Chapter 1. Overview
Transatlantic differences in unemployment rates

Tito Boeri and Jan van Ours (2013), The Economics of Imperfect Labor Markets, Princeton University Press.
The usual suspects

- Size of the shocks
- Labour Market Institutions

However .....
Okun’s Law

Okun’s law:

\[ \Delta u_t = \alpha - \beta \Delta y_t + \varepsilon_t \]  

possibly also taking into account of time-varying institutions and allowing for asymmetries during recession and non-recession years
Moreover differences in institutions are long-lasting

Literature has a short memory

- 1960s: “Looking enviously at Europe to see how they do it” – employment protection as explanation for low European unemployment

- 1990s: “Europe should adjust its rigid labor market institutions” (OECD Jobs Study, 1994) responsible for higher and longer duration unemployment

- 2010: Krugman ‘Germany’s jobs miracle hasn’t received much attention in this country - but it’s real, it’s striking, (...) Germany came into the Great Recession with strong employment protection legislation.. and a ”short-time work scheme,” which provides subsidies to employers who reduce workers’ hours rather than laying them off. These measures didn’t prevent a nasty recession, but Germany got through the recession with remarkably few job losses.”
How to explain differences in unemployment then?

- Interactions between shocks and institutions
- Triple interaction: shocks, nature of shocks and institutions
- Great Recession was a financial recession
Definitions: Labor market states

- Employed, \( L \) (OECD-ILO convention): People in working age who, during the reference week (or day), have made for at least one hour:
  - Paid work (also paid in nature) or
  - Self-employed work
  - Paid work includes people who are temporarily not working but who have formally paid work (e.g. they have a salary, are on maternity leave, etc.)
Labor market states (cont.)

- **Unemployed, $U$:** people in working age who, during the reference week (or day) were:
  - without either paid or self-employed work,
  - willing to work *and*
  - looking for a job.

- **Inactive, $O$:** people in working age neither employed nor unemployed
Normalization rules

- **Labor force** \((LF)\): \(L + U\)
- **Working age population** \((N)\): \(L + U + O\)
- **Unemployment rate**: \(u = \frac{U}{LF}\)
- **Employment rate**: \(e = \frac{L}{N}\)
- **Participation rate**: \(p = \frac{LF}{N}\)

**Note**: \(e = p(1 - u)\)
Employment and Unemployment rates Prime Age Males – 2008
Employment and Unemployment rates Prime Age Females – 2008
The value of a job, $y$, is the value of the labor product obtained when the firm and the worker engage in production.

The worker’s surplus or rent is the difference between the wage earned by the worker and that worker’s reservation wage, $w'$, that is, the lowest wage at which the worker is willing to accept a job offer. Formally, the worker’s surplus is given by $(w - w')$.

The surplus (or rent) of the firm is the difference between the value of a job and its costs $(y - w)$.

The total surplus: $(y - w) + (w - w') = y - w'$. 

Tito Boeri and Jan van Ours (2013), The Economics of Imperfect Labor Markets, Princeton University Press.
Perfect vs. Imperfect Labour Markets

- A **perfect labor market** is one where there is no total surplus associated to any given job, i.e., it is a market where \( y = w \) and \( w = w' \) so that also \( y = w' \),

- An **imperfect labor market** is one where there are rents associated with any given job, so that the total surplus is positive. Wages are, in this context, a rent splitting device.
Labour Market Institutions

- An **institution** is a system of laws, norms or conventions resulting from a **collective choice**, and providing constraints or incentives which alter individual choices over labor and pay.

- A **labor market** is a market where labor services (specified in a vacant job) are sold for a remuneration called wage.

- Institutions create a **wedge** between the value of the marginal job for the firm and the wage.
A framework – generalities

- Labor supply derived from labor-leisure (plus home production) choice
- Aggregation assuming that workers do not choose hours, just participation
- Heterogeneity in reservation wages
- (Derived) labor demand with markups
- Institutions implement a wedge between labor supply and demand
Preferences: indifference curves are negatively sloped in $c$ and $l$ (negative $MRS$), do not intersect (no incoherence) and convex ($MRS$ declining with $l$)

$MRS = \text{Marginal Rate of Substitution of Income and Leisure}$:

$$\frac{\partial U}{\partial l} = \frac{U_l}{U_C}$$

Budget constraint: $c \leq m + wh$

- Hourly wage ($w$) as slope of the budget constraint
- Maximum hours ($l_0$) to be allocated to labor ($h$) and leisure ($l$)
- Slope budget constraint: $\left| \frac{dC}{dl} \right|$
- Maximum utility conditional on constraint: $MRS = \left| \frac{dC}{dl} \right|$
Slope of individual labor supply

