6. The labour market equilibrium

6.1. Perfect competition equilibrium

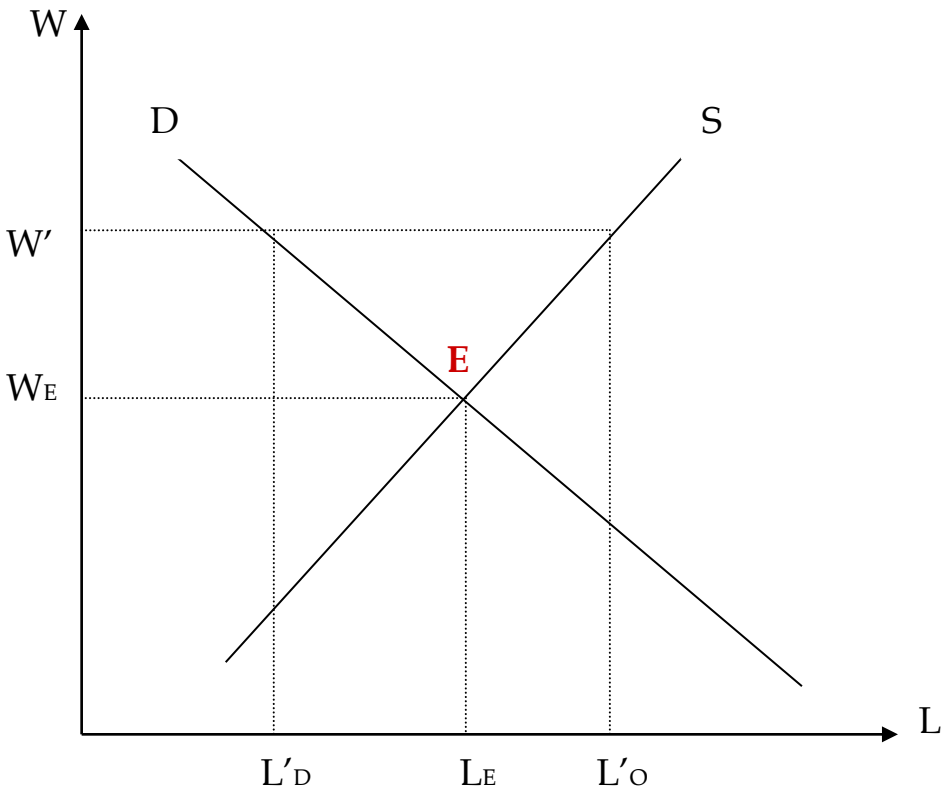
✓ Determining the equilibrium : a reminder

Confronting aggregate labour supply and demand curves
to determine the quantities exchanged and the wage.

Hypothèses :

- Labour (and capital) are homogeneous, i.e. workers are perfect substitutes.
- Many sellers and buyers, i.e. economic agents are ‘price takers’.
- Perfect information, i.e. economic agents have instantaneously all available information at zero cost.
- Perfect mobility of workers and other production factors, i.e. no obstacle to labour and capital mobility.

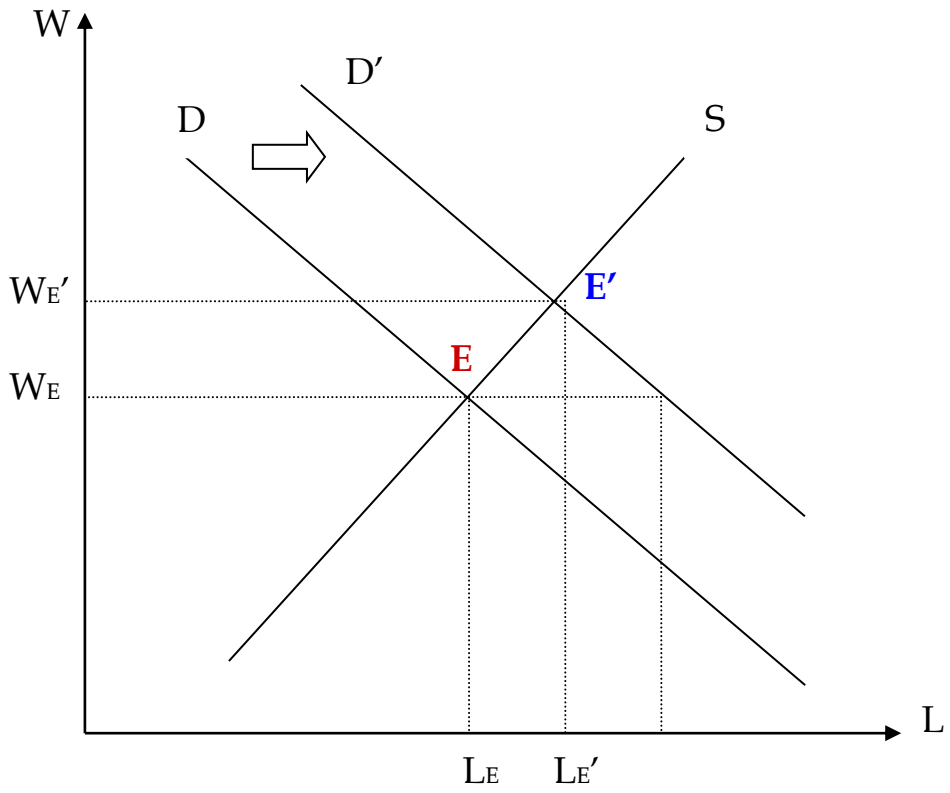
Graphically :



✓Changing the equilibrium

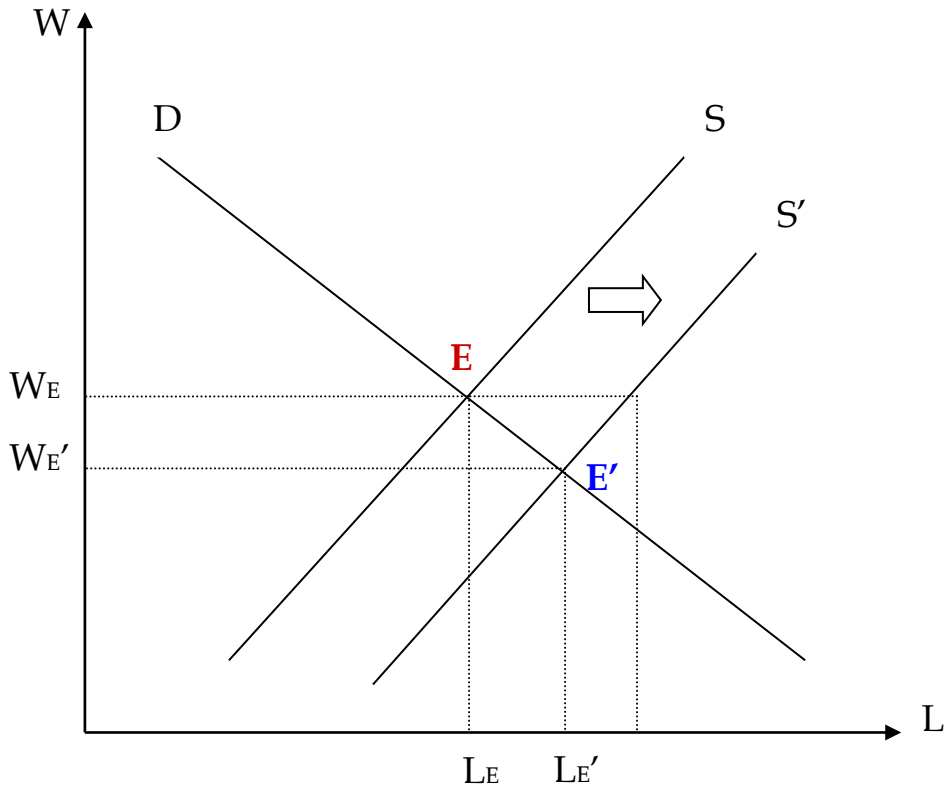
i) Demand curve shifted to the right

Example : organisation of the Olympic Games in Belgium



ii) Supply curve shifted to the left

Example : legal retirement age increases from 65 to 70



6.2. Labour market imperfections

i) Direct imperfections :

Deviations from competition directly observed on the labour market

Example: minimum wages.

ii) Indirect imperfections :

Deviations from competition observed on other markets, for instance on product markets, affecting the labour market equilibrium

Example : rent-sharing, i.e. the elasticity between wages and company profits

Rent-sharing?

Impact of firm profits on workers' wages (all other things being equal)

Intuition:

The market power of firms enable them to generate profits which in turn might (at least partly) be captured by workers. In this case, the 'going wage' will be higher than the 'market-clearing wage'. Therefore, there will be excess labour supply (i.e. unemployment).

Magnitude: wage-profit elasticity between 0.01 and 0.10 depending on the country under investigation and the quality of the instruments to control for simultaneity (Abowd and Lemieux, 1993; Araï, 2001; Martins and Yong, 2014). Contributes to explain the gender wage gap notably in Belgium and Sweden (Nekby, 2002; Rycx and Tojerow, 2004).

Table: The elasticity between wages and company profits in the Belgian private sector

Variables/models	OLS (1)	OLS (2)	OLS (3)	OLS (4)	2SLS (5)
Intercept	1.946**	1.946**	4.367**	4.162**	5.085**
	(21.35)	(5.25)	(18.45)	(25.80)	(26.36)
Profits-per-worker (ln)[a]	0.074**	0.074**	0.036**	0.029**	0.063**
	(39.49)	(8.96)	(8.11)	(8.15)	(11.71)
Sector unemployment rate (ln)	−0.035**	−0.035	−0.010	−0.129**	−0.148**
	(−7.37)	(−1.93)	(−0.89)	(−5.93)	(−7.02)
Sector average wage (ln)	0.624**	0.624**	0.218**	0.305**	0.139**
	(43.11)	(10.43)	(5.70)	(11.98)	(4.28)
Group effects[b]	No	Yes	Yes	Yes	Yes
Individual characteristics and working conditions[c]	No	No	Yes	Yes	Yes
Firm characteristics[d]	No	No	Yes	Yes	Yes
Industry effects (149 dummies)	No	No	No	Yes	Yes
Adjusted R^2	0.208	0.208	0.694	0.719	0.712
F-test	1,786**	133**	270**	1,491**	1,967**
Test of over identification restrictions[e]	–	–	–	–	3.497
					(0.174)
Lester's range of wages (per cent)	47.7	47.7	23.2	18.7	40.6
Number of observations	34,972	34,972	34,972	34,972	34,972
Number of groups	–	1,501	1,501	1,501	1,501

Notes: The dependent variable is the (Naperian) logarithm of the individual gross hourly wages. t-statistics are between brackets. Standard errors have been corrected for heteroscedasticity by the

Source : Rycx and Tojerow (2004, IJM), données relatives à 1995.

