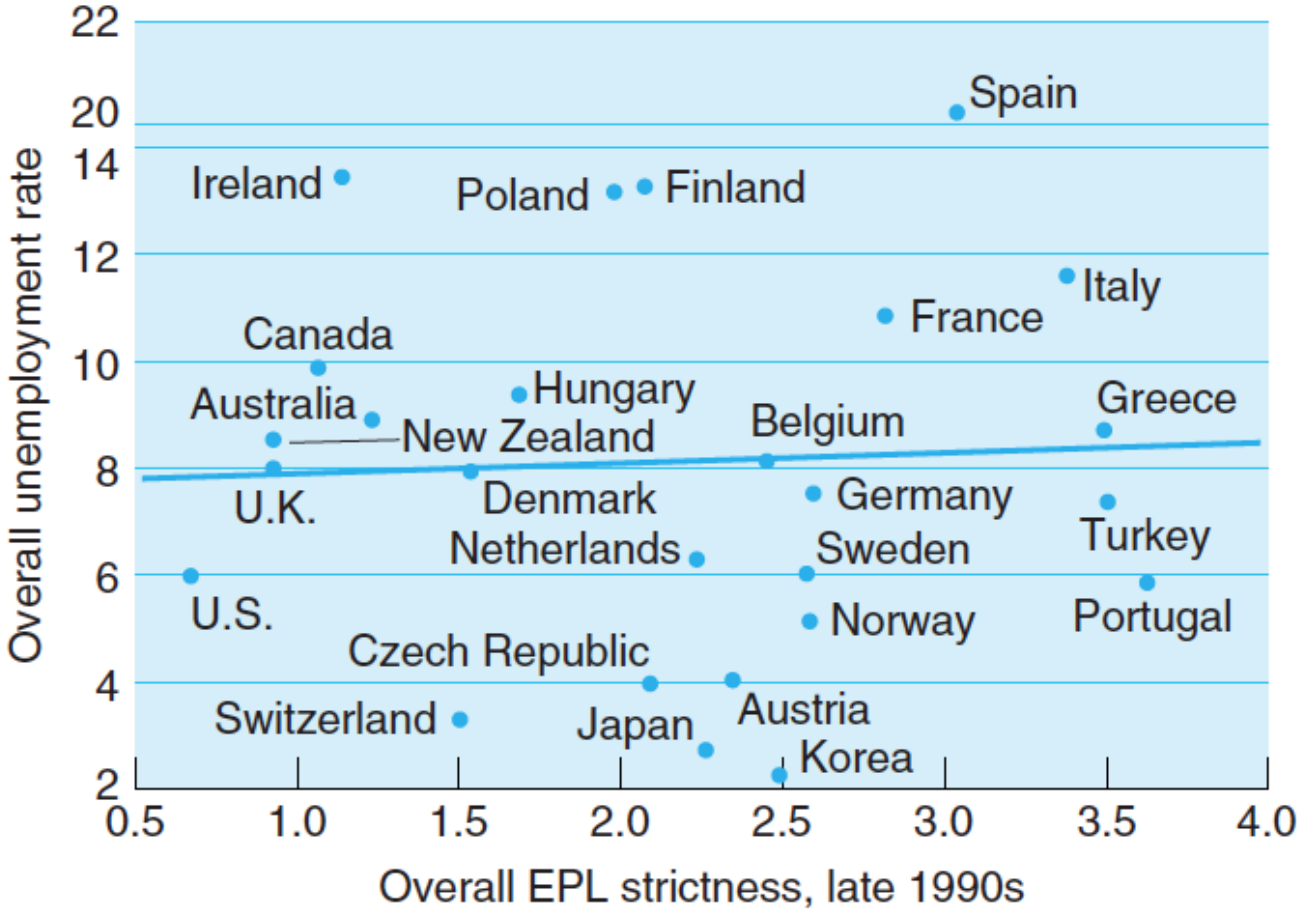

Figure: EPL and unemployment OECD

A Quick Look at the Data VII

Stricter EPL favors employed workers!

