ECON3123
Macroeconomic Theory I

Tutorial #7: The Labour market and the medium term

Today's tutorial

- Where we've got to and where we are going

- Prices, wages and the medium term

  - Price setting

  - Wage setting

  - The natural rate of unemployment

- Exercise: Long term unemployment

Where we've got to and where we are going

- Where we've got to and where we are going

- From one market to three

Model	Markets considered	Model equilibrium in terms of:
Keynesian Cross	Goods market	Z, Y
IS-LM	Goods market Financial market	i, Y
IS-LM-PC	Goods market Financial market Labour market	i, Y, π

- Why do we do this?
  - To take account of unemployment and inflation - economies do not really have fixed prices

- Towards being able to explain the 'Big Three' of macroeconomics
  - GDP growth
  - Unemployment
  - Inflation

Prices

- We start with price determination:

- Price setting relation: $P = (1 + m) \times marginal\ cost\ of\ production$

- In which:

  - $m =$ mark-up

    - Reflects market power

    - $= 0$ in a perfectly competitive market

- What about the marginal cost of production?

  - It measures the cost of an extra one unit of production

- We need a production function

The Production Function in this economy

- We assume a production function of the form:

  - $Y = AN$

  - $Y = $ output

  - $A = $ output per worker

    - A is constant

    - A is also the marginal product of labour in this economy

- Why are there no other factors of production in this economy?

  - To keep things simple

  - We can assume that A depends on other factors (capital, especially) but assume then that the other factors are fixed (a key assumption that is relaxed when we look at long run economic growth)

The Production Function (continued)

- The cost of hiring one more worker $= W$

- The marginal product of labour $= A$

  - So one extra worker can produce A units of output

- So one extra worker costs W and produces A units of output

- Therefore the marginal cost of one extra unit of output is $\dfrac{W}{A}$

- ie the marginal cost of production is $\dfrac{W}{A}$

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The Price setting relation

- And so we have price setting relation:

$$P = (1 + m) \times marginal\ cost\ of\ production$$

ie $\qquad P = (1 + m) \times \dfrac{W}{A}$

- Therefore, prices are higher:

  - The more market power firms have

  - The higher are wages

  - The lower is labour productivity

The share of wages in GDP in the US

US Labour Share of GDP

Source: ERC analysis of FRED data

- There is evidence that market power is increasing in US industry (see lecture notes)
- The share of labour income in US GDP has been on a declining trend
- Both raise questions about economic efficiency and fairness

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The share of wages in GDP in the US