Table: The wage-profit elasticity by gender in the Belgian private sector

Variables/models	Model 4 (OLS) Men	Model 4 (OLS) Women	Model 5 (2SLS) Men	Model 5 (2SLS) Women
Intercept	5.738**	5.424**	5.631**	5.270**
	(45.45)	(73.15)	(45.35)	(61.93)
Profits-per-worker (ln)[a]	0.030**	0.025**	0.066**	0.059**
	(8.30)	(4.71)	(12.81)	(6.68)
Sector unemployment rate (ln)	No	No	No	No
Sector average wage (ln)	No	No	No	No
Group effects[b]	Yes	Yes	Yes	Yes
Individual characteristics and working conditions[c]	Yes	Yes	Yes	Yes
Firm characteristics[d]	Yes	Yes	Yes	Yes
Industry effects (149 dummies)	Yes	Yes	Yes	Yes
Adjusted R^2	0.709	0.678	0.702	0.669
F-test	1,348**	1,544**	624**	1,506**
Test of over identification restrictions[e]	–	–	5.330	1.664
			(0.069)	(0.435)
Lester (1952) range of wages (per cent)	17.4	21.4	38.2	50.4
Number of observations	26,650	8,322	26,650	8,322
Number of groups	1,475	1,217	1,475	1,217

Notes: The dependent variable is the (Naperian) logarithm of the individual gross hourly wages. t-statistics are between brackets. Standard errors have been corrected for heteroscedasticity by the

Source : Rycx and Tojerow (2004, IJM), données relatives à 1995.

Table: Contribution of rent-sharing to the gender wage gap in the Belgian private sector

Non-discriminatory wage structure	Overall gender wage gap: $\bar{W}_m - \bar{W}_f$	Percentage of overall wage gap due to differences in: Average values of firm profits per capita: $(\overline{(\Pi/L)}_m - \overline{(\Pi/L)}_f)\hat{\lambda}_{m(f)}$	Wage-profits elasticities: $\overline{(\Pi/L)}_{f(m)}(\hat{\lambda}_m - \hat{\lambda}_f)$	All other factors
Male wage structure	0.237	14.3	17.3	68.4
Female wage structure	0.237	12.7	18.9	68.4

Note: Computation based on the 2SLS estimates reported in Table IV

Source : Rycx and Tojerow (2004, IJM), données relatives à 1995.

$\Rightarrow$ Rent-sharing explains around 1/3 of the gender wage gap

Table: Centralization of collective bargaining and rent-sharing

TABLE 4
Rent-Sharing by Bargaining Regime, IV Estimates

	Centralized industries[a]		*Decentralized industries*[a]	
	Industry agreement	*Firm agreement*	*Industry agreement*	*Firm agreement*
Profits per worker (log)[b]	0.020*** (0.004)	0.039*** (0.009)	0.049** (0.024)	0.109** (0.044)
R^2	0.468	0.436	0.451	0.306
Prob > F	0.000	0.000	0.000	0.000
Lester (1952) range of wages (%)	18.1	15.9	23.6	66.2
Test of over-identifying restrictions[c]	1.761	4.694	0.000	0.613
(P-value)	(0.415)	(0.096)	(1.000)	(0.736)
Number of workers	17,612	3,611	1,823	3,063
Number of establishments	1,424	238	164	179
First stage results[d]				
Profits per worker (log, in 2001)	0.656*** (0.013)	0.662*** (0.014)	0.655*** (0.026)	0.335*** (0.029)
Herfindahl index (in 2000)	0.310*** (0.117)	–0.946*** (0.216)	–0.587** (0.272)	0.534** (0.272)

[a] An industry is considered as (de)centralized if (more) less than 50% of blue-collar workers in that industry (i.e. Joint Committee) are covered by a firm-level collective agreement.

Source : Rusinek and Rycx (2013, BJIR), données relatives aux ouvriers du secteur manufacturier belge en 2003.

$\Rightarrow$ Rent-sharing is more pronounced in decentralized sectors (i.e. Joint Committees, so-called “Commissions paritaires”) and especially when wages are renegotiated collectively at company level.

✓The imperfectly competitive market

Focus on :

- Discriminatory behaviours
- Minimum wages
- Collective bargaining

Trois sources d'imperfections directes :

- Relaxing the hypothesis that economic agents are 'price-takers'

  ⇒ **« Transformed » equilibrium**

- Comportements ou calculs d'agents qui n'obéissent pas aux critères habituels de maximisation du profit (employeurs) ou de l'utilité (travailleurs)

  ⇒ **« Displaced » equilibrium**

- Interventions of outside economic agents (e.g. the State) modifying the functioning of the labour market

  ⇒ **« Suspended » equilibrium**

6.2.1. The « displaced » equilibtrium

Labour market discrimination

Employers, notably because of prejudice, might be less likely to hire some categories of workers (such as women or migrants) even when the latter have the same productive characteristics than their male or native counterparts.

Discrimination refers to a situation in which differences in labour market positions are related to irrelevant characteristics, i.e. to characteristics that do not affect the productivity of the workers.

Our focus to illustrate this issue: gender discrimination, in terms of employment and earnings.

La législation anti-discrimination

All advanced economies have a legal and institutional framework to fight labour market discrimination, notably on gender and ethnic grounds.

The bottom line of all these laws is that there should be no discrimination against workers on the basis of characteristics that are not related to productivity.

Effectiveness of legal discrimination framework depends on how difficult it is for workers to take action and how severe violations of employers are punished.

For the worker incentives, we can distinguish between elements of the proof to be provided by the plaintiff and protection against victimization of the plaintiff.

For the employer incentives, we can distinguish between three types of sanctions in case of non-compliance, namely publicity, fines and prison sentences.

Not only laws themselves but also interpretation and enforcement of laws are important.

Tableau 3.1: Workers' incentives to bring a case to the court

(Boeri and van Ours, 2021)

	Proof	Protection
Denmark	Gender: presumption	Limited
	Ethnicity: strong presumption	
France	Presumption	Limited
Germany	Presumption	Yes
Italy	Gender: strong presumption	Gender: no
	Ethnicity: proof	Ethnicity: limited
Netherlands	Presumption	Limited
Spain	Strong presumption	Yes
United Kingdom	Strong presumption	Yes
United States	Proof	Yes

Source: OECD Employment Outlook

Table 3.2: Employers' incentives to comply

(Boeri and van Ours, 2021)

	Publicity	Fines	Prison
Denmark	No	Penal	None
France	Yes	Penal	Yes
Germany	Yes	Administrative and penal, low	None
Italy	Yes	No	None
Netherlands	Yes	Penal	Yes
Spain	Yes	Some	Yes
United Kingdom	Yes	None	None
United States	Yes	Some	None

Source: OECD Employment Outlook

Various theories on discrimination

Discrimination is the valuation of personal characteristics that are unrelated to individual productivity.

In the context of a ***competitive*** labour market:

i) **Taste-based discrimination model**

In the context of a ***non-competitive*** labour market:

i) **Statistical discrimination** and

ii) **Discrimination due to occupational crowding**

Taste-based discrimination model (Becker, 1971)

Main framework used to analyse the nature and consequences of discrimination based on prejudice under perfect competition (i.e. equally productive workers and economic agents are price-takers)

Different variants of the model, depending on whether prejudice caused to:

- **Employers** (employers do not like women)
- **Co-workers** (male workers do not like to work with women)
- **Customers** (customers do not like to be served by women).

Employer prejudice

Assumption: employers have a preference for male workers. Consequence: employer does no longer maximize its profit *stricto sensu*. They now maximize their utility which depends on the profits that they make but also on the wage cost that they pay to women

$$U = \Pi - \omega\, w_f\, L_f$$

where:

- U = utility
- Π = profit
- w_f = wage females
- L_f = the number of female workers hired
- ω = the employer-specific coefficient of discrimination; $0 \leq \omega \leq \omega_{max}$

For unprejudiced employers $\omega = 0$ (they maximize $U = \Pi$), while for employers with maximum prejudice $\omega = \omega_{max}$ (they maximize $U = \Pi - \omega\, w_f\, L_f$).

The wage costs for *male* workers = $w_m L_m$.
The (perceived) wage costs for *female* workers = $(1 + \omega) w_f L_f$

Hiring strategy:

Non-prejudiced firms (maximizing their profit) are indifferent to hire men or women if $w_f = w_m$ (as workers are assumed to be equally productive). If $w_f > w_m$: only men are hired. If $w_f < w_m$: only women are hired.

Prejudiced firms (maximizing their utility) will hire:

- Only men if $w_m \leq (1 + \omega) w_f$
- Only women if $w_m > (1 + \omega) w_f$

For given values of w_m and w_f, the magnitude of the prejudice ω for a firm will determine if the latter hires only men or only women.

$\Rightarrow$ Workforce will be segregated (firms solely composed of men or women)
$\Rightarrow$ Conditional on the female wage, the higher the mean coefficient of discrimination ω across firms, the lower will be the number of females hired.