- Depends on relative magnitude of income/substitution effects
- With leisure as normal good, income effect negatively affects labor supply
- Substitution effects always positive on hours worked
- Generally substitution effects dominates for low-wage earners while income effect for high wage earners
- Income effect irrelevant at participation margins
The (static) reservation wage

- It is the lowest wage at which a job-seeker is willing to work (slope of Indifference Curve at $l_0$ and non-labor income level)
- At that level, elasticity of individual labor supply is always positive – there is only a substitution effect
- Reservation wage is increasing in non-wage income
- Reservation wage separates employment from non-employment
Reservation wage – no hours restrictions
Without and with hours restrictions

Tito Boeri and Jan van Ours (2013), The Economics of Imperfect Labor Markets, Princeton University Press.
From individual to aggregate labor supply

- Heterogeneity in non-wage income or preferences
- Hence heterogeneity in reservation wages $w^r$
  $\Rightarrow$ density function $g(w^r)$
- Fraction of population participating at wage $w$: $G(w) = \int_{0}^{w} g(w^r) dw^r$
- $N = $ working age population
- If individuals can only offer fixed number of hours of work, then aggregate labor supply = $NG(w)$
- Note: aggregate labor supply is *always* increasing in wage

Empirical Agg LS for Germany

Tito Boeri and Jan van Ours (2013), The Economics of Imperfect Labor Markets, Princeton University Press.
(Derived) labor demand

- Obtained from profit maximization (including choice of optimal output level) of individual firms
- Optimal employment level: value of marginal product of labor equals the wage
- Decreasing marginal product: labor demand decreasing in wages
- If the firms have some monopoly power in product markets, then the value of the marginal product equals the wage times a markup increasing in the firm market power
With two inputs

- with two inputs of production (e.g., capital and labor), slope of labor demand also affected by degree of substitutability between capital and labor
- as in the case of labor supply, a wage rise involves a substitution and a scale (analogous to the income) effects
- however in this case the two effects are both negative and reinforce each other
Equilibrium in a perfect labor market

- Aggregate labor demand \( \{L^d(w)\} \) is always decreasing in \( w \)
- Aggregate labor supply when hours are fixed is fraction of workers with \( w^f \leq w \)
- Labor supply \( \{L^s(w)\} \) is also increasing in wages
- Due to monotonicity of the two functions, there can be only one equilibrium
- The latter is defined by the condition \( \{L^d(w)\} = \{L^s(w)\} \)
Graphically

(a) Firms’ and workers’ surplus

Equilibrium in a competitive labor market

(b) A flat segment of labor supply

$F_s$, $W_s$, $L^d(w)$, $L^s(w)$
Why Institutions?

1. **Efficiency**: a competitive labor market doesn’t exist
2. **Equity**: as no lump-sum transfer is available, redistribution is distortionary
3. **Policy failure**: heterogeneity and powerful minority interest groups

Tito Boeri and Jan van Ours (2013), The Economics of Imperfect Labor Markets, Princeton University Press.
Labor market institutions

1. Acting on prices:
   - Minimum wage
   - Taxes on labor
   - Trade unions affecting wages
   - Unemployment benefits

2. Acting on quantities
   - Regulations of working hours
   - Immigration policies
   - Compulsory schooling age
   - Employment protection legislation
Institutions and wedges

(a) Price-based and (b) quantity-based institutions and the wedge

Tito Boeri and Jan van Ours (2013), The Economics of Imperfect Labor Markets, Princeton University Press.
Increasing employment bias of LM institutions?

- In the 1950s and 1960s US enviously looking at European institutions. In the 1980s and 1990s the other way round.
- Interactions between shocks and institutions (e.g., shocks create U, EPL or UBs make it long-lasting)
- Under stronger competitive pressures, LM institutions may have higher costs in terms of foregone employment
- Under financial crises however high leverage and low EPL involve very large job loss rates
Reforms of Labor Market Institutions

FIGURE 1.8 Evolution of the index of strictness of EPL

FIGURE 1.9 Evolution of summary generosity measure of UBs

Tito Boeri and Jan van Ours (2013), The Economics of Imperfect Labor Markets, Princeton University Press.
Reforms of Labor Market Institutions

**FIGURE 1.10** Evolution of ALMP expenditure to GDP ratio

**FIGURE 1.11** Evolution of the total tax wedge on low wages

Tito Boeri and Jan van Ours (2013), The Economics of Imperfect Labor Markets, Princeton University Press.