Income Gains Widely Shared in Early Postwar Decades — But Not Since Then

Real family income between 1947 and 2018, as a percentage of 1973 level

95th percentile
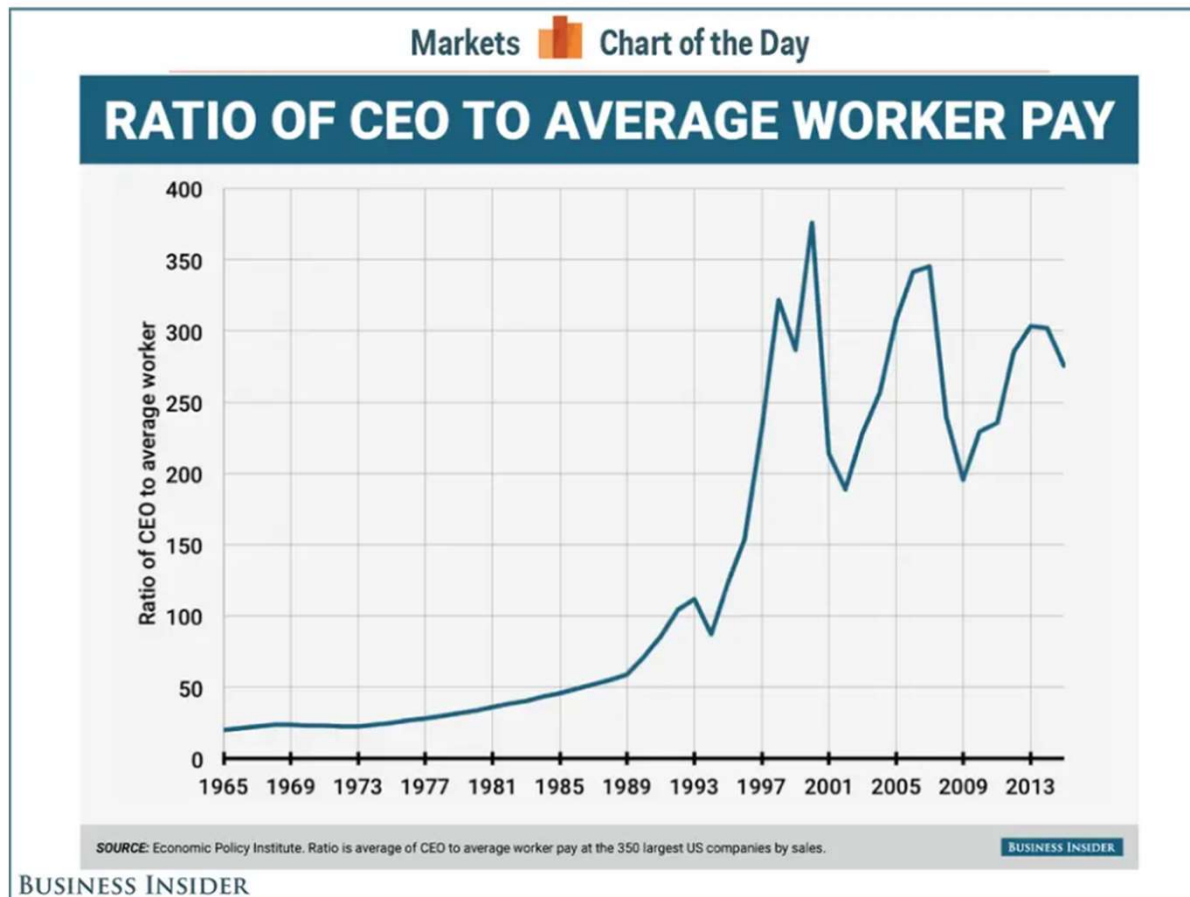
Median

20th percentile
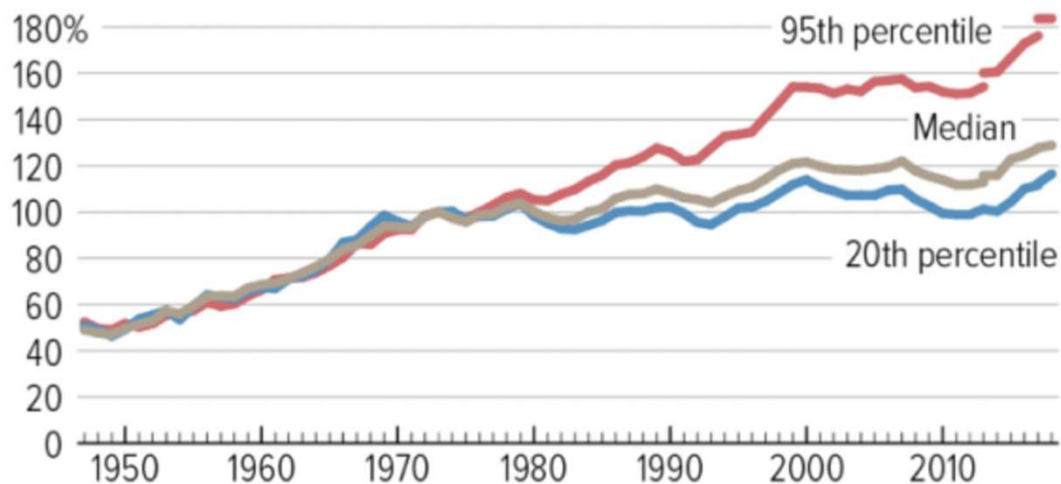
Note: Breaks indicate implementation of a redesigned questionnaire (2013) and an updated data processing system (2017).

Source: CBPP calculations based on U.S. Census Bureau Data

CENTER ON BUDGET AND POLICY PRIORITIES | CBPP.ORG

- Income inequality in the US has also increased since the 1970s
- How many times average pay do you think Chief Executive Officers at the largest 350 US firms earn?

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The share of wages in GDP in the US

Markets — Chart of the Day

RATIO OF CEO TO AVERAGE WORKER PAY

SOURCE: Economic Policy Institute. Ratio is average of CEO to average worker pay at the 350 largest US companies by sales.

BUSINESS INSIDER

- About 280 times!