⇒ Because of the existence of prejudiced firms, wages of women m be lower than those of men at equilibrium

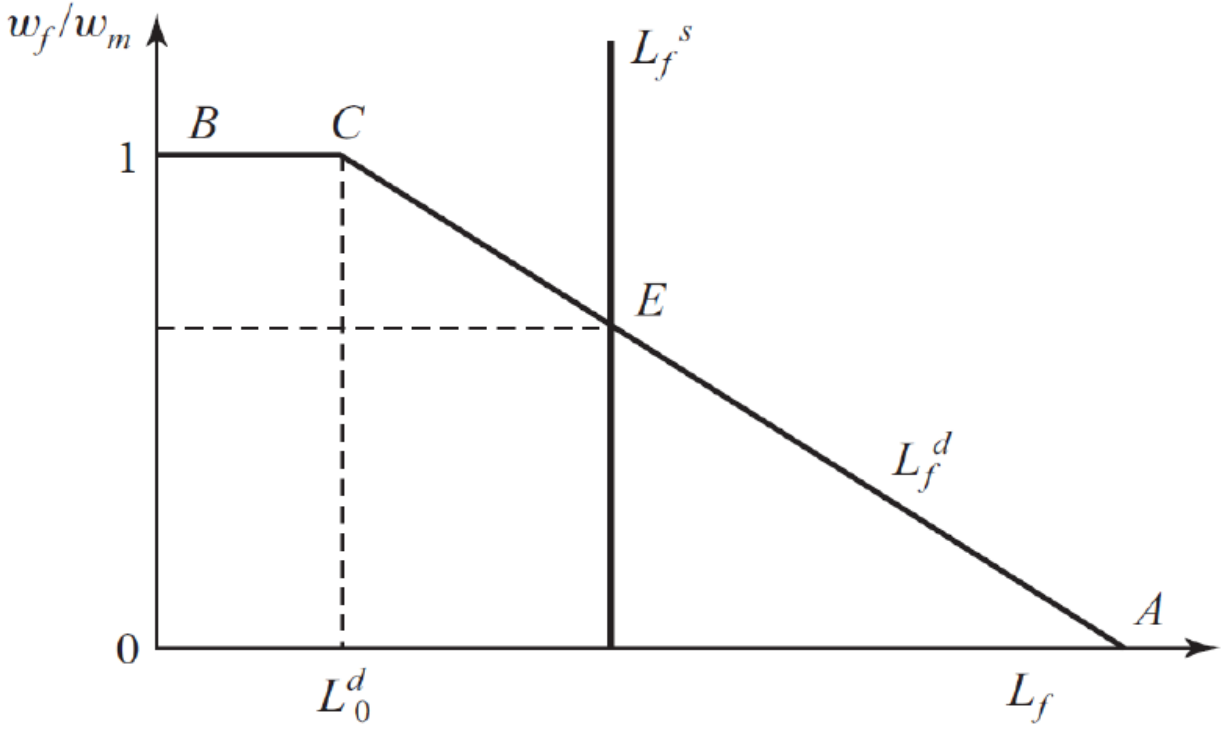


FIGURE 4.1 Employer discrimination and the gender wage gap equilibrium

Source: Boeri and van Ours (2013)

How to read this graph?

– L_0^d denotes labour demand from unprejudiced firms (which are ready to pay women as men).

– BCA shows the labour demand curve for women (from both prejudiced and unprejudiced firms)

– If male and female wages have the same wage, only L_0^d jobs are available for women.

– Female employment can only increase beyond L_0^d if the relative wage w_f/w_m falls.

– Point A represents an employer that is sufficiently prejudiced to hire no female worker even if the latter's wage is equal to zero.

– L_f^s is the female labour supply curve, which is assumed to be perfectly inelastic.

– Equilibrium is at point E, that is at the interaction of the female demand and supply curves, where $w_f^* < w_m^*$.

Model predictions?

– All firms that employ women (even those with unprejudiced employers) pay the same low wage to women, i.e. $w_f^* < w_m^*$. This is due to the fact that wages are the outcome of a market process and are not influenced by individual employers (because by definition economic agents are price-takers).

– Even if many employers are prejudiced, an increase in the number of unprejudiced firms will reduce the gender wage gap. Why? If number of unprejudiced firms increases, than point C moves to the right, the slope of CA becomes steeper, which in turn increases the relative wage $w_f^* \big/ w_m^*$.

Model predictions (Cont.)?

– If $L_0^d \succ L_f^s$ (i.e. if labour demand of unprejudiced firms is higher than female labour supply), there is no wage discrimination despite the presence of many prejudiced employers. Yet, there will be some segregation: women will find a job at non prejudiced firms and men (predominantly) at prejudiced firms.

– An increase in female labour supply (i.e. a shift of L_f^s to the right) will reduce women's wages relative to men's wages and thus increase the equilibrium level of wage discrimination on the labour market.

– Profits of firms hiring only women will be higher than those hiring only men (because at equilibrium $w_f^* < w_m^*$ and that by definition men and women are equally productive)

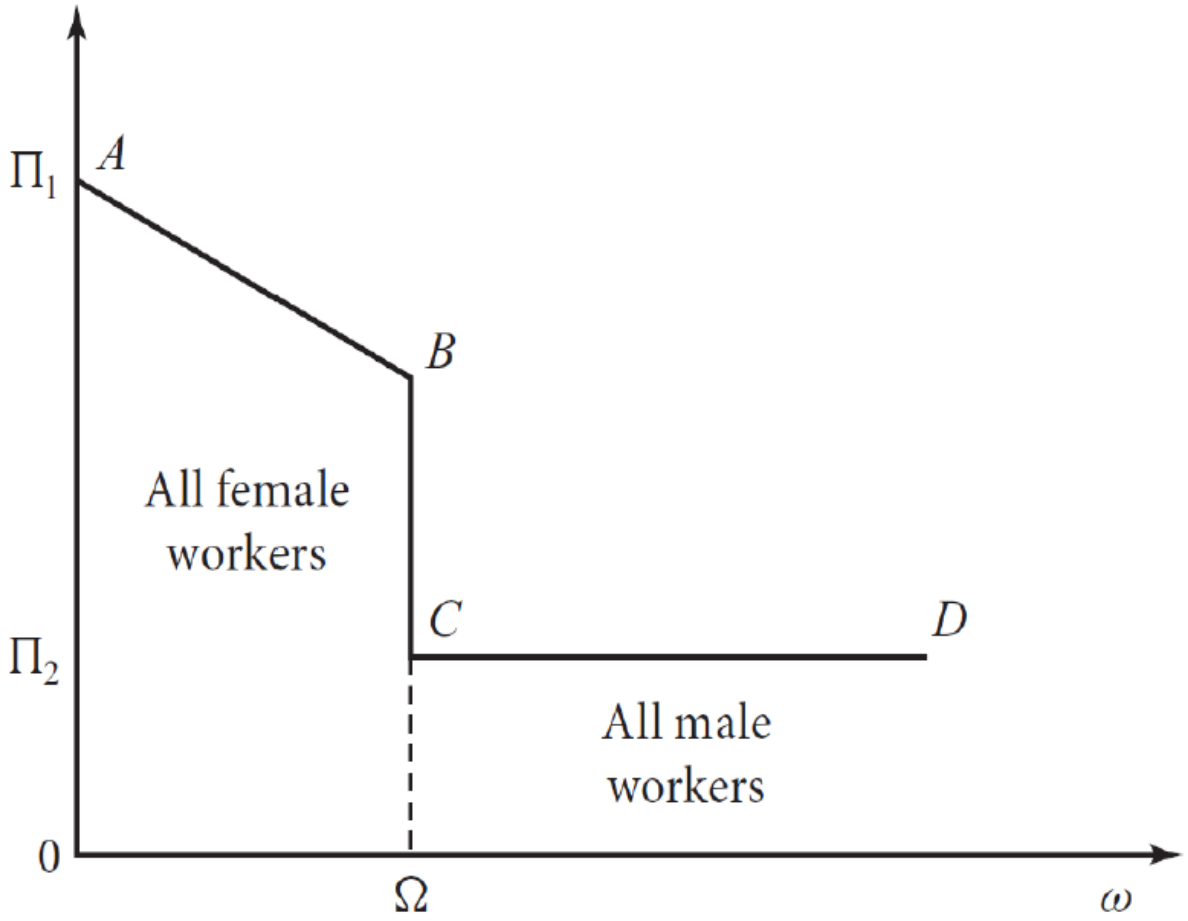


FIGURE 4.2 Profits and coefficient of discrimination

How to read this graph?

– A firm will hire only women if its coefficient of discrimination ω satisfies the following condition:

$$w_m^* > (1 + \omega)\, w_f^* \quad \Rightarrow \quad \omega < (w_m^* - w_f^*) / w_f^*$$

Suppose:

$(w_m^* - w_f^*) / w_f^* = \Omega^* \equiv$ Coefficient of market discrimination at equilibrium

$\Rightarrow$ Firm will only hire women if: $\omega < \Omega^*$

$\Rightarrow$ Firm will only hire women if: $\omega \geq \Omega^*$

$\Rightarrow$ A non-prejudiced firm at equilibrium will only hire women in order to maximize its profit (as $w_f^* < w_m^*$, while men and women are equally productive)

Relation between firm profits and ω?

- The profit is maximum at point A, i.e. for non-prejudiced firms ($\omega = 0$), and equal to Π_1. Non-prejudiced firms will only hire women and pay them w_f^* (which also corresponds to their *perceived* wage cost as they have no prejudice employing women).

- As the coefficient of discrimination ω increases, profits decrease. Indeed, prejudiced firms, only employing women (i.e. for which $\omega < \Omega^*$), will see their profits (i.e. utility) decrease as their perceived cost for women $(1 + \omega)\, w_f^*$ goes up.

- When $\omega = \Omega^*$, profits drop from B to C, as from then on firms will only hire male workers and will have to pay $w_m^* > (1 + \omega)\, w_f^*$

- Any further increase in prejudice (ω) will not lower profits as male labour costs will not be affected. Put differently, firms will pay w_m^* whatever the level of prejudice (and $\omega \geq \Omega^*$).

Long run equilibrium?

Prejudiced firms (hiring only women or men) have lower profits than unprejudiced firms.

Yet, this is a short-run phenomenon. Indeed, in a competitive market, prejudiced firms will not be able to survive in the long run.

More precisely, they will be forced to leave the market either through takeover by unprejudiced firms or through competition from unprejudiced firms entering the market.

Co-worker prejudice

Discrimination against women may also appear because male workers prefer not to work with female co-workers

In this case, the utility U_m of a male prejudiced worker depends on his own wage but also on whether he has female co-workers:

$$U_m = w_m (1 - \omega I_f)$$

where:

- U_m = utility of male workers
- W_m = wage of male workers
- ω = coefficient of discrimination against female co-workers
- I_f = 1 if the worker has at least one female co-worker and 0 otherwise

$\Rightarrow$ Prejudiced male workers will want to be compensated for the disutility of having female co-workers. Alternatively, for a given wage, they will prefer to work in a male-only firm.