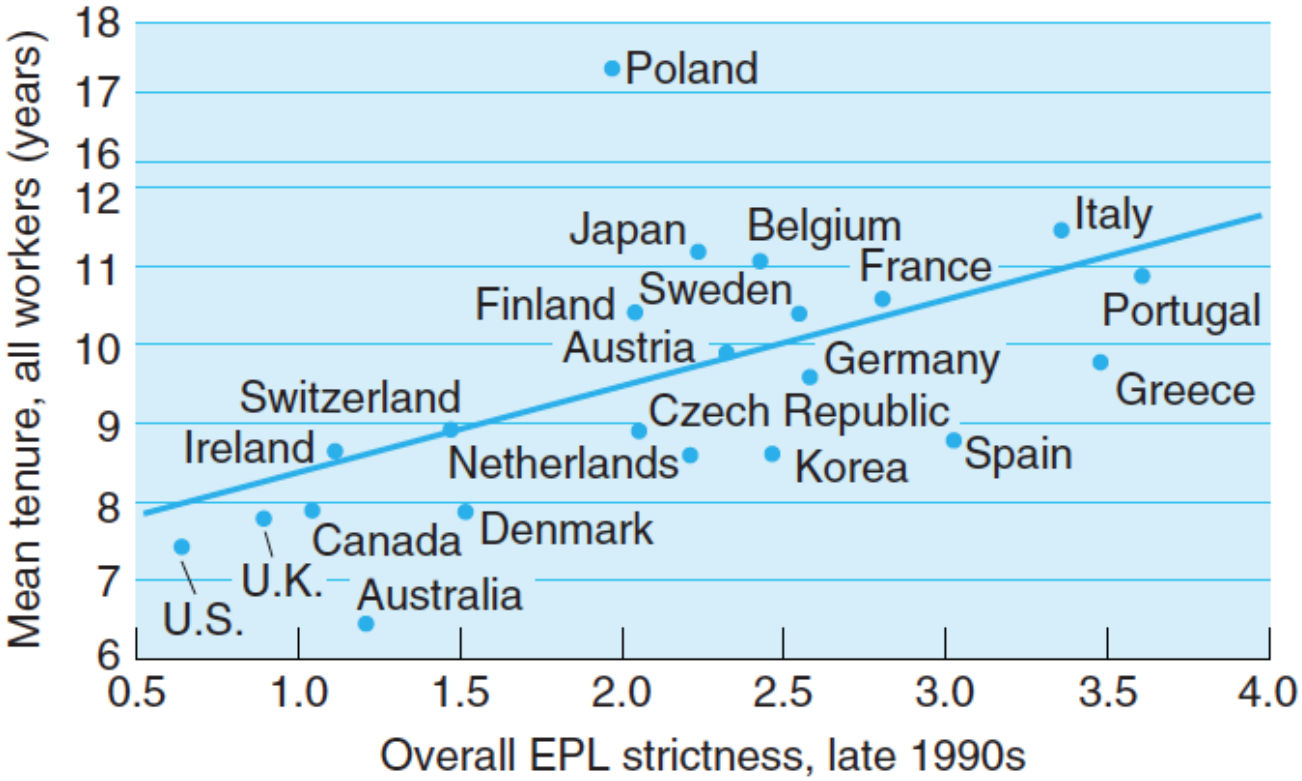

Figure: EPL and employment duration OECD

A Quick Look at the Data VIII

Stricter EPL works against unemployed people!