<table>
<thead>
<tr>
<th>Reform area</th>
<th>Number</th>
<th>Effect on the wedge (%)</th>
<th>Scope of the reform (%)</th>
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<td>55</td>
<td>45</td>
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<td>AP</td>
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<td>ECI</td>
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<td>91</td>
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<tr>
<td>ER</td>
<td>65</td>
<td>58</td>
<td>42</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>883</td>
<td>72</td>
<td>28</td>
</tr>
</tbody>
</table>

Considering only the 1985-2005 period for Other RET, WT and MIT.

And in financial and product markets?
Acceleration of reforms decreasing the wedge

Note: 5-year backward weighted moving average

Tito Boeri and Jan van Ours (2013), The Economics of Imperfect Labor Markets, Princeton University Press.
How LM institutions are reformed: a summary

- Many LM reforms
- Sometimes undoing previous reforms: net changes in the values of the indicators conceal a lot of action
- Possible interpretation of inconsistency: political obstacles to reforms (reason nr. 3 for the presence of LM institutions)
- Increasing share of reforms reducing the wedge. Due to globalisation?
- What is going to be happen after the Great Recession?
Exercise:

Mike’s preferences over consumption $C$ and leisure $l$ are given by $U(C, l) = Cl$. The hourly wage is 20 euros per hour and there are 168 hours in the week.

(a) Write down Mike’s budget constraint and graph it.

(b) What is Mike’s optimal amount of consumption and leisure?

(c) What happens to employment and consumption if Mike receives 200 euros of non-labor income each week?
Technical annex.
Competitive equilibrium:

Labor Demand:

\[ L^d = \left( \frac{A}{w} \right)^{\frac{1}{\eta}} \]  

(1)

Where \( A \) is a technological parameter and \( \eta \) is the (inverse) labor demand elasticity, \( 0 \leq \eta \leq 1 \).

Labor Supply:

\[ L^s = G(w) = w^{\frac{1}{\varepsilon}} \]  

(2)

Where \( \varepsilon \) is the (inverse) labor supply elasticity, \( \varepsilon > 0 \).

Equilibrium in a competitive, wedge-free market is given by \( y = w^r = w^* \), hence:

\[ L^* = (A)^{\frac{1}{\varepsilon+\eta}}, \quad w^* = A^{\frac{\varepsilon}{\varepsilon+\eta}} \]  

(3)

Which indeed maximizes the Total Surplus of the Economy, given by the sum of employer’s profit and workers’ surplus:

\[ \max_L \left( \left[ \frac{AL^{1-\eta}}{1-\eta} - wL \right] + \left[ wL - \frac{1}{\varepsilon + 1} L^{\varepsilon+1} \right] \right) \]  

(4)

Tito Boeri and Jan van Ours (2013), The Economics of Imperfect Labor Markets, Princeton University Press.
Equilibrium with a proportional tax on labor income ($t$). Government maximizes a Bernoulli-Nash social welfare function:

$$W = \max \left( \left[ \frac{AL^{1-\eta}}{1 - \eta} - w(1 + t)L \right]^{(1-\beta)} \left[ w(1 + t)L - \frac{1}{\varepsilon + 1} L^{\varepsilon+1} \right]^{\beta} \right)$$

(5)

where $\beta$ measures the distribution weight of labor.

Maximizing we obtain that the wedge is zero if and only if

$$\frac{\beta}{1 - \beta} = \frac{\varepsilon}{(1 + \varepsilon)} \frac{(1 - \eta)}{\eta}$$

(6)
The disemployment bias

It is given by:

\[ 1 + t = \frac{(1 - \eta) + \beta(\eta + \varepsilon)}{(1 - \eta)(1 + \varepsilon)} \]  

(7)

\( \mu = 1 + t \) is the markup imposed by institutions over the competitive wage. When the markup is bigger than 1, the employment level is lower than in the competitive equilibrium. If labor demand becomes more elastic, for example as a result of a globalization shock, at unchanged institutions, the disemployment bias increases.

\[ L_2^I = A\mu_0 - \frac{1}{\varepsilon + \eta_1} < L_1^I = A\mu_0 - \frac{1}{\varepsilon + \eta_0} \]  