Model predictions?

- In firms in which women and men would cooperate, the male worker should earn more to overcome his dislike of female co-workers.

  Given that firms maximize their profits and that all workers are equally productive, firms will choose to hire either men or women, but not both because this would imply to pay higher wages to men, which in turn would reduce profits. So, the workforce will be segregated: women will never work with (prejudiced) men in the same firm.

- Even if all men are prejudiced there will be no gender wage gap. Women and prejudiced men will not work in the same companies (workforce segregation) but they will earn the same wages (no gender wage gap) as they are equally productive.

  Recall if employer prejudice: workforce segregation and gender wage gap.

Customer prejudice

If customers do not like to be served by women, the perceived price of a product or service may differ from the actual price.

Discrimination will occur if the perceived price p_w for a particular product depends on the presence of women when the transaction takes place.

In this case:

$$p_w = p\,(1+ \omega\, I_f)$$

where:

- p = actual price
- ω = coefficient of customer discrimination

$\Rightarrow$ Conditional on the price, prejudiced consumers will only buy from firms that have no female workers. Alternatively, prejudiced consumers will only buy from firms with female workers if the price is sufficiently low.

Model predictions?

- Since firms pay workers according to their marginal product (i.e. the additional production value they generate to the firm), in an environment with customer discrimination women will have a lower wage. There will be a gender wage gap.

- The workforce will be segregated. In an all-women firm the product price will be low and hence this firm will not be able to afford to hire a male worker (because his salary would be too high in relation to his marginal productivity value).

- In an all-man firm the product price will be high, but the price would fall once a female worker is hired (because in this case customers would want to pay a lower price to compensate for the prejudice of potentially being served by a woman).

Comparison of taste-based discrimination outcomes

- In the short-run, the workforce will be segregated irrespective of whether the taste-based discrimination is related to employers, co-workers or customers.

- In a labour market with employer discrimination market forces will eventually remove discrimination through competition (and the bankruptcy of prejudiced employers), but no such market force exists with customer discrimination.

- Co-worker discrimination does not cause a gender wage gap.

- With customer and co-worker discrimination, workforce segregation may persist.

What if the market is not perfectly competitive?

Taste-based discrimination may also occur in ***a non-competitive*** labour market.

In a labour market with employer discrimination against women and search frictions, it is more difficult for women to find a job, since an application at a prejudiced employer may not be successful.

Moreover, if women have to apply more often to find a job than men do, it implies that job search for women is more expensive and the bargaining power of women is weaker.

In the end, unprejudiced employers may exploit this by offering women a lower wage. Put differently, wage discrimination may persist in the long run in the presence of employer prejudice if we assume that the labour market is not perfectly competitive (Black, 1995).

Statistical discrimination

The theory of statistical discrimination is based on the assumption that employers have imperfect information about workers productivities. More precisely, they observe a noisy signal of the true productivity of individual workers (Aiger and Cain, 1977).

To assess individual productivity, employers use individual ‘test scores’. The latter may be based on actual recruitment tests, but they may also come from the interpretation of an application letter or the evaluation of a CV. As the results of these individual tests are imperfect, they are combined with information about the group to which the candidate belongs.

The perceived productivity of an individual worker is the weighted average of the individual test score and the perceived group productivity (i.e. the average test score of the group to which the individual belongs to).

La productivité perçue d'un travailleur individuel va correspondre à la moyenne pondérée du résultat du test individuel de ce travailleur et de la productivité perçue du groupe auquel il appartient (càd la note moyenne du test pour l'ensemble des membres du groupe auquel le travailleur appartient).

$$q_{ij} = \alpha\, T_j + (1 - \alpha)\, T_i$$

où:

- q_{ji} = la productivité perçue du travailleur i du groupe j,
- Tj = la productivité perçue du groupe j (càd la note moyenne du groupe j),
- Ti = la note du travailleur i,
- α = la pondération associée aux informations sur la productivité du groupe.

$\Rightarrow$ Des travailleurs ayant la même productivité réelle et les mêmes résultats aux tests peuvent être traités différemment s'ils appartiennent à des groupes ayant une productivité (perçue) différente.

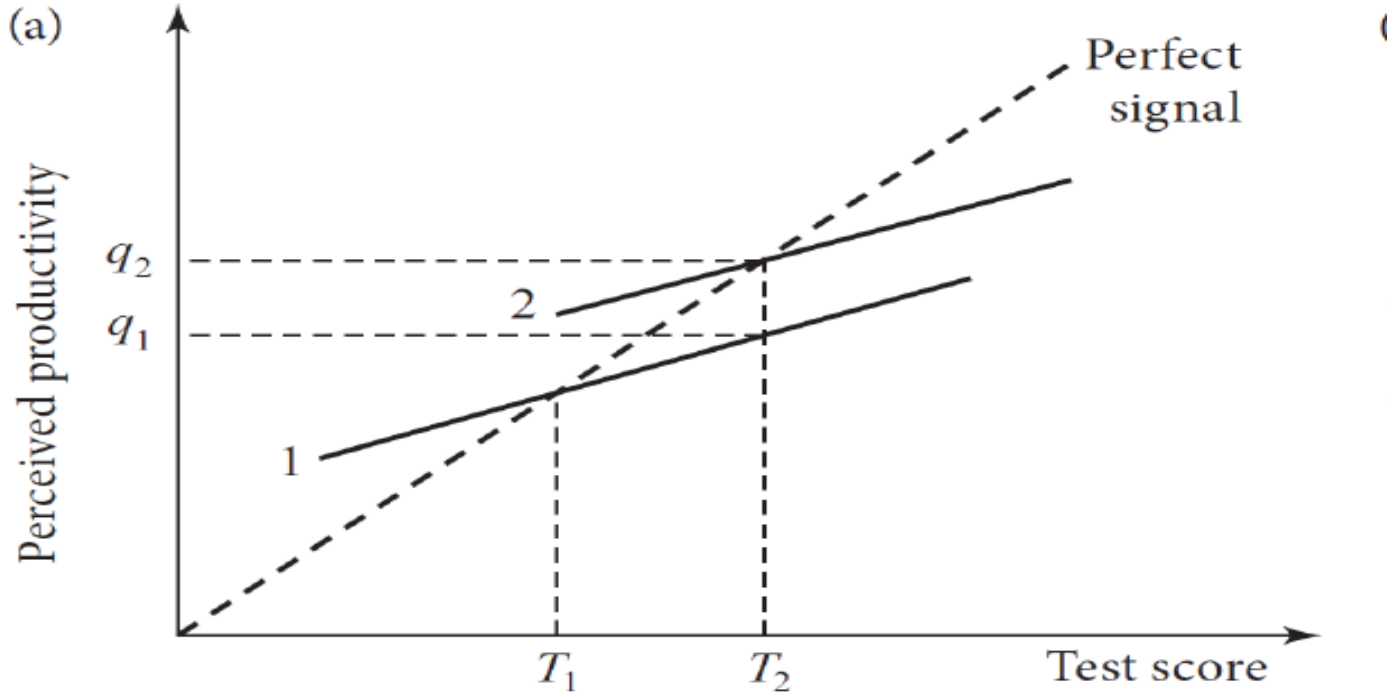


FIGURE 4.3: Statistical discrimination

Source: Boeri and van Ours (2021)

How to read this graph?

- Lines 1 and 2 show how test scores of two groups of workers are perceived in terms of productivity by employers.

  Example: Perceived productivity of a worker with test score T_2 is equal to q_1 (q_2) if he belongs to group 1 (group 2).

- The 'perfect signal' line shows the true productivity of a worker given his test score.

  Example: True productivity of a worker with test score T_2 is equal to q_2 whatever the group of workers to which he belongs.

- Lines 1 and 2 are parallel $\rightarrow$ quality of the signal provided by test scores (in terms of perceived productivity) is the same for the two groups of workers.

- Average test score of group 1 (2) = T_1 (T_2) $\rightarrow$ actual mean productivity is lower in group 2 than in group 1.

What about individual discrimination?

At test score T_2, an individual of group 1 (group 2) will have a perceived productivity of q_1 (q_2), with $q_2 > q_1$.

$\Rightarrow$ The firm will hire the worker from group 2 because he has a higher perceived productivity. The worker from group 1 either will not be hired or will be hired at a lower wage (than his counterpart from group 1).

$\Rightarrow$ Two workers with the same actual productivity will not be treated equally because they belong to groups having different (perceived) productivity.

$\Rightarrow$ This type of statistical discrimination could be based on stereotypes, where the perceived productivity differences between groups are based on prejudice or lack of information.

What about *average* discrimination between groups?

- If perceived group differences are real, on average there is no discrimination between groups, because on average perceived and actual productivity differences coincide.

- On average workers in each group will be paid at their marginal productivity. But some will be underpaid (when perceived productivity is lower than actual productivity) and other will be overpaid (when perceived productivity is higher than actual productivity).

Discrimination due to occupational crowding

The theory of occupational crowding explains how wage differences between occupations may occur when some groups of workers are restricted in their entrance to certain occupations.

According to this theory, wage discrimination is not within occupations or industries but across occupations and industries.

Suppose that women are not allowed (or not supposed) to enter a particular occupation. In this case, women will enter other occupations, and they will push wages in these other occupations down.

The barriers for women to enter specific occupations may come of institutions, traditions or because of self-selection (or self-censorship).

Historically, some occupations had “marriage bars”, which prohibited the employment of married women in these occupations.

Because of marriage bars, employed single women had to give up their jobs as soon as they got married. If they wanted to remain employed after marriage, they had to look for a job outside the marriage-bar occupations.

In some cases, widowed women with children were still considered to be married, which also prevented them from exercising certain professions.

Marriage bars typically caused highly skilled women to work in low-wage jobs.

During the Great Depression of the 1930s, in many Western countries, this practice was promoted as a social policy aimed at guaranteeing employment for a greater number of family units.

But this practice has persisted beyond these years of severe economic downturn.

Examples:

– In the US, marriage bars were in place until the 1950s, notably in teaching jobs (Goldin, 1988).

– In the Netherlands, a law prohibiting married women to work in government service was introduced in 1937, at a time of high unemployment. However, this law was not abolished until 1957. Although they were not legally obliged to do so, some big companies followed the example of the government and also fired women, as soon as they got married or became pregnant (Portegijs et al., 2008).