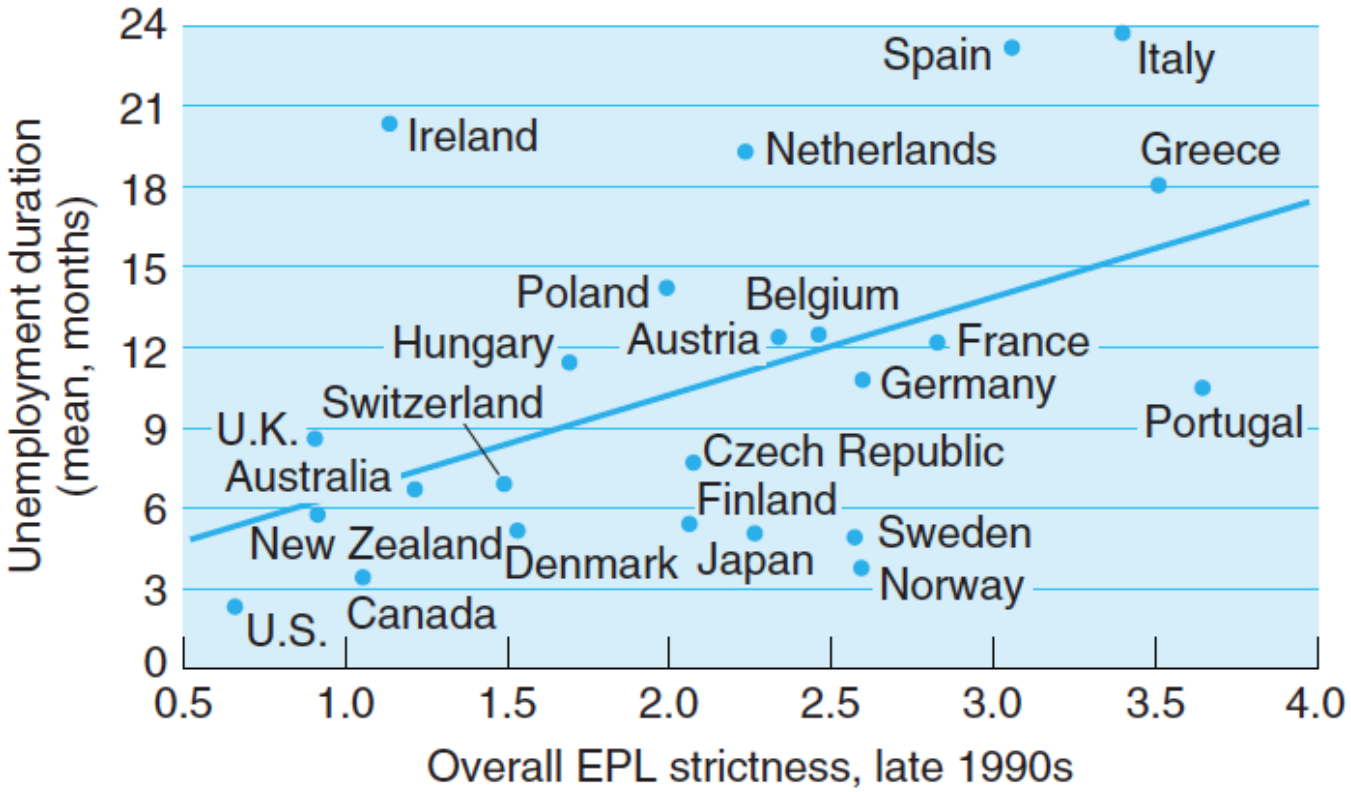

Figure: EPL and unemployment duration

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Making Assumptions

- Data not always available, e.g. avg. annual hours African countries
- Make (reasonable) assumptions!
- Important part of empirical work
- It is okay that your results depend on them!
- Just try to convince the reader of why your assumption makes sense!

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Missing Values I

- Several options:
  1. Look for the best proxy when no data are available for "ideal" measure
  2. Make assumptions if there neither data nor proxies available
  3. Impute a value!
  4. Drop the entire observation
- Two imputation methods:
  1. Interpolation, when missing intermediate data
  2. Extrapolation, when missing top- or bottom- end data in the series
- Interpolation is *way safer* than extrapolation!
- When is imputation possible?
  - ⋆ Slow movements in data
  - ⋆ Regular variation in data