(8)

Where subscripts 0 and 1 indicate the situation before and after the shock respectively.
ADDITIONAL MATERIAL:
the porous OLF-U borders: Problem with OECD-ILO definitions

- Porous participation borders: potential labor force excluded
- Relaxing job search requirement, less inactive (about 15% less inactive in the EU countries)
- Some *discouraged workers* – without work and willing, but not searching because they deem that there are no opportunities for them – are undistinguishable from the unemployed in terms of labor market transitions
## The porous OLF-U borders: OECD-ILO definitions

<table>
<thead>
<tr>
<th>Country</th>
<th>Empl.</th>
<th>Unempl.</th>
<th>Total</th>
<th>Out of the labor force</th>
<th>Potential</th>
<th>Discouraged</th>
<th>Unattached</th>
</tr>
</thead>
<tbody>
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<td>74.1</td>
<td>4.9</td>
<td>21.0</td>
<td>3.4</td>
<td></td>
<td>0.4</td>
<td>17.2</td>
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<tr>
<td>France</td>
<td>60.6</td>
<td>7.0</td>
<td>32.4</td>
<td>1.7</td>
<td></td>
<td>0.1</td>
<td>30.6</td>
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<td>5.7</td>
<td>29.8</td>
<td>1.3</td>
<td></td>
<td>0.2</td>
<td>28.3</td>
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<tr>
<td>Italy</td>
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<td>8.6</td>
<td>39.7</td>
<td>2.8</td>
<td></td>
<td>0.5</td>
<td>36.4</td>
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<tr>
<td>Netherlands</td>
<td>67.8</td>
<td>3.9</td>
<td>28.3</td>
<td>1.1</td>
<td></td>
<td>0.1</td>
<td>27.1</td>
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<tr>
<td>Spain</td>
<td>48.3</td>
<td>12.4</td>
<td>39.4</td>
<td>1.7</td>
<td></td>
<td>0.3</td>
<td>37.4</td>
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<tr>
<td>United Kingdom</td>
<td>68.8</td>
<td>7.4</td>
<td>23.8</td>
<td>1.2</td>
<td></td>
<td>0.3</td>
<td>22.3</td>
</tr>
</tbody>
</table>

Measures based on OECD-ILO definitions

Tito Boeri and Jan van Ours (2013), The Economics of Imperfect Labor Markets, Princeton University Press.
Income and Substitution effect: Total effect of a wage rise

The diagram illustrates the effects of a wage rise on labor supply. The axes represent money income and hours of leisure/work. The observed change shows the shift from N1 to N2, indicating an increase in leisure hours and a decrease in work hours. The slope of individual labor supply is indicated by the line segment between A and B, which represents the change in leisure hours for a unit change in money income.
Income and Substitution effect:
The Income Effect

Slope of individual labor supply

Tito Boeri and Jan van Ours (2013), The Economics of Imperfect Labor Markets, Princeton University Press.
Income and Substitution effect: The Substitution Effect

Slope of individual labor supply

Tito Boeri and Jan van Ours (2013), The Economics of Imperfect Labor Markets, Princeton University Press.
Empirically estimated agg LS for Germany
Employment Bias

More competition in product markets (globalisation) increases the employment costs of institutions

Tito Boeri and Jan van Ours (2013), The Economics of Imperfect Labor Markets, Princeton University Press.
## Labor Market vs. Financial and Product Market Reforms

<table>
<thead>
<tr>
<th>Product Mkt</th>
<th>Decreasing the wedge</th>
<th>Increasing the wedge</th>
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<th>Of which decreasing</th>
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<td>Discrete</td>
<td>31</td>
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<td>31</td>
<td>100%</td>
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<td>Incremental</td>
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<td>14</td>
<td>22</td>
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<td>Total</td>
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<td>74%</td>
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<tr>
<td>Of which discrete</td>
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<td>Financial Mkt</td>
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<tr>
<td>Incremental</td>
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<tr>
<td>Total</td>
<td>94</td>
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<td>Of which discrete</td>
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<td>Labor Mkt</td>
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<td>12</td>
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<td>57%</td>
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<td>23</td>
<td>18</td>
<td>41</td>
<td>56%</td>
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<tr>
<td>Total</td>
<td>39</td>
<td>30</td>
<td>69</td>
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<tr>
<td>Of which discrete</td>
<td>41%</td>
<td>40%</td>
<td>41%</td>
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Chapter 2. Minimum Wages
Minimum Wages: What are We Talking About?