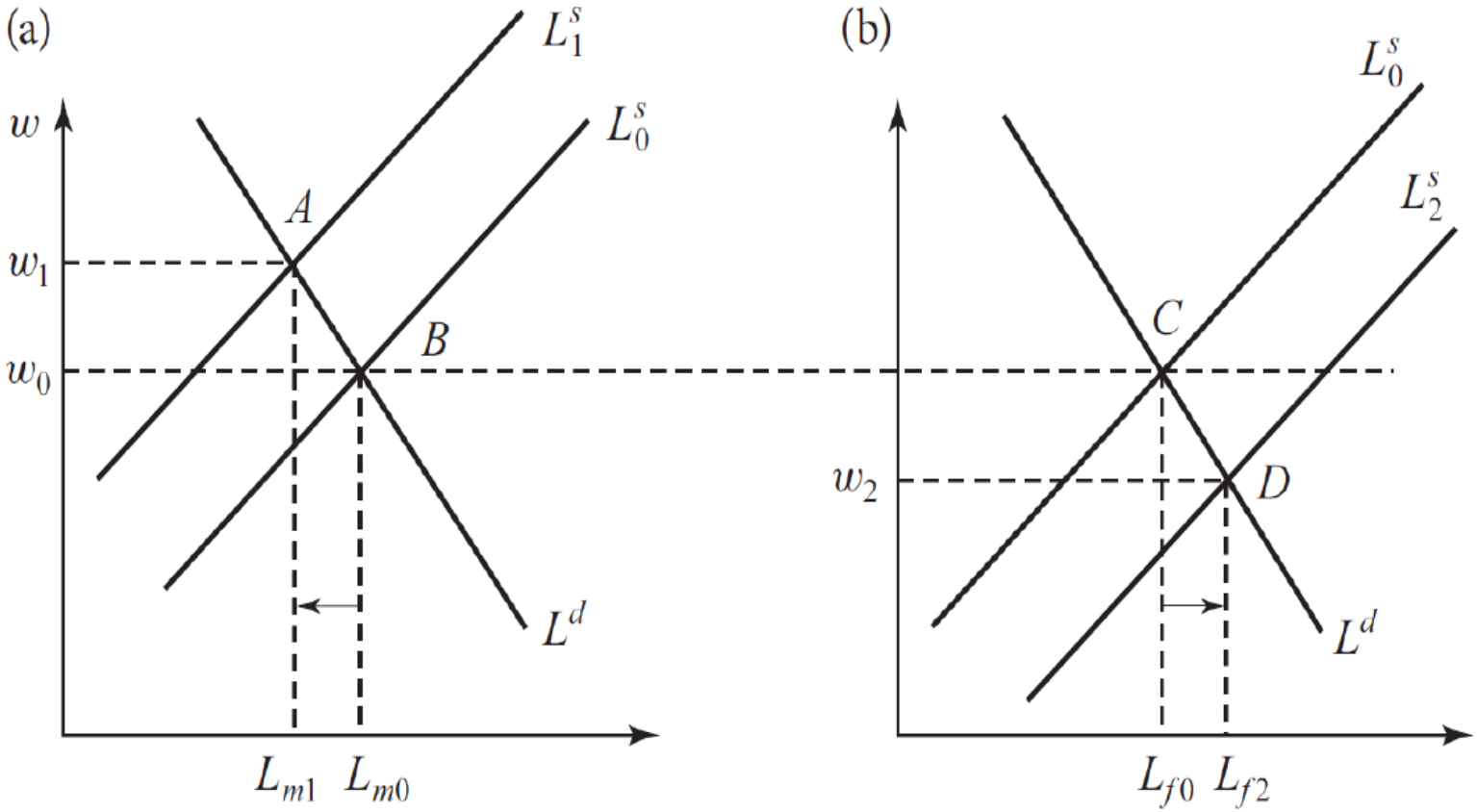


FIGURE 4.5 Occupational crowding: (a) male jobs; (b) female jobs

Source: Boeri and van Ours (2021)

How to read this graph?

– *Without occupational barriers*, the labour markets for the two occupations are in equilibrium, the equilibrium wage is equal to w_0 in both markets, and women and men work indifferently in one market or the other.

  There is no distinction between ‘male’ and ‘female jobs’ because women can work in ‘male jobs’ and men can work in ‘female jobs’.

– If barriers are introduced, so that women are no longer allowed to enter ‘male jobs’, the equilibrium will be modified:

  ✓ The supply curve of ‘male jobs’ will be shifted to the left. This will reduce employment and increase the wage of ‘male jobs’ to w_1.

  ✓ If we assume that women, who are banned from ‘male jobs’, still want to work, they will have to work in ‘female jobs’ → The labour supply curve for ‘female jobs’ will be shifted to the right. This will increase employment and decrease the wage to w_2.

A key assumption of the occupational crowding model is that men working in ‘female jobs’ will not respond to decreasing wages by moving to ‘male jobs’. This may be explained by their professional preferences or by the high mobility costs (geographical or professional) that discourage them from changing jobs.

✓ In the end, the wage will be determined by the type of job and not by the gender of the worker:

- On average women will earn less than men, but within occupations there will be no gender wage gap.

- Men and women working in ‘female occupations’ will earn less than men in ‘male occupations’. But women and men working in ‘female occupations’ will earn the same wages.

Empirical evidence

a) Unconditional gender wage gap

Tab. 7 : Female gross hourly wages in % of male gross hourly wages in the private sector

	2007	2010	2014	2018	2020
Italy	5,1	5,3	6,1	5,5	**4,2**
Belgium	**10,1**	**10,2**	**6,6**	**5,8**	**5,3**
Spain	18,1	16,2	14,9	11,9	9,4
Greece	21,5	15,0	12,5	10,4	n.d.
France	17,3	15,6	15,5	16,7	11,2
Sweden	17,8	15,4	13,8	12,1	11,2
Ireland	17,3	13,9	13,9	11,3	n.d.
Portugal	8,5	10,0	14,9	8,9	11,4
Denmark	17,7	17,1	16,0	14,6	13,9
Netherlands	19,3	17,8	17,0	14,7	14,2
Finland	20,2	20,3	18,4	16,9	16,7
Germany	22,8	22,3	22,3	20,1	**18,3**
Austria	25,5	24,0	22,2	20,4	**18,9**
United-Kingdom	20,8	23,3	20,9	**19,8**	n.d.
Average*	**16,8**	**15,6**	**14,6**	**13,5**	**12,2**

Notes : * Unweighted average of the data in the table. Differences between men's average hourly earnings and women's average hourly earnings as a percentage of men's average hourly earnings. Results obtained from the Structure of Earnings Survey. This survey covers only private sector companies with fewer than ten employees. The private sector includes industry, construction and market services (except public administration, defence and mandatory social security), codes C to K in the NACE Rev.2 nomenclature. Gross wages cover cash remuneration paid directly by the employer before deduction of taxes and social security contributions. They do not include non-regular bonuses and allowances, such as 13th month or holiday bonuses. Severance pay and payments in kind are also excluded. Source: Eurostat database.

An underestimated pay gap:

✓ **These are hourly wages**

Yet the incidence of part-time work (often involuntary) is much higher among women.

✓ **Only the basic component of salaries is taken into account.**

Regular and non-regular annual bonuses (such as 13th month and holiday bonuses) are not included.

Extra-legal monetary and non-monetary benefits (health insurance, pension supplements, company cars, petrol cards, etc.) are also excluded.

✓ **The pay gap is expressed as a % of men's pay**

Example : women's wage = 8 EUR, men's wage = 10 EUR

$(W_h - W_f) / W_h = (10 - 8) / 10 = 0{,}2 \quad \Rightarrow \quad 20\%$

$(W_h - W_f) / W_f = (10 - 8) / 8 = 0{,}25 \quad \Rightarrow \quad 25\%$!

Illustration for 2018:

- Gross <u>hourly</u> gender pay gap $((w_h-w_f) /w_h)$ = **5,8%** (SES) vs **9,2%** (ONSS)

  SES : basic pay, mainly private sector, companies with 10 or more employees;
  ONSS : broader definition of pay, all sectors, all company sizes.

- Gross <u>annual</u> gender pay gap $((w_h-w_f) /w_h)$ in 2018 = **23,1%** (ONSS)

- Gross annual gender pay gap, <u>as a % of women's wages</u> $((w_f-w_h) /\mathbf{w_f})$ = **-30,0%** (ONSS)

  Note :
  (76,9 – 100) / 100 = -23.1%
  (100 – 76,9) / 76,9 = -30%

The unconditional gender pay gap:

$$\frac{(W_f - W_h)}{W_h}$$

↳ Interesting information but provides no insight regarding the origin of the gender wage gap.

↳ Does not enable to identify:

- ✓ Part of the gender wage gap explained by differences in productive characteristics of men and women, e.g. education, experience, tenure.

- ✓ Part of the gender wage that remains unexplained after controlling for these characteristics, part that could be attributed to discrimination (but with caution, cf. infra).

Regression analyses and correspondence studies often used to investigate the origin of wage differentials between different groups of workers, and in particular to test for the presence of wage discrimination.

b) Regression analyses

A popular way to establish the extent of wage discrimination between any two groups of workers (for instance men and women) is based on estimates of wage equations.