The determination of wages

- Next, we consider how wages are set in this economy:

- Wage setting relation:
$$W = AP^e F(u, z)$$
$$+ \quad - \ +$$

- In which:

  - W = nominal wages

  - A = marginal productivity of labour

  - P^e = expected prices

  - $F(u, z)$:

    - u = unemployment rate

    - z = catch-all variable for all other variables that may affect wage setting

      - Especially bargaining power, welfare provision, employment protection

Wage setting relation: Example

- Assume the wage setting relation:

$$W = A \times P^e \times [1 - 0.5u + 2 \times bargaining + 0.5 \times welfare]$$

- Assume that $A = 1$ and that $P^e = 100$, and that $bargaining$ and $welfare$ are indices in the range [0,1]

- Assume that unemployment rate $= u = 5\%$, and that $bargaining$ and $welfare = 0$

- Then $W =$

- Now, if 10% inflation is expected, so that $P^e = 100$, what happens to wages?

- $W =$

- And if, instead, a recession causes unemployment to increase to 10%, what happens to wages?

- $W =$

Bargaining Power: Adapted from Blanchard ch.7 q.5

- What does the bargaining power of different types of workers depend on?

Worker	Wages	Degree of Bargaining Power	Factors determining bargaining power			
			Economic cycle	Skill	Social value	Trades Union membership
Surgeon	2					
Hospital cleaner	4					
Investment banker	1					
Computer programmer	3					

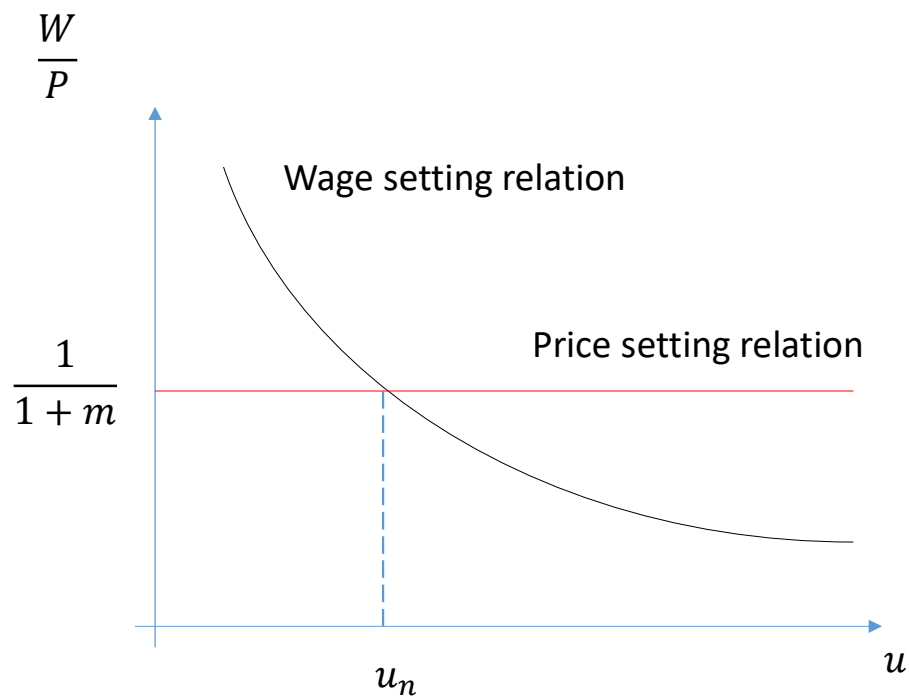Next step: drawing the wage setting and price setting relations

- We assume that in the medium term:

  - $P = P^e$

- We then have:

  - Price setting relation: $\qquad P = (1 + m) \times \dfrac{W}{A}$

  - Wage setting relation: : $\qquad W = A \times P \times F(u, z)$

- And so:

  - $\dfrac{W}{P} = \dfrac{A}{(1+m)} = A \times F(u, z)$

  - $\Rightarrow F(u, z) = \dfrac{1}{1+m}$ $\qquad$ (only when $P = P^e$)