- Unlike other institutions, MW acts on minima. It sets a wage floor.
- The first minimum wage was introduced in the United States in 1938 and paid 25 cents per hour. In 2007 the federal minimum wage was $5.85, in nominal terms 23 times larger, but, in real terms, only 1.4 times larger than 70 years ago.
Types of minimum wages:

1. National, government-legislated (possible consultation with trade unions and employers associations).
2. National, outcome of collective bargaining agreements and extended to all workers.
3. Industry-level minimum resulting from industry-level collective bargaining and extended to all workers in that industry.
Within-country variation

1. Not easy to collect info - not always a unique minimum wage
2. Cross-industry when set at the industry level - cross regional when large differences in cost-of-living
3. Age dependent: different minimum for *youngsters*
4. Some countries: acknowledging on the job training, returns to experience & family status
Measures

- Ratio of the Minimum Wage to the Median (or average) Wage
- Coverage of the minimum wage: share of workers occupying jobs eligible for the MW
- Kaitz Index: minimum wage as a proportion of the average wage adjusted by the industry-level coverage of the MW
- Fraction affected: workers with a wage between the old and the new minimum wage
- Spike at the minimum wage (share of workers paid exactly the minimum wage)
### Minimum wages in OECD countries (2010)

<table>
<thead>
<tr>
<th>Country</th>
<th>Ratio MW to median wage (%)</th>
<th>Monthly MW, 2010 (euros)</th>
<th>Taxonomy</th>
<th>Percentage earning MW (2005)</th>
<th>Youth subminimum</th>
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<td></td>
<td>1990</td>
<td>2010</td>
<td>Difference</td>
<td>(1)</td>
<td>(2)</td>
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<td>63</td>
<td>54</td>
<td>-9</td>
<td>1,670</td>
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<td>Belgium</td>
<td>56</td>
<td>52</td>
<td>-4</td>
<td>1,388</td>
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<td>Canada</td>
<td>38</td>
<td>44</td>
<td>6</td>
<td>1,187</td>
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<td>35</td>
<td>—</td>
<td>311</td>
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</tr>
<tr>
<td>Turkey</td>
<td>46</td>
<td>67</td>
<td>21</td>
<td>—</td>
<td>N</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>—</td>
<td>46</td>
<td>—</td>
<td>1,169</td>
<td>N</td>
</tr>
<tr>
<td>United States</td>
<td>36</td>
<td>39</td>
<td>3</td>
<td>949</td>
<td>N-S</td>
</tr>
</tbody>
</table>

Sources: Dolton and Bondiense (2011); OECD Minimum Wage Database.

Note: MW = minimum wage; — = not available.

- **System:** N = national; N-S = national state; S = sectoral collective agreement; R = regional; P = provincial.  
- **Type:** 1 = national, government legislated; 2 = national, bargaining; 3 = industry level, bargaining (see main text).  
- **The ratio of MW to median wage is for 2005 instead of 2010.**

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Tito Boeri and Jan van Ours (2008), The Economics of Imperfect Labor Markets, Princeton University Press.
Evolutions

**FIGURE 2.1** Ratio of minimum to median wage, 1971–2010

*Source: OECD minimum wage database.*
Problems with these Measures

- **Spillover effects**: Increase of the minimum wage may raise the average wage leaving the MW/AveWa ratio unchanged. Also increase of MW may reduce wages in the uncovered segment (absorbing more low-skill workers)
- Gross measure, but taxation is progressive
- Earnings should not include bonuses and overtime premiums (measurement issue)
A Competitive Labor Market

FIGURE 2.2 The minimum wage in a competitive labor market
Pure monopsonist

FIGURE 2.3 Monopsony and the minimum wage

Tito Boeri and Jan van Ours (2008), The Economics of Imperfect Labor Markets, Princeton University Press.
Market power – monopsony

- Classical example: mining company in remote area
- Another example: couple of which the spouse is a “tied stayer”
- More frequent collusion among employers (but then also workers: collective bargaining)
- Modern monopsony: many employers, but few vacancies to apply for
- Wage posting: a higher wage attracts more applicants
MW may increase productivity

- Supply side: productivity of a worker depends on the investment in human capital.
- A minimum wage induces workers to acquire education in order not to be crowded out.
- Similar effect may arise on the demand side: minimum wage increases the number of vacancies for high-productivity jobs issued by employers.
Dual Labor Markets