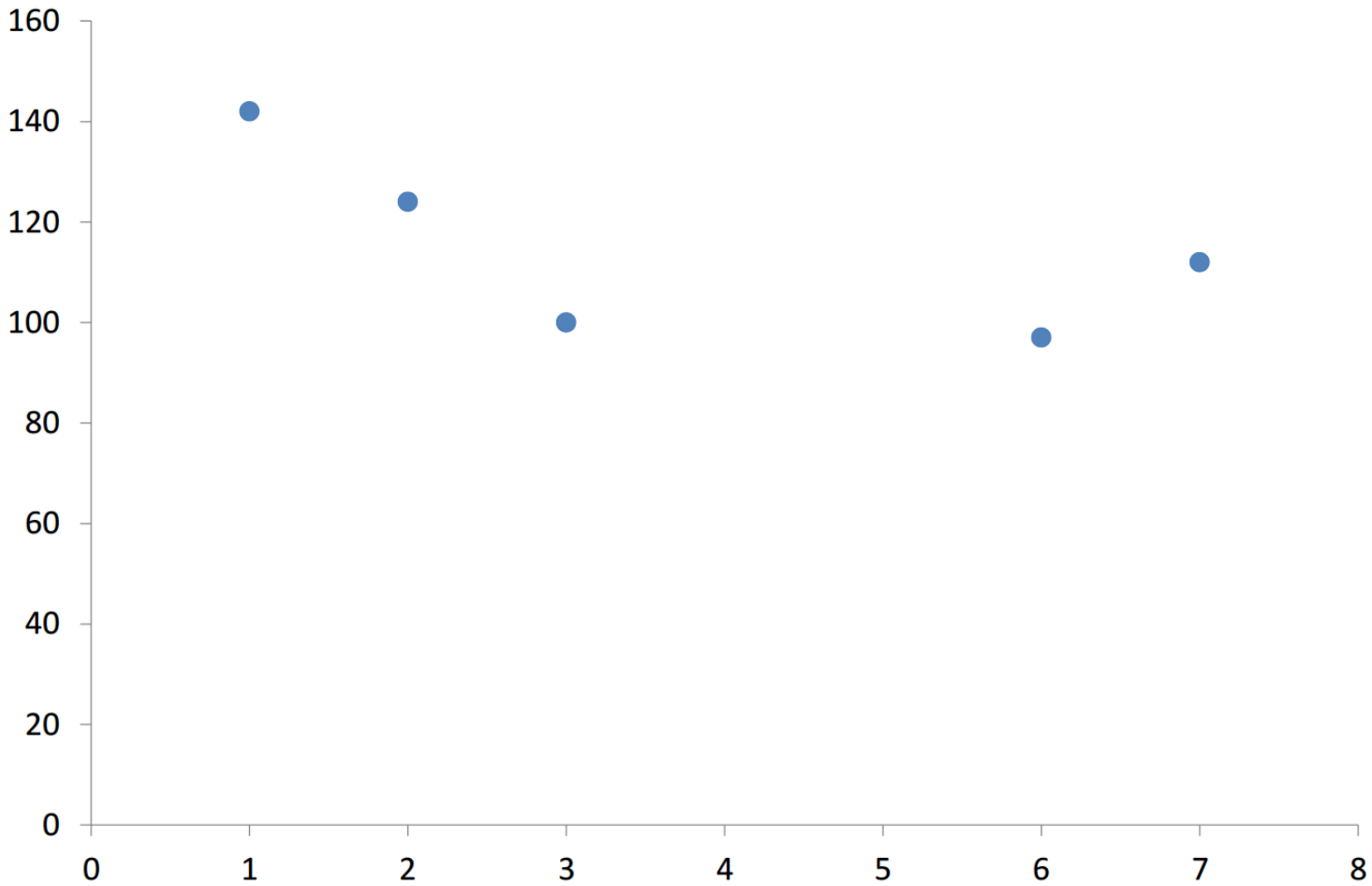
Missing Values II

- How to impute values?
  - ⋆ Linear trend
  - ⋆ Regression estimates
  - ⋆ Cubic splines
  - ⋆ Look at the data!
- An example of imputation