Next step: drawing the wage setting and price setting relations
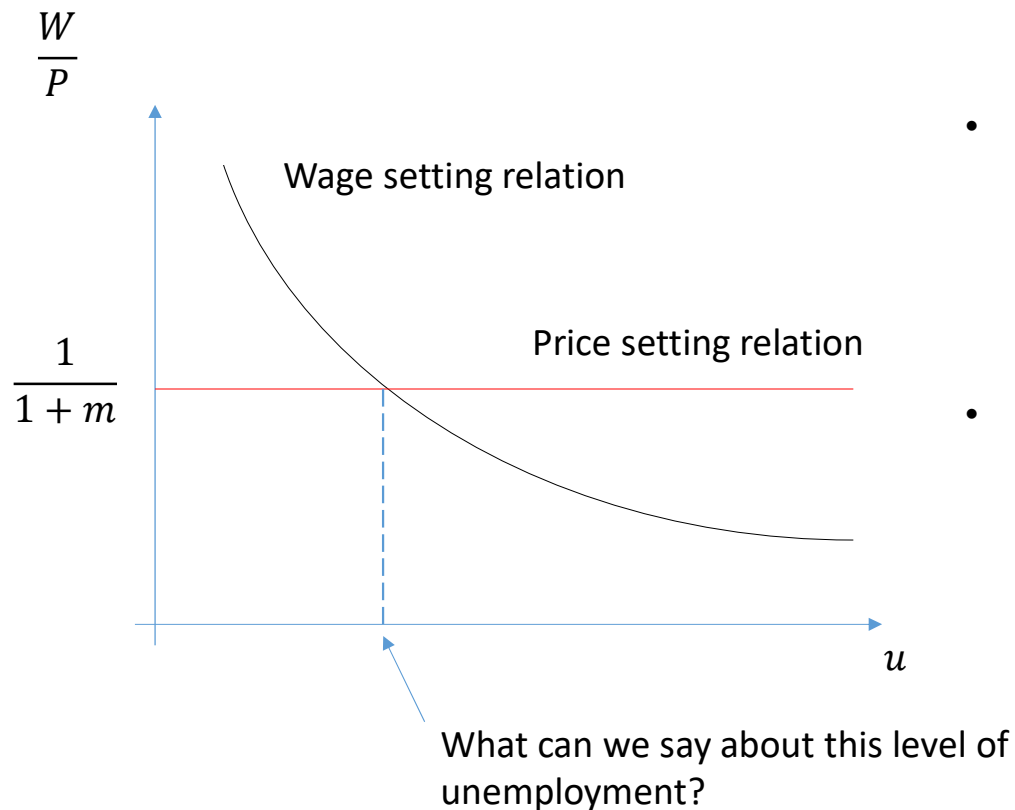
$\dfrac{W}{P}$

Wage setting relation

Price setting relation

$\dfrac{1}{1+m}$

u

What can we say about this level of unemployment?

- We assume that in the medium term:

  - $P = P^e$

- We then have:

  - Price setting relation: $\qquad P = (1 + m) \times \dfrac{W}{A}$

  - Wage setting relation: : $\qquad W = A \times P \times F(u, z)$

- And so:

  - Price setting: $\qquad \dfrac{W}{P} = \dfrac{A}{(1+m)}$

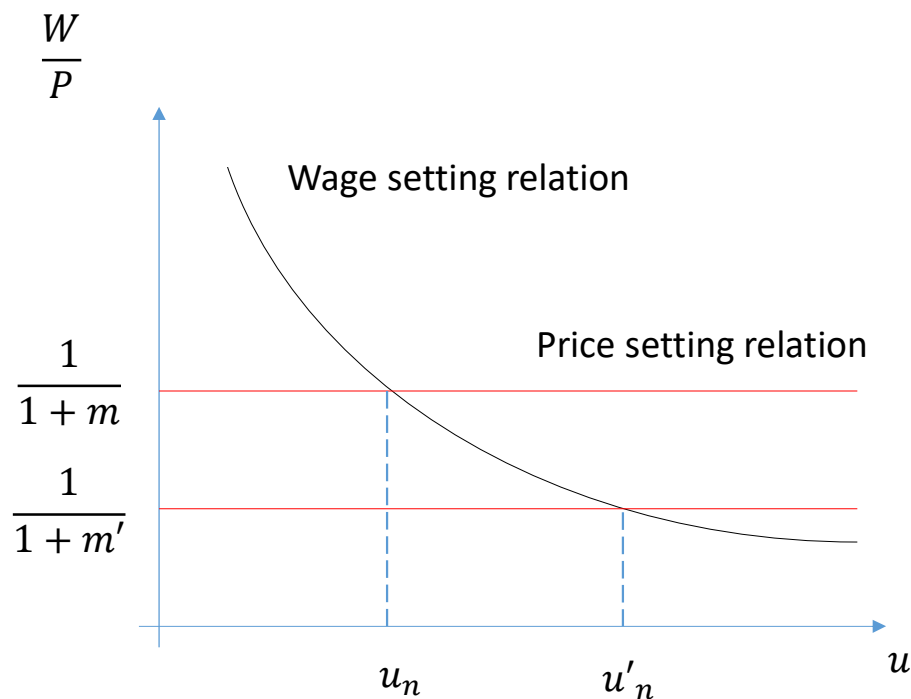 - Wage setting: $\qquad \dfrac{W}{P} = A \times F(u, z)$
  $$\qquad\qquad\qquad\qquad\qquad -\ +$$