Wage equation ?

$$\ln(W_i) = \alpha + \sum_{j=1}^{J} \beta_j X_{j,i} + \delta\, Y_i + \varepsilon_i$$

where

- W_i : the wage of individual i (i = 1,…,N)
- X_i : the vector of personal and job characteristics of individual i
- Y_i : a binary variable relative to gender (Yi=1 if male, Yi=0 otherwise)
- ε_i : the error term

♦ Wage equation including only a binary variable

$$W_i = \alpha + \delta Y_i + \varepsilon_i$$

where

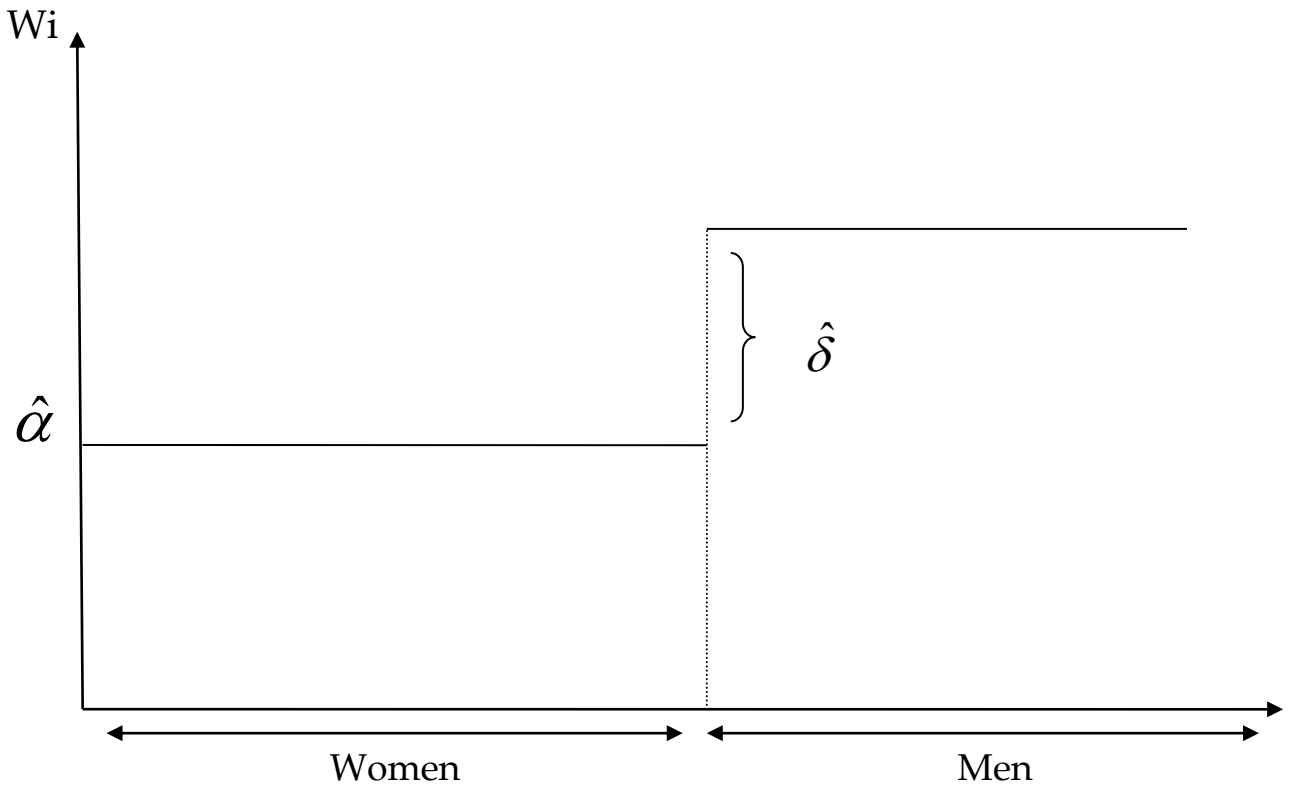
- W_i : the wage of individual i (i = 1,..,N)
- Y_i : a binary variable relative to gender (Yi=1 if male, Yi=0 otherwise)
- ε_i : the error term

↳ Average wage of women : $E(W_i / Y_i = 0) = \alpha$

↳ Average wage of men : $E(W_i / Y_i = 1) = \alpha + \delta$

↳ The average wage gap between men and women is equal to δ.

Graphically :



♦ Wage equation including a binary variable and a quantitative variable

$$W_i = \alpha + \beta X_i + \delta Y_i + \varepsilon_i$$

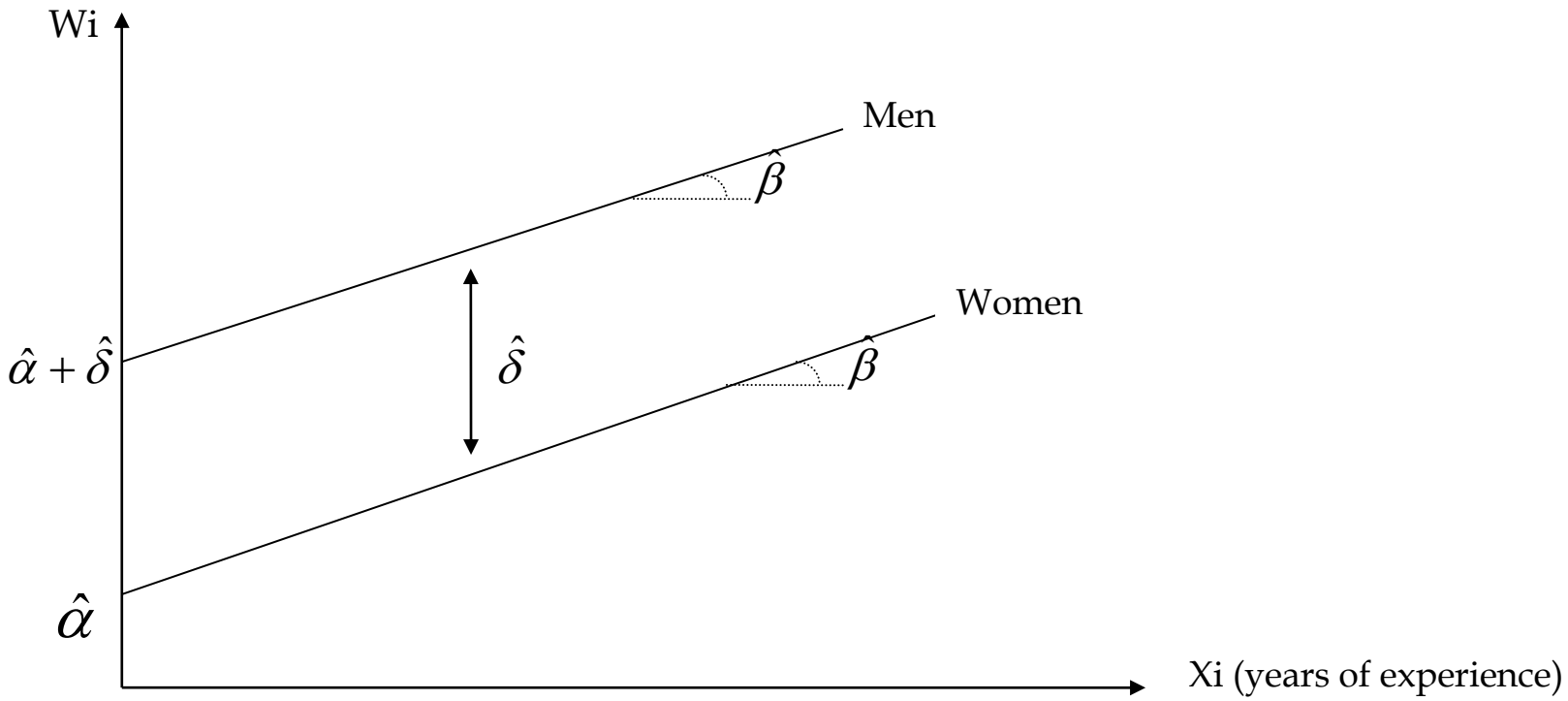
wher

- W_i : the wage of individual i (i = 1,..,N)
- Y_i : a binary variable relative to gender (Yi=1 if male, Yi=0 otherwise)
- X_i : the number of years of experience of an individual
- ε_i : the error term

↳ Average wage of women : $E(W_i / X_i, Y_i = 0) = \alpha + \beta\ X_i$

↳ Average wage of men : $E(W_i / X_i,\ Y_i = 1) = (\alpha + \delta) + \beta\, X_i$

Graphically :



- δ measures the pay gap between men and women "all other things being equal".
- Hypothesis: the value of the parameter β is identical for men and women.

- **Results based on the SES (completed with ONSS data)**

Period / Explanatory variables :	**1995**	**2002**	**2004**	**2005**
Intercept	5.524**	2.239**		
General experience				
Level	0.016**	0.020**		
Squared/10²	-0.036**	-0.056**	*Specification slightly different from that for 1995 and 2002*[a]	
Cubed/10⁴	0.022**	0.054**		
Tenure				
Level	0.016**	0.022**		
Squared/10²	-0.017**	-0.029**		
Gender				
Men	Référence	Référence	Référence	Référence
Women	**-0.116****	**-0.114****	**-0.120****	**-0.103****
R^2 ajusté	0.713	0.637	0.657	0.618
F-test	11792**	821**	510**	443**
Nombre d'observations	67023	98023	94909	95930

Dependent variable: ln (gross hourly wage in BEF and EUR). This table is extracted from regressions containing a larger number of explanatory variables (including level of education, employment contract, working time, occupation, sector of activity, firm size and region). [a] Use of categorical variables for age and seniority. *, ** : coefficients significant at 5 and 1%, respectively. Sources : Rycx (2001), Rycx *et al.* (2008), Du Caju *et al.* (2010).

♦ Oaxaca – Blinder decomposition

$$\ln(W_h) - \ln(W_f) = \overline{X}_h\ (\hat{\beta}_h - \beta^*) + \overline{X}_f\ (\beta^* - \hat{\beta}_f) + (\overline{X}_h - \overline{X}_f)\beta^*$$

where

- Indices *h* and *f* refer to men and women respectively
- Left-hand term measures the difference between the average pay of men and women
- $\overline{X}$: vector of mean values of explanatory variables.
- The betas are obtained from the following regressions:

$$\begin{cases} \ln\ (W_{h,i}) = \beta_h\ X_{h,i} + \varepsilon_i \\ \ln\ (W_{f,i}) = \beta_f\ X_{f,i} + \varepsilon_i \end{cases}$$

$$\ln(W_h) - \ln(W_f) = \overline{X}_h\,(\hat{\beta}_h - \beta^*) + \overline{X}_f\,(\beta^* - \hat{\beta}_f) + (\overline{X}_h - \overline{X}_f)\,\beta^*$$

In short, the terms on the right measure respectively :

- The advantage enjoyed by men.
- The loss suffered by women.
- The proportion of the pay gap resulting from the diversity of individual characteristics.