Year	X
1	142
2	124
3	100
4	.
5	.
6	97
7	112

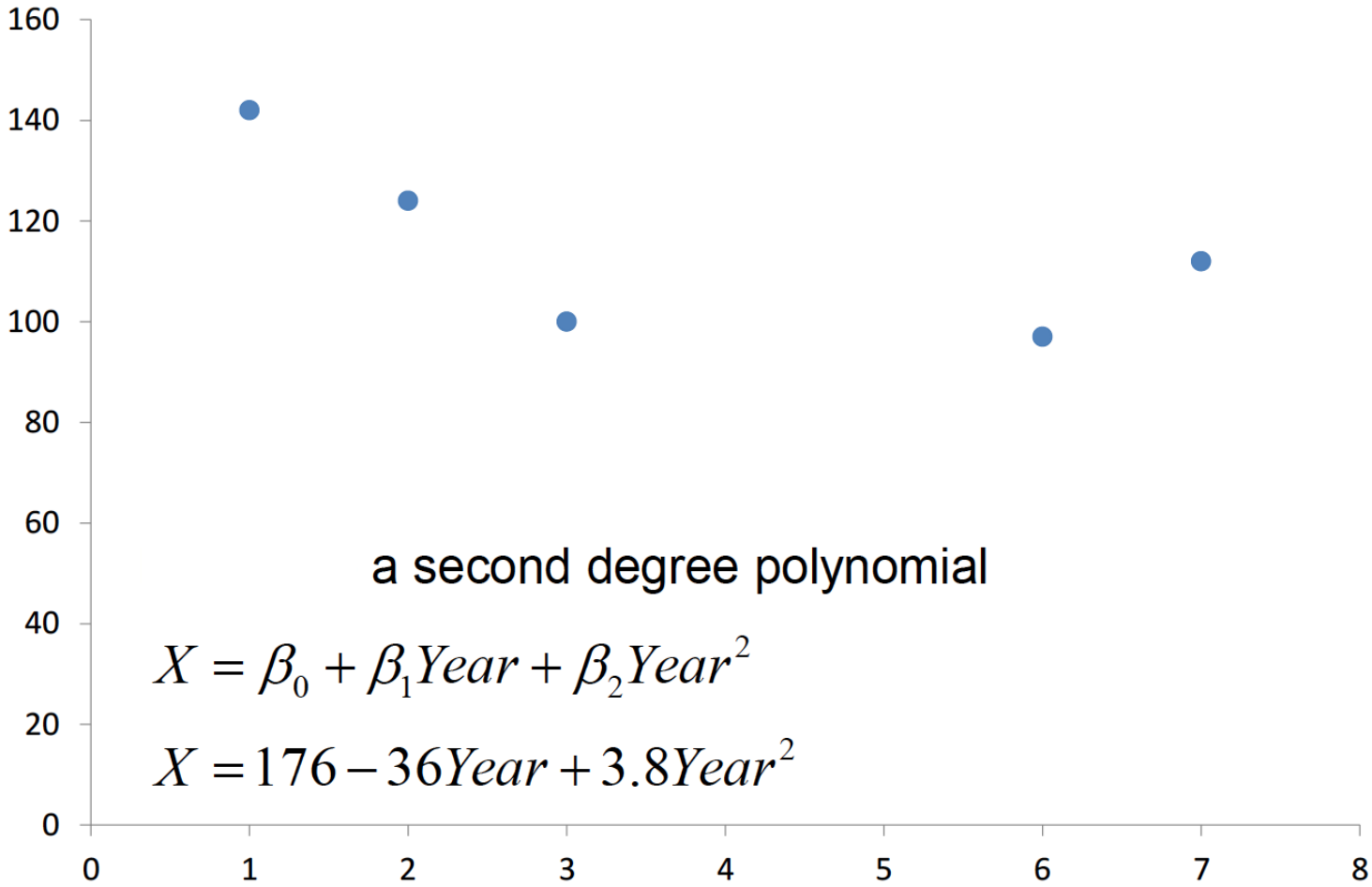
Missing Values III