Next step: drawing the wage setting and price setting relations

$\frac{W}{P}$

Wage setting relation

$\frac{1}{1+m}$

Price setting relation

u_n

u

- With $P = P^e$, the price and wage setting relations in terms of u cross at a unique value of u

- At this point:

  - $F(u_n, z) = \frac{1}{1+m}$

- This is defined as the natural rate of unemployment, u_n

- We will see that u_n does not depend on aggregate demand conditions in the economy

  - It is a structural characteristic of an economy
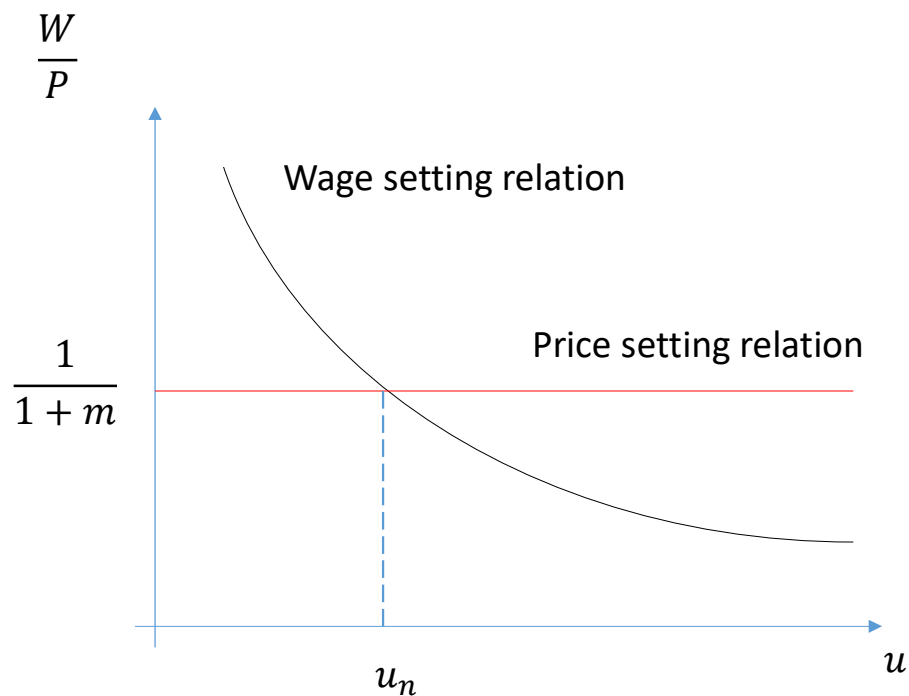
  - u_n depends on m and z

Next step: drawing the wage setting and price setting relations

$\dfrac{W}{P}$

Wage setting relation

$\dfrac{1}{1+m}$ — Price setting relation

$\dfrac{1}{1+m'}$

u_n $\quad$ u'_n $\quad$ u

- Example: The impact of greater market power on the natural rate of unemployment

- We model this as m increasing

- Firms can set higher prices at all levels of wages which results in a reduction in real wages $\left(\dfrac{W}{P}\right)$ at each level of u

- The price setting relation shifts down

- The result is an increase in the natural rate of unemployment

Next step: drawing the wage setting and price setting relations

$$\frac{W}{P}$$

Wage setting relation

$$\frac{1}{1+m}$$

Price setting relation

u_n

u

- Our model says that in the medium term, the natural rate of unemployment depends on m and z

- According to the model, unemployment in the medium term is higher:

  - The lower is market power of firms (ie the more competitive an economy)

  - The higher is employment protection, bargaining power and social insurance

- What do you think of these implications?

Exercise: Blanchard ch.7 q.8

- In the US, around 44% of unemployed workers leave unemployment each month.   Assume that the probability of leaving unemployment is the same for all unemployed, independent of how long they have been unemployed. What is the probability that an unemployed worker will still be unemployed after one month? Two months? Six months?