FIGURE 2.4 A dual labor market and the minimum wage: (a) formal sector; (b) informal sector

Tito Boeri and Jan van Ours (2008), The Economics of Imperfect Labor Markets, Princeton University Press.
Large literature

- Dolado and Teuling (1996) cross-country study: negative effects on youth employment
- More recent studies look at the entire wage distribution and use matched employer-employee data
- Autor et al. (2009) effects just above the minimum wage
- Pisschke et al. (2006): effects also at the very top. managerial positions less paid to make room for MINWA
- This suggests that there may be identification problem in taking top earners as controls
- In addition to selection: workers affected are not representative of the entire population
A controversial study: Card & Krueger (1994)

“Natural experiment”

- Impact of increases in the minimum wage in New Jersey (treatment group) in April 1992 from $4.25 to $5.05: increase by 80 dollar-cents.
- Control group: Pennsylvania, where the minimum wage remained at $4.25 throughout this period.
- New Jersey and Pennsylvania are bordering states with similar economic structures
- Data on employment in 410 fast-foods in the two states in March 1992 (before the MW hike) and in December (after).
FIGURE 2.5 The wage distribution (a) before and (b) after an increase in the minimum wage

Tito Boeri and Jan van Ours (2008), The Economics of Imperfect Labor Markets, Princeton University Press.
### Employment effects – a simple approach

Number of full-time equivalents working in a full-time restaurant:

<table>
<thead>
<tr>
<th></th>
<th>New Jersey</th>
<th>Pennsylvania</th>
</tr>
</thead>
<tbody>
<tr>
<td>March 1992</td>
<td>20.4</td>
<td>23.3</td>
</tr>
<tr>
<td>December 1992</td>
<td>21.0</td>
<td>21.2</td>
</tr>
<tr>
<td>Difference</td>
<td>+0.6</td>
<td>−2.1</td>
</tr>
<tr>
<td>Difference-in-differences</td>
<td>2.7</td>
<td></td>
</tr>
</tbody>
</table>

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Tito Boeri and Jan van Ours (2008), The Economics of Imperfect Labor Markets, Princeton University Press.
## Monopsony effects – what about prices?

Price of a full meal in $:

<table>
<thead>
<tr>
<th>Time</th>
<th>New Jersey</th>
<th>Pennsylvania</th>
</tr>
</thead>
<tbody>
<tr>
<td>March 1992</td>
<td>3.35</td>
<td>3.04</td>
</tr>
<tr>
<td>December 1992</td>
<td>3.41</td>
<td>3.03</td>
</tr>
<tr>
<td>Difference</td>
<td>0.06</td>
<td>-0.07</td>
</tr>
<tr>
<td>Difference-in-differences</td>
<td>0.07</td>
<td></td>
</tr>
</tbody>
</table>
### Effects on profitability

<table>
<thead>
<tr>
<th></th>
<th>Low (average wage)</th>
<th>Profit margin</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low-wage firm</td>
<td>Nonlow-wage firm</td>
</tr>
<tr>
<td>Pre-NMW</td>
<td>2.149</td>
<td>2.775</td>
</tr>
<tr>
<td>Post-NMW</td>
<td>2.378</td>
<td>2.893</td>
</tr>
<tr>
<td>Difference</td>
<td>0.229</td>
<td>0.118</td>
</tr>
<tr>
<td>Difference-in-differences</td>
<td>0.111</td>
<td></td>
</tr>
</tbody>
</table>

*Note: NMW = national minimum wage; Profit margin = ratio of profits to sales.*
Other studies

- Another “natural experiment”
  - Effect of the introduction of a MW in the UK April 1999
  - Comparison of employment outcomes of individuals just below the MW and higher up the wage distribution (1st difference) before and after (2nd difference) the introduction of the minimum wage.
  - No adverse effects (adult and youth, men and women)

- Other studies: generally negative effects on employment, notably among youngsters.

Tito Boeri and Jan van Ours (2008), The Economics of Imperfect Labor Markets, Princeton University Press.
Minimum wages – Empirical Evidence

Studies based on workers histories

- Since the late 1990s, work combining data on workers and firms (matched employee-employer micro data)
- Focus on the economy as a whole and on the effects on employment and hours
- Increase in MW by 1% in France reduces probability of men (women) keeping a job at the MW by 1% (1.3%)
- Increase by 50% of MW in Portugal reduced hirings but increased job retention

Tito Boeri and Jan van Ours (2008), The Economics of Imperfect Labor Markets, Princeton University Press.
Policy issues

- Should the minimum wage be reduced or increased?