- Look at the data



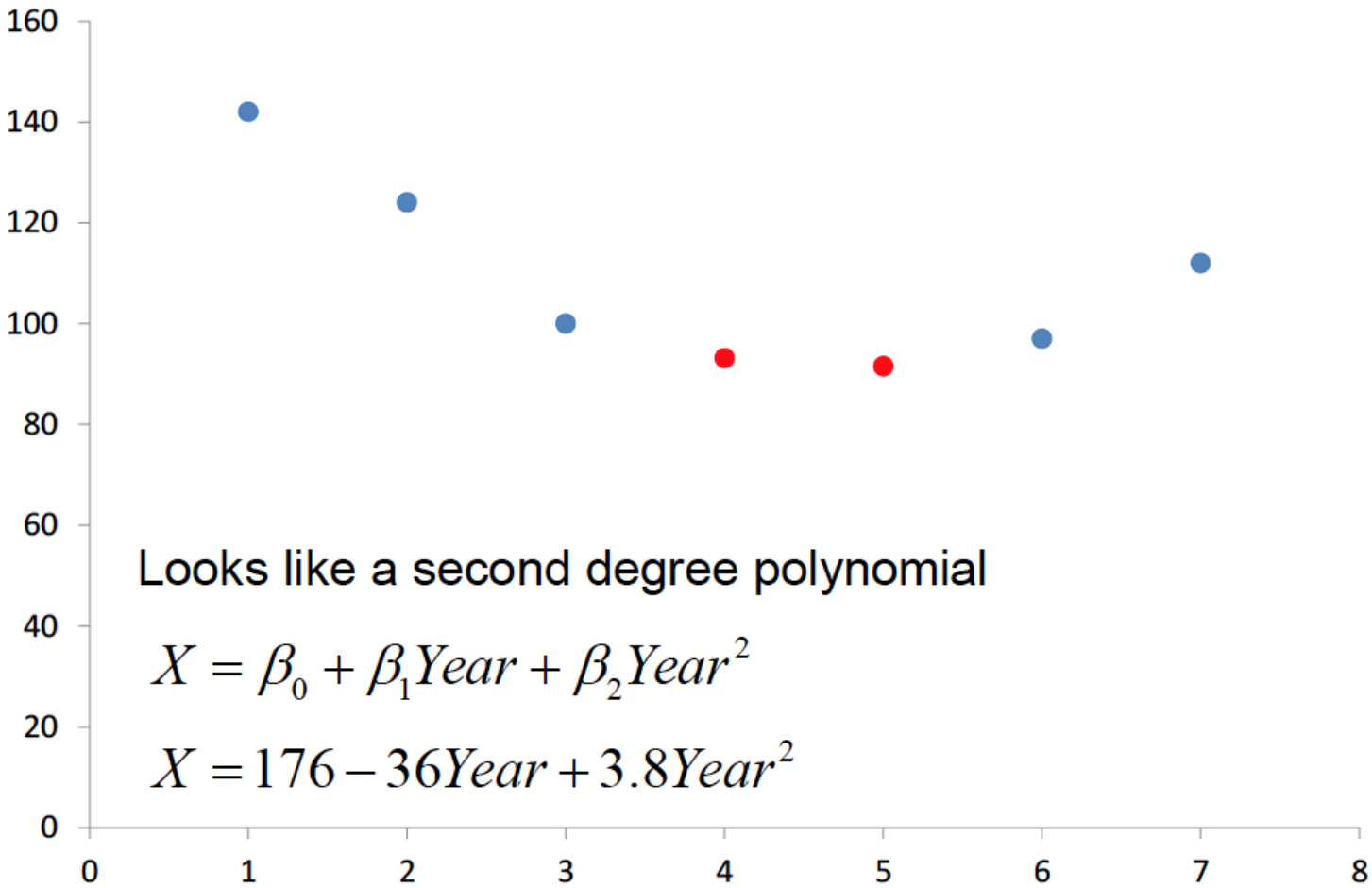
Missing Values IV

- Looks like. . .