Exercise: Blanchard ch.7 q.8

- Now consider the composition of the unemployment pool.   We will use a simple experiment to determine the proportion of the unemployed who have been unemployed six months or more. Suppose the number of unemployed workers is constant and equal to x.   Each month, 44% of the unemployed find jobs, and an equivalent number of previously employed workers become unemployed.

- Consider the group of x workers who are unemployed this month.   After a month, what percentage of this group will still be unemployed?

Exercise: Blanchard ch.7 q.8

- After a second month, what percentage of the original x unemployed workers has been unemployed for at least 2 months?   After the sixth month, what percentage of the original x unemployed workers has been unemployed for at least six months?

Exercise: Blanchard ch.7 q.8

Year or month	Unemploy-ment	Less than 5 weeks	5–14 weeks	15–26 weeks	27 weeks and over	% over 27 weeks	Average (mean) duration (weeks) [2]
2000.	5,692	2,558	1,815	669	649	11.4%	12.6
2001.	6,801	2,853	2,196	951	801	11.8%	13.1
2002.	8,378	2,893	2,580	1,369	1,535	18.3%	16.6
2003.	8,774	2,785	2,612	1,442	1,936	22.1%	19.2
2004.	8,149	2,696	2,382	1,293	1,779	21.8%	19.6
2005.	7,591	2,667	2,304	1,130	1,490	19.6%	18.4
2006.	7,001	2,614	2,121	1,031	1,235	17.6%	16.8
2007.	7,078	2,542	2,232	1,061	1,243	17.6%	16.8
2008.	8,924	2,932	2,804	1,427	1,761	19.7%	17.9
2009.	14,265	3,165	3,828	2,775	4,496	31.5%	24.4
2010.	14,825	2,771	3,267	2,371	6,415	43.3%	33.0
2011.	13,747	2,677	2,993	2,061	6,016	43.8%	39.3
2012.	12,506	2,644	2,866	1,859	5,136	41.1%	39.4
2013.	11,460	2,584	2,759	1,807	4,310	37.6%	36.5
2014.	9,617	2,471	2,432	1,497	3,218	33.5%	33.7
2015.	8,296	2,399	2,302	1,267	2,328	28.1%	29.2
2016.	7,751	2,362	2,226	1,158	2,005	25.9%	27.5
2017.	6,982	2,270	2,008	1,017	1,687	24.2%	25.0
2018.	6,314	2,170	1,876	917	1,350	21.4%	22.7
2019.	6,001	2,086	1,789	860	1,266	21.1%	21.6

- How do the numbers in the table for the % of workers unemployed for more than 27 weeks in the years 2000-2008 compare to the numbers we just calculated?

Source: Economic Report of the Office of the President, 2020

Exercise: Blanchard ch.7 q.8

- How do the numbers in the table for the % of workers unemployed for more than 27 weeks in the years 2000-2008 compare to the numbers we just calculated?

- Can you guess what may account for the difference between the actual numbers and the answer you obtained in this problem?

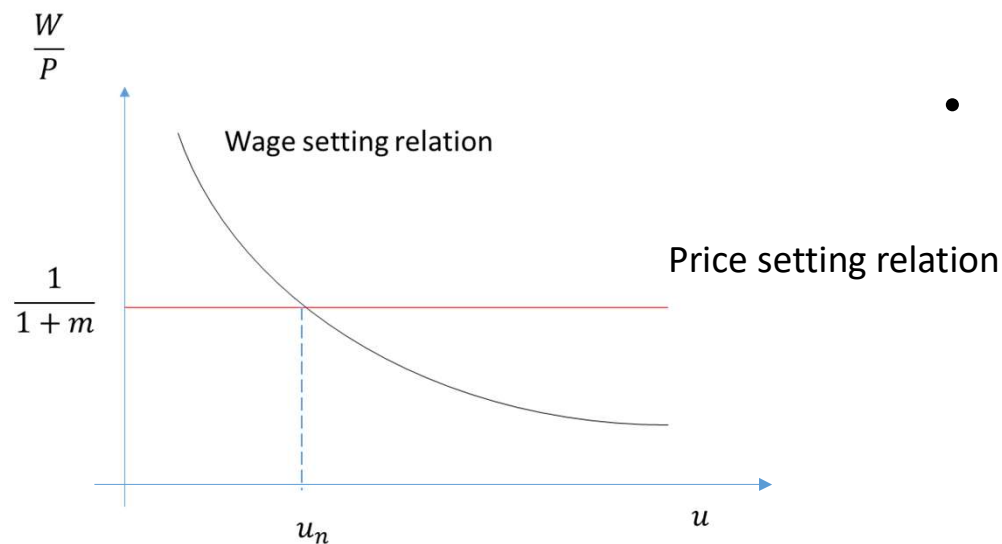| month	p(leaving unemployment)	p(unemployed in mth month)	% unemployed after m months
1	44%	56%	56%
2	31%	69%	39%
3	22%	78%	30%
4	15%	85%	26%
5	11%	89%	23%
6	7%	93%	21%