Hypothesis : $\beta^* = \hat{\beta}_h$

⇩

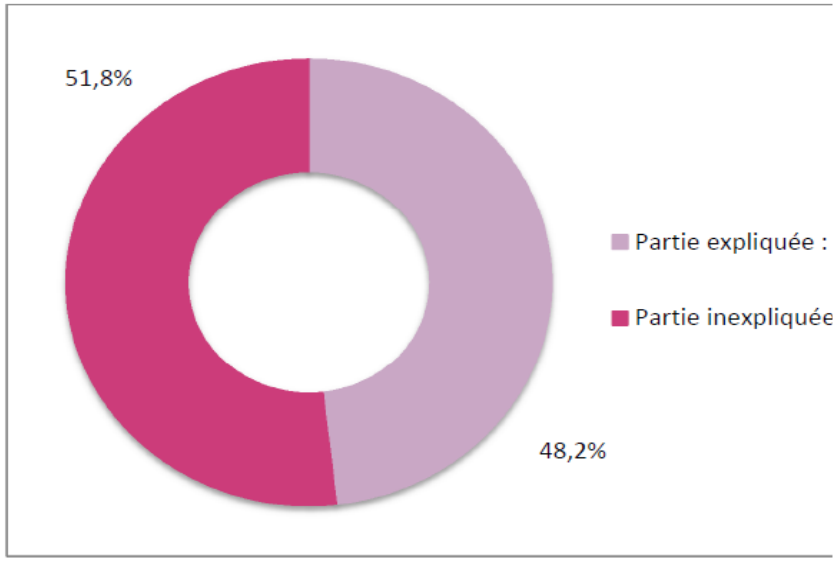
$$\ln(W_h) - \ln(W_f) = \underbrace{\overline{X}_f\,(\hat{\beta}_h - \hat{\beta}_f)}_{\text{Unexplained part}} + \underbrace{(\overline{X}_h - \overline{X}_f)\,\hat{\beta}_h}_{\text{Explained part}}$$

Decomposition of the gender pay gap in Belgium :

Wage data from the SES in 2014 & 2018

- Gross annual gender pay gap ($(w_h-w_f)/w_h$) = **24,3%** & **23,1%**.
- Gross hourly gender pay gap ($(w_h-w_f)/w_h$) = **10,7%** & **9,2%**.
- Decomposition of gross hourly pay gap ("explained" part = **48,2%** & **49,4%**, "unexplained" part = **51,8%** & **50,6**).

Example for 2014 :



Source : SPF Emploi, Statbel, Institut pour l'Egalité entre les Hommes et les Femmes, "L'écart salarial entre les hommes et les femmes en Belgique : Rapport 2022", Bruxelles. **ONSS** data for 2014 et 2018.

Decomposition of the explained part in 2018 :

Labour market segregation	Occupation	17,1%
	Sector	14,6%
	Type of contrat (fixed term or open ended)	4,9%
	Work duration (full or part time))	7,3%
	Region of work	-2,4%
	Type of financial and economic control	4,9%
	Total segregation	**46,4%**
Workers' employment characteristics :	Level of education	12,2%
	General professional experience	12,2%
	Tenure	7,3%
	Total workers' employment characteristics	**31,7%**
Workers' individual characteristics :	Marital status (married or not)	2,4%
	Type of household (with or without children)	14,6%
	Nationality	4,9%
	Total workers' individual characteristics	**21,9%**

Source : Statbel, **Enquête sur la Structure et la Répartition des Salaires et Registre national.**

Caution is required :

a) The unexplained part (attributed to discrimination) may at least partly derive from the omission of key explanatory variables reflecting the productivity of men and women.

Examples : field of studies, career breaks, vocational training.

‘

b) There may be some endogenous discrimination. ‘Explained’ part is not necessarily ‘justified’.

Example : occupations and the glass ceiling effect, involuntary part-time.

Tab.: Incidence of involuntary part-time employment, 2022

Country	Part-time employment as a % of total employment[1]	Share of women in part-time employment[1]	Involuntary part-time as a % of total part-time employment[2]
Portugal	4,4	**73,6**	**34,2**
Greece	8,7	66,6	**47,2**
USA	11,7*	64,5*	3,7
Spain	11,9	**72,9**	**49,7**
France	12,5	**71,5**	**23,8**
Sweden	10,1	57,9	19,6
Finland	15,8	60,5	**23,5**
Belgium	**16,7**	**72,9**	**18,4**
Italy	16,2	**74,6**	**57,2**
Denmark	16,5	60,8	5,4
Germany	**20,8**	**75,1**	5,8
UK	**20,4**	**71,9**	10,1
Netherlands	**34,1**	**70,3**	2,6
Average**	**15,7**	**69,1**	**23,2**

Notes: Involuntary part-time employment refers to workers who work part-time because they cannot find full-time work. 1 Part-time employment refers to workers who usually work less than 30 hours per week in their main job. 2 Part-time employment is based on national definitions. * Data for 2020. ** Unweighted average of countries in this table. Source: OECD (2023), OECD Employment Outlook, Paris.

In sum, the unexplained part of the gender wage gap may:

- ✓ **Overstate** the extent of wage discrimination if some key productivity-related characteristics, such as training, knowledge of languages, or commitment to career, are omitted from the analysis.

- ✓ **Understate** the extent of wage discrimination if differences in mean male and female characteristics (with respect to e.g. occupations, working time or education) are the results of a discriminatory process.

Example for US (Altonji and Blank, 1999; CPS data):

Percentages	1979		1995	
	Model 1	Model 2	Model 1	Model 2
Males-Females				
Characteristics	2.6	12.6	0.8	7.6
Coefficients	43.8	33.5	27.9	21.1
Whites-Black				
Characteristics	6.3	10.8	8.2	11.4
Coefficients	10.2	6.1	13.4	9.8

Note: The numbers indicate the percentage wage difference of males-females and whites-blacks;
Model 1 includes education, potential experience and region;
Model 2 contains in addition occupation, industry and job characteristics.
Source: Boeri and van Ours (2013)

Total **gender**/black-white wage gap = **46.4**%/16.5% (in 1979) and **28.7**%/21.6% (in 1995).

Unexplained part ('coefficients') decreases as control variables increases, i.e. when moving from Model 1 to Model 2 → be cautious when interpreting OB decompositions.

Alternative econometric approaches :

Hellerstein, Neumark and Troske (JoLE, 1999) :

Estimation, at firm level, of: i) a wage equation, and ii) a productivity equation. Comparison of the regression coefficients associated with the gender dummy in the two regressions. Gender wage discrimination estimated at 12%.

Table 3. Difference GMM Estimates, Baseline Specification (Model 1)

Variable	*(1) Added value per hour (ln)*	*(2) Mean hourly wage (ln)*	*(3) Added value-wage gap (ln)*
Share of part-time workers	0.08*	–0.01	0.09*
Share of female workers	0.02	–0.11***	0.12**
Control variables			
Share of workers < 40 years	0.05	–0.14***	0.19***
Share of workers with fixed contract	0.10**	0.04	0.06
Education level 2 (ISCED 3 and 4)	–0.03	–0.00	–0.03
Education level 3 (ISCED 5, 6, and 7)	–0.10**	0.10***	–0.19***
Managers	–0.14	0.55***	–0.68***
Professionals	0.04	0.19***	–0.15*
Technicians and associate professionals	–0.04	0.06**	–0.10
Clerical occupations	–0.04	0.09***	–0.13**
Craft	–0.03	–0.07***	0.04
Machine operators	–0.02	–0.07***	0.05
Low-skilled occupations	–0.03	–0.08***	0.06
Capital stock	–0.00	0.00	0.00
Firm size	0.00*	0.00	0.00*
Squared firm size	–0.00	0.00	–0.00*
Number of firm-year observations	5,171	5,171	5,171
Underidentification test			
p-value Kleibergen-Paap rk LM statistic	0.00	0.00	0.00
Weak identification test			
Kleibergen-Paap rk Wald F statistic	447.29	477.13	831.47
Overidentification test			
p-value of Hansen J statistic	0.48	0.50	0.35
Endogeneity test of endogenous regressors			
p-value	0.03	0.12	0.01

Notes: All models include year dummies and control for the firm's sector of activity at NACE 1. Part-time jobs < 35 hours per week. Reference categories include, respectively, the share of full-time workers, the share of male workers, the share of workers >= 40 years, the education level 1 (ISCED 1 and 2), and service occupations. First two lags of main explanatory variables are used as instruments.
***, **, * significant at the 1, 5, and 10% level, respectively.

Données relatives au secteur privé belge entre 1999 et 2010.
Source: Garnero, Kampelmann and Rycx (ILRR, 2014).

Bartolucci (ILRR, 2014):

Estimation, at firm level, of a wage equation, controlling for the usual variables & average labour productivity in the firm. Gender wage discrimination estimated at 9%.

Table 2 Firm-level wage-setting equation without gender-immigrant interaction

Log av. hourly wage	OLS	OLS	OLS	OLS	Fixed effects	GMM-IV
	(1)	(2)	(3)	(4)	(5)	(6)
Labor productivity	–	–	–	0.10*** (0.01)	0.01** (0.00)	−0.00 (0.00)
Share of non-EU workers[a]	−0.24*** (0.02)	−0.02 (0.01)	−0.00 (0.01)	−0.01 (0.01)	−0.02* (0.01)	−0.07 (0.06)
Share of women	–	−0.19*** (0.01)	−0.20*** (0.01)	−0.17*** (0.01)	−0.09*** (0.03)	−0.13** (0.05)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Individual and job characteristics[b]	No	Yes	Yes	Yes	Yes	Yes
Sectors and regions[c]	No	No	Yes	Yes	Yes	Yes
Firm characteristics[d]	No	No	No	Yes	Yes	Yes
Observations	23,712	23,712	23,712	23,712	23,712	8333
Adjusted R^2	0.06	0.63	0.65	0.70		0.30
Within R^2					0.36	
Between R^2					0.61	
Underidentification test[e]						0.00
Weak identification test[f]						68.4
Overidentification test[g]						0.37
Endogeneity test[h]						0.54

Data source: SES-SBS 1999–2010; HAC standard errors in parentheses
***, **, * significant at 1, 5 and 10 % levels, respectively
[a]Omitted reference: share of EU workers
[b]Individual and job characteristics include share of workers younger than 40 years, share of 8 occupational groups (reference: service occupations); 3 educational levels (reference: ISCED 1–2); share of fixed-term contracts; share of workers with more than 5 years of tenure
[c]Sector and regional controls include 9 sectors (reference: manufacturing) and 3 regions (reference: Flanders)
[d]Firm controls include the logarithm of firm size, logarithm of capital and a dummy for firm-level collective bargaining. All regressions include year dummies
[e]Underidentifcation test reports *p* value of Kleibergen-Paap rk LM statistic
[f]Weak identification test reports Kleibergen-Paap rk Wald F statistic
[g]Overidentification test reports *p* value of Hansen J statistic
[h]Endogeneity test shows probability that endogenous regressors can actually be treated as exogenous

Source: Kampelmann and Rycx (IZA JoM, 2016).