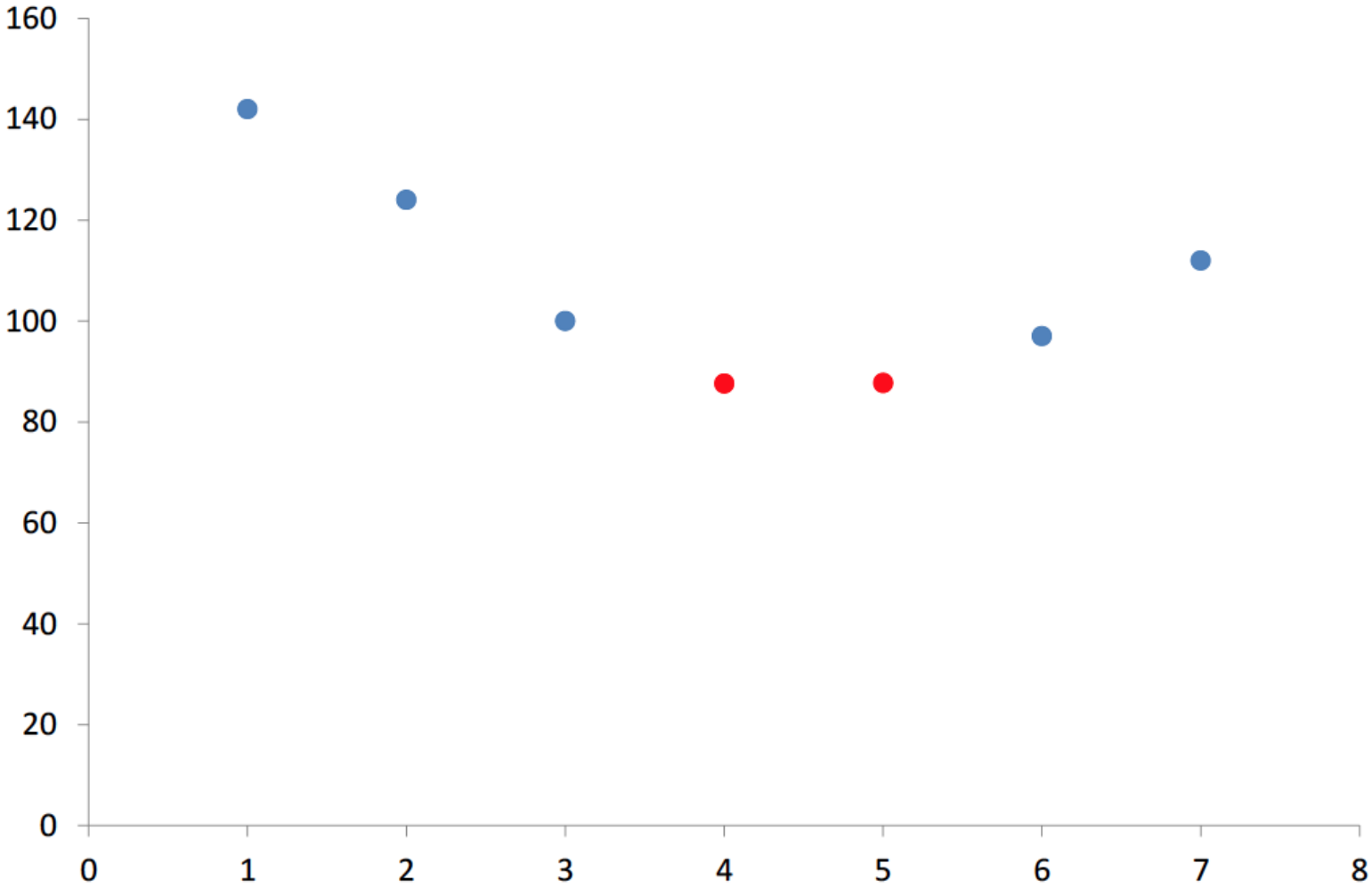
Missing Values V

- Let's see...



Missing Values VI

- Cubic splines (Stata, Matlab, R, Python, etc.)