Exercise: Blanchard ch.7 q.8

- What happens to the percentage of unemployed who have been unemployed for 6 months or more during the crisis years 2009-11?

- Is there any evidence of the crisis ending when you look at the percentage of the unemployed who have been unemployed 6 months or more?

Exercise: Blanchard ch.7 q.8

- Part of the policy response to the crisis was an extension of the length of time that an unemployed worker could receive unemployment benefits.   How do you predict this change would affect the proportion of those unemployed more than 6 months?   Did this occur?
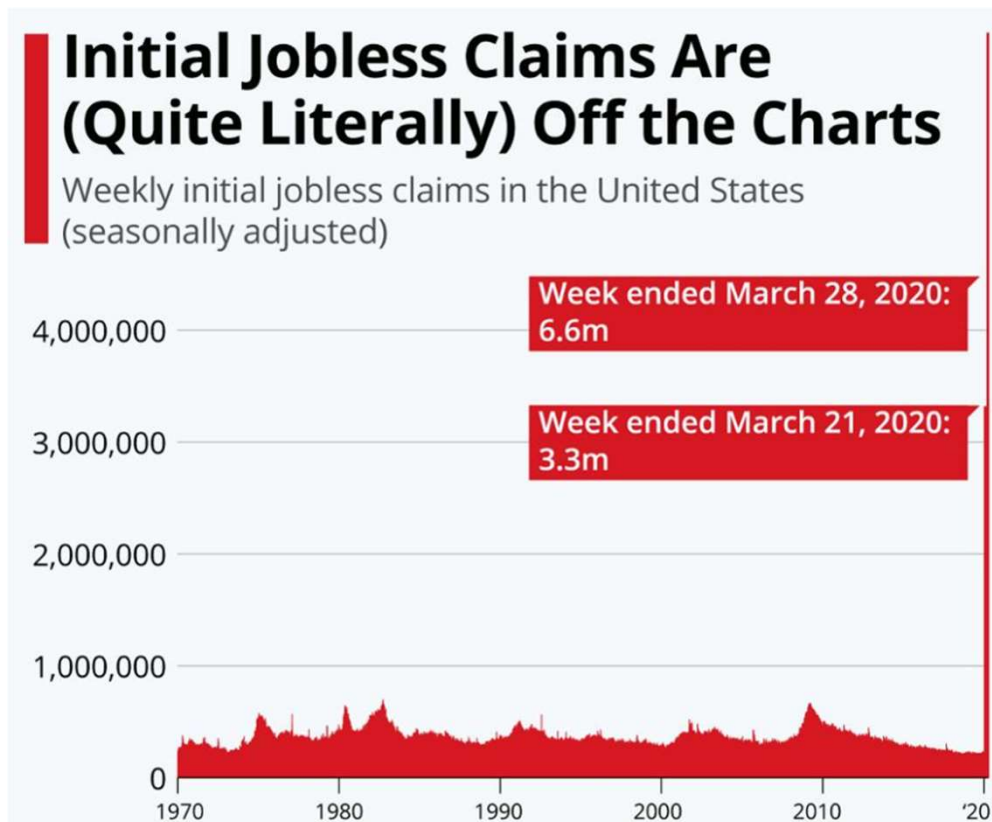
$$\frac{W}{P}$$

Wage setting relation

- $F(u_n, z) = \dfrac{1}{1+m}$

Price setting relation

$$\frac{1}{1+m}$$

u_n

u

- What do you think will happen to unemployment in the US as a result of the COVID-19 outbreak?

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Initial Jobless Claims Are (Quite Literally) Off the Charts

Weekly initial jobless claims in the United States (seasonally adjusted)

Week ended March 28, 2020: 6.6m

Week ended March 21, 2020: 3.3m

Source: Forbes.com