- Should there be a youth minimum wage?
Should there be a youth minimum wage?

Youth Minimum Wage as a percentage of the adult minimum wage by age

Tito Boeri and Jan van Ours (2008), The Economics of Imperfect Labor Markets, Princeton University Press.
Unemployment Rates of Prime Age Workers and Young Workers (2010)

FIGURE 2.7 Unemployment rates of prime-aged workers and young workers, 2010

Source: OECD (2011b).

Tito Boeri and Jan van Ours (2008), The Economics of Imperfect Labor Markets, Princeton University Press.
Hyslop and Stinman (2007): New Zealand

<table>
<thead>
<tr>
<th>Minimum wage (percentage of adult wage)</th>
<th>Treatment group</th>
<th>Control group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Aged 16–17</td>
<td>Aged 18–19</td>
</tr>
<tr>
<td>Before March 5, 2001</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>From March 5, 2001</td>
<td>70</td>
<td>100</td>
</tr>
<tr>
<td>From March 18, 2002</td>
<td>80</td>
<td>100</td>
</tr>
<tr>
<td>Increase 2000–2003 (%)</td>
<td>50</td>
<td>87</td>
</tr>
</tbody>
</table>
## Effects on youth Employment

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Treatment group</th>
<th>Control group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Aged 16–17</td>
<td>Aged 18–19</td>
</tr>
<tr>
<td>Employment rate (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Before</td>
<td>41.3</td>
<td>53.8</td>
</tr>
<tr>
<td>After</td>
<td>43.2</td>
<td>56.2</td>
</tr>
<tr>
<td>Difference</td>
<td>1.9</td>
<td>2.4</td>
</tr>
<tr>
<td>Difference-in-differences</td>
<td>0.5</td>
<td>1.0</td>
</tr>
<tr>
<td>Weekly working hours</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Before</td>
<td>16.4</td>
<td>27.4</td>
</tr>
<tr>
<td>After</td>
<td>19.0</td>
<td>28.2</td>
</tr>
<tr>
<td>Difference</td>
<td>2.4</td>
<td>0.8</td>
</tr>
<tr>
<td>Difference-in-differences</td>
<td>3.4</td>
<td>1.8</td>
</tr>
</tbody>
</table>
Why Does a MW exist?

1. Efficiency: remedies market failures, e.g. deriving from excessive monopsonistic power

2. Equity: reduces earnings inequality by supporting incomes of low-earning, workers, for example, low-skilled workers.
Review Questions

1. Why are there so few workers earning the minimum wage?
2. Why are minimum wages age dependent?
3. When does a minimum wage increase employment?
4. When does a minimum wage increase welfare, although not necessarily employment?
5. How does a minimum wage affect poverty?
Suppose that $w$ is the wage and $L$ is employment. The supply curve of low wage workers is given by $w = 10 + 2L$. The demand curve is given by $w = 70 - 2L$.

(a) What are the equilibrium levels of wage, employment, and unemployment?

(b) What happens to employment and unemployment if a minimum wage of 40 euros is introduced?

(c) What happens to employment and unemployment if a minimum wage of 60 euros is introduced?
Minimum Wage and Monopsony

The pure monopsonist chooses the employment level that maximizes profits:

$$\pi^m = \frac{AL^{1-\eta}}{1-\eta} - wL,$$

subject to being on the labor supply curve $w = L^\varepsilon$, Therefore

$$\pi^m = \frac{AL^{1-\eta}}{1-\eta} - L^{1+\varepsilon}.$$ Deriving the first-order condition and substituting:

$$L^m = \left[ \frac{A}{1 + \varepsilon} \right]^{\frac{1}{\varepsilon + \eta}} < A^{\frac{1}{\varepsilon + \eta}} = L^*$$

and

$$w^m = \left[ \frac{A}{1 + \varepsilon} \right]^{\frac{\varepsilon}{\varepsilon + \eta}} < A^{\frac{\varepsilon}{\varepsilon + \eta}} = w^*;$$

Tito Boeri and Jan van Ours (2008), The Economics of Imperfect Labor Markets, Princeton University Press.
Bargaining or Government Setting?