Missing Values VII

- Linear trend:

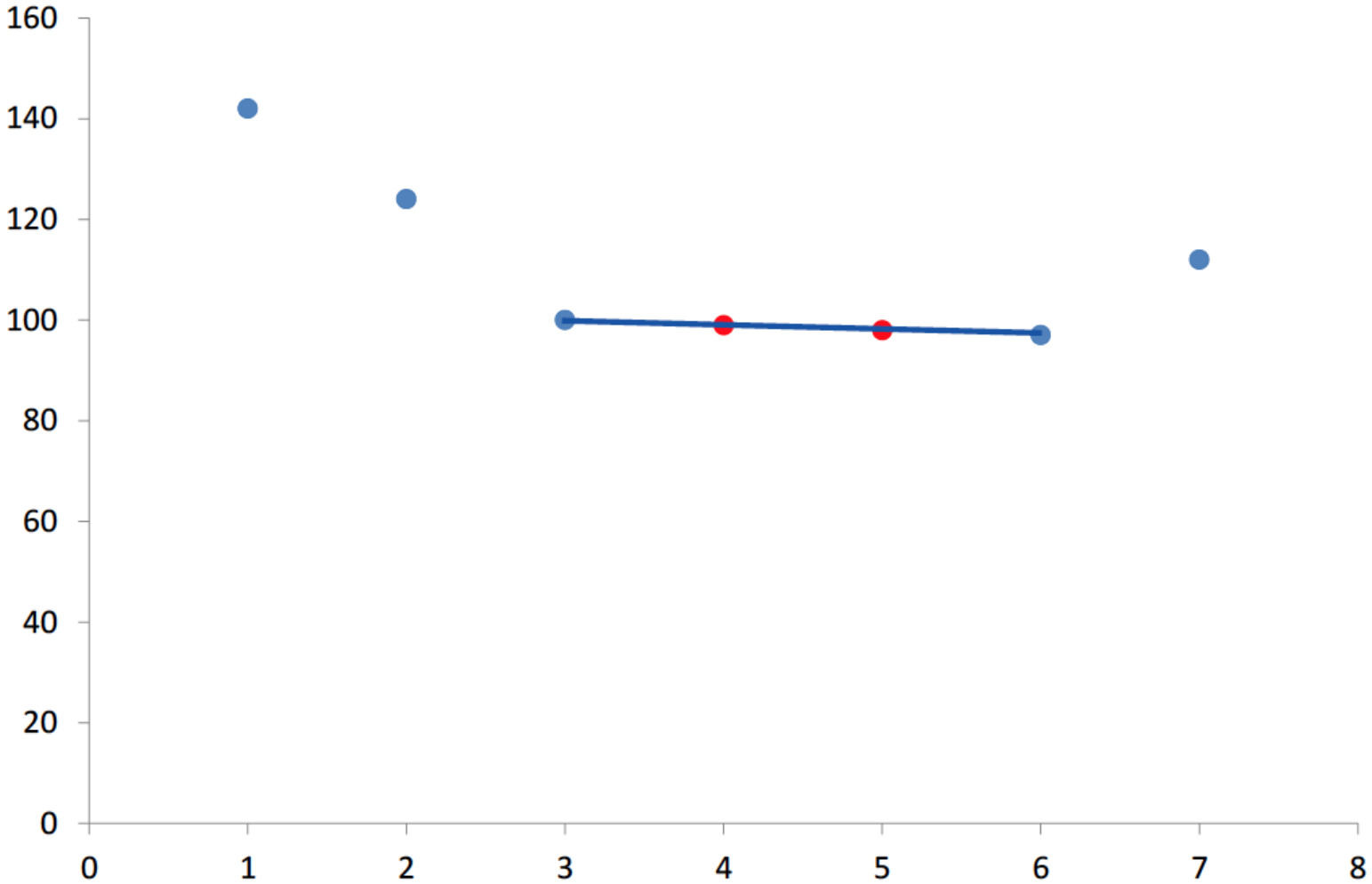
Year	X
1	142
2	124
3	100
4	99
5	98
6	97
7	112

$$X_4 = \left(\frac{97 - 100}{3} \right) + 100 = 99$$

$$X_5 = \left(\frac{97 - 100}{3} \right) + 99 = 98$$

Missing Values VIII

- Linear trend:



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