With **bargaining** the socially optimal wage will deviate by a mark-up factor \( \mu = 1 + t \), where \( t \) is the wedge between \( L^s \) and \( L^d \), that is a function of labor demand and supply elasticities, as well as distributional weights of employers and workers:

\[
\mu = \frac{(1 - \eta) + \beta(\eta + \varepsilon)}{(1 - \eta)(1 + \varepsilon)}
\]  

\( \mu \) is the mark-up factor.

**Government legislation**: the outcome depends on the weights the government attaches to workers and employers. Assume that the Government maximizes a Nash-Bernoulli social welfare function line, the mark-up imposed by the Government over the reservation wage is:

\[
\mu^G = \frac{(1 - \eta) + \beta^G(\eta + \varepsilon)}{(1 - \eta)(1 + \varepsilon)}
\]

\( \mu^G \) is the mark-up factor imposed by the Government.

where \( \beta^G \) represents the distribution weight that the government attaches to wage-earners and \( 1 - \beta^G \) is a measure of the electoral power of employers and profit-earners.
Efficiency Wages

The profits of the firm are equal to

$$\pi = f(e(w)L) - wL$$

The firm has two degrees of freedom, wage and employment, so there are two first-order conditions:

$$\frac{\partial \pi}{\partial L} = 0 \rightarrow f'(e(w)) - w = 0 \rightarrow f'(e(w)) = \frac{w}{e(w)} \quad (6)$$

$$\frac{\partial \pi}{\partial w} = 0 \rightarrow f'(e(w))L - L = 0 \rightarrow f'(e(w)) = \frac{\partial w}{\partial e(w)} \quad (7)$$

Combining these two first-order conditions we find that

$$\frac{\partial e(w)}{e(w)} = 1 \quad \text{“Solow condition”} \quad (8)$$
ADDITIONAL MATERIAL:
The Lighthouse Effect

Kernel Density Plot Formal Workers

Kernel Density Plot Informal Workers

Dual Labor Markets

Tito Boeri and Jan van Ours (2008), The Economics of Imperfect Labor Markets, Princeton University Press.
Difference-in-Differences estimators

- If the employment $L$ in state $i$ is determined by an equation of this type:

$$L_i = \alpha w_i + X_i \gamma$$

where $w_i$ is the level of the minimum wage and $X_i$ contains all the other variables which influence $L_i$.

- If we have two observations which refer to two dates for the same State, so:

$$\Delta L_i = L_{i2} - L_{i1} = \alpha (w_{i2} - w_{i1}) + (X_{i2} - X_{i1}) \gamma$$
Difference-in-Differences estimators (2)

- If we also have data for another state $j$ which is identical to $i$ in each characteristic except for $w$, which is not changed, so:

\[ \Delta L_j = (X_{j2} - X_{j1})\gamma \]

then:

\[ \Delta L_i - \Delta L_j = \alpha(w_{i2} - w_{i1}) \]

- In our case, if we think that New Jersey and Pennsylvania are similar enough, we can obtain an estimation of $\alpha$ by simply calculating the difference of the difference.
Diff-Diff estimation: results

\[ \Delta L_{NJ} - \Delta L_{PA} = 0.29 - (-2.01) = 2.30 \]

\[ \frac{\Delta L_{NJ} - \Delta L_{PA}}{\Delta w_{NJ}} = \frac{2.30}{0.8} = 2.875 \]

An increase of the minimum wage leads to an increase of the number of employees.
⇒ An increase of $w_i$ of $1 creates 2.875 more employees per fastfood restaurant.

Card and Krueger (1994)
The degree of monopsony power

Let \( y(L) \) be the value of the marginal product of labor and \( L^s = G(w) \) the aggregate labor supply. Total labor costs \( C \) are \( wL \). For marginal labor costs \( \frac{dC}{dL} = w + \frac{dw}{dL} L = w(1 + \frac{dw}{w} \frac{L}{dL}) \) so marginal labor costs \( \frac{dC}{dL} = w(1 + \varepsilon) \), where \( \varepsilon \) is the inverse elasticity of labor supply. At the monopsony equilibrium:

\[
y(L^m) = w^m(1 + \varepsilon), \tag{9}
\]

The wedge measures the degree of monopsonistic power of the firm.

\[
\frac{y(L^m) - w^m}{w^m} = \varepsilon, \tag{10}
\]

is decreasing with the wage elasticity of labor supply: when labor supply is infinitely elastic, \( \varepsilon \) tends to zero and hence monopsonistic power is zero.