Wage discrimination against immigrants varies greatly according to region of birth.

Table 4. Firm-level wage-setting equations focusing on workers born in non-EU15 countries, divided by regions of birth.

Dependent variable: log of hourly wage	OLS (1)	FD (2)	GMM-FD (3)
Share of hours worked by workers born in:			
EU15 countries	Ref.	Ref.	Ref.
Africa	−0.044***	−0.070***	−0.088***
	(0.015)	(0.016)	(0.022)
North-Western Asia	0.0001	0.017	0.032
	(0.023)	(0.024)	(0.032)
Asia	−0.072*	−0.175***	−0.132**
	(0.037)	(0.039)	(0.051)
Eastern Europe	−0.068***	−0.120***	−0.112***
	(0.025)	(0.027)	(0.039)
Northern and Latin America	0.231***	0.160**	0.098
	(0.087)	(0.066)	(0.088)
South Pacific (and other countries)	−0.022	−0.059***	−0.043
	(0.022)	(0.020)	(0.029)
Control variables			
Year dummies	Yes	Yes	Yes
Human capital[A]	Yes	Yes	Yes
Gender and job characteristics[B]	Yes	Yes	Yes
Firm characteristics[C]	Yes	Yes	Yes
Added value	Yes	Yes	Yes
Adjusted R2	0.671	0.647	0.647
Underidentification test[D]			0.00
Weak identification test[E]			1459.01
Endogeneity test[F]			0.61
Number of observations	13,631	13,631	13,631
Sig. Model (*p*-value)	0.00	0.00	0.00

Data source: SES-SBS-National Register 1999–2010; Robust standard errors in brackets.

Source: Fays, Mahy, Rycx and Volral (Applied Economics, 2020).

Wage discrimination against immigrants appears to decrease with professional seniority...

Table 5. Firm-level wage-setting equation focusing on workers born in non-EU15 countries, according to years of tenure.

Dependent variable: log of hourly wage	GMM-FD (1)
Share of hours worked by workers born in:	
EU15 countries	Ref.
Non-EU15 countries with up to 4 years of tenure	−0.060***
	(0.020)
Non-EU15 countries with 5 to 9 years of tenure	−0.002
	(0.033)
Non-EU15 countries with at least 10 years of tenure	−0.034
	(0.042)
Control variables[A]	Yes
Adjusted R2	0.650
Underidentification test[B]	0.00
Weak identification test[C]	3328.36
Endogeneity test[D]	0.056
Number of observations	13,621
Sig. Model (*p*-value)	0.00

Data source: SES-SBS-National Register-Statistics Belgium 1999–2010; Robust standard errors in brackets.

***, **, * significant at 1, 5 and 10% levels, respectively.

[A]Control variables include year dummies, human capital, gender and job characteristics, firm characteristics, and added value. For more details, see Table 4.

[B]Underidentification test reports *p*-value of Kleibergen-Paap rk LM statistic

[C]Weak identification test reports Kleibergen-Paap rk Wald F statistic

[D]Chi2 *p*-value of the endogeneity test

Source: Fays, Mahy, Rycx and Volral (Applied Economics, 2020).

... and with the degree of competition on the product market.

Table A4. Firm-level wage-setting equations focusing on workers born in non-EU15 countries, divided into 3 subgroups and according to product market competition.

Dependent variable: log of hourly wage	Competition indicator:	Market share of the eight largest firms in the sector	Herfindahl-Hirschmann index	Price-cost margin	Market share volatility of the four largest firms in the sector
High product market competition	Preferred estimator:	GMM-FD (1)	GMM-FD (2)	FD (3)	FD (4)
	EU15[A]	Ref.	Ref.	Ref.	Ref.
	Africa[B]	−0.068	−0.097	0.016	0.000
		(0.075)	(0.075)	(0.058)	(0.063)
	Asia and Eastern Europe[C]	−0.076	−0.048	−0.102	0.034
		(0.069)	(0.075)	(0.063)	(0.067)
	Other countries[D]	0.126	0.115	0.094	−0.001
		(0.088)	(0.101)	(0.102)	(0.055)
	Control variables[E]	Yes	Yes	Yes	Yes
	Adjusted R2	0.640	0.645	0.629	0.635
	Number of observations	913	856	842	922
	Sig. Model (*p*-value)	0.00	0.00	0.00	0.00
Medium or low product market competition	Preferred estimator:	FD (5)	FD (6)	FD (7)	FD (8)
	EU15[A]	Ref.	Ref.	Ref.	Ref.
	Africa[B]	−0.067**	−0.068**	−0.090***	−0.114***
		(0.034)	(0.032)	(0.028)	(0.028)
	Asia and Eastern Europe[C]	−0.069**	−0.095***	−0.052*	−0.092***
		(0.035)	(0.034)	(0.028)	(0.028)
	Other countries[D]	−0.022	−0.006	−0.044	−0.049
		(0.034)	(0.034)	(0.027)	(0.034)
	Control variables[E]	Yes	Yes	Yes	Yes
	Adjusted R2	0.646	0.640	0.655	0.654
	Number of observations	3,513	3,608	3,667	3,351
	Sig. Model (*p*-value)	0.00	0.00	0.00	0.00

Data source: SES-SBS-National Register-AGORA MMS Project 1999–2010; Robust standard errors in brackets
***, **, * significant at 1, 5 and 10% levels, respectively
[A]Reference group: share of hours worked by workers born in EU15 countries.
[B]Africa: share of hours worked by workers born in North and Sub-Saharan Africa.
[C]Asia and Eastern Europe: share of hours worked by workers born in Eastern Europe, North-West Asia and Asia.
[D]Other countries: share of hours worked by workers born in North and Latin America, South Pacific (and other countries).
[E]Control variables include year dummies, human capital, gender and job characteristics, firm characteristics, and added value. For more details, see Table 4.

Source: Fays, Mahy, Rycx and Volral (Applied Economics, 2020).

c) Correspondence studies

Real vacancies, fake identical applications letters except for the characteristic that may lead to discrimination (i.e. gender, race, immigrant status, sexual orientation, beauty).

Study	Group	Callback (%)	Country	Sample
Booth and Leigh (2010)	Male	25	Australia	3,365
	Female	32		
Bertrand and Mullainathan (2004)	White	10	United States	2,435
	African-American	6		
Carlsson and Rooth (2007)	Swedish	29	Sweden	1,552
	Middle Eastern	20		
Ahmed et al. (2011)	Male heterosexual	30	Sweden	1,978
	Male homosexual	26		
	Female heterosexual	32		2,018
	Female homosexual	26		
Ruffle and Shtudiner (2010)	Male plain	9	Israel	2,656
	Male attractive	20		
	Female plain	14		2,656
	Female attractive	13		

Source: Boeri and van ours (2021)

6.2.2. Thye « displaced » equilibrium

Diverse minimum wage regulations

Minimum wages may:

- Be set at the regional (e.g. in the US, Canada, Japan) and/or national level (e.g. in Belgium, France, the Netherlands, the UK, US).
- Vary across sectors (e.g. Germany, Belgium, Ireland, Portugal) or across qualification (e.g. Luxembourg).
- Depend on workers' age (reduced minimum wage rates for youngsters e.g. in Belgium, France and the Netherlands).
- Be set by law (e.g. in Eastern European countries, the UK) or through collective bargaining (e.g. in the Nordic countries, Belgium).
- Follow the price index (e.g. in Belgium) or the mean growth rate of wages (e.g. in France, Japan and Spain).

For cross-country comparisons: the 'Kaitz' index, i.e. the ratio between the minimum wage and the average wage.

Tab. : Gross monthly national minimum wages [a]

	EUR		Evolution between 2008 and 2023 (in %)	Purchasing power parity, in 2023	Minimum wage as % of average gross monthly earnings, 2020 (Kaitz index) [b]	Proportion of employees earning less than 105% of the minimum wage	
	In 2008	In 2023				2010	2018
Bulgaria	112	399	256	679	43	3,4	**14,1**
Roumania	139	604	335	1.053	48	4,4	**13,3**
Hongria	272	624	129	887	42	4,4	7,7
Poland	313	811	159	1.249	51	**9,9**	**12,1**
Portugal	497	887	78	987	51	3,1	4,4
Greece	794	910	15	1.034	n.d.	2,0	8,9
USA	689	1.157	68	897	n.d.	n.d.	n.d.
Spain	700	1.260	80	1.305	53	0,2	0,8
UK	1.242	1.583*	27	1.341*	46**	3,8	4,4***
France	1.280	1.747	36	1.587	49	**9,2**	**11,6**
Ireland	1.462	1.910	31	1.305	46	**9,2**	8,3
Belgium	**1.310**	**1.955**	**49**	1.703	**40****	n.d.	0,9
Netherlands	1.335	1.995	49	1.710	43	3,7	6,1
Germany	[c]	1.997	[c]	1.835	42	[c]	6,6
Luxembourg	1.570	2.508	60	1.833	50	**10,2**	5,1

Note: **Denmark, Italy, Cyprus, Finland and Sweden: no national minimum wage**. a In some countries the national minimum wage is not set on a monthly basis but on an hourly or weekly basis. For these countries, hourly and weekly minimum wages are converted into monthly wages. The national minimum wage is set by law, often after consultation with the social partners, or directly by national intersectoral agreement (as is the case in Belgium and Greece). The national minimum wage generally applies to all employees, or at least to a large majority of employees in the country. Minimum wages are gross amounts, i.e. before deduction of income tax and social security contributions. These deductions vary from country to country. b As a % of average monthly earnings in industry and services (excluding agriculture, hunting and forestry), i.e. NACE codes B to S, excluding section O, working in companies with 10 or more employees, excluding apprentices. c No national minimum wage until 2015. n.a.: not available. n.a.: not available. * Data for 2020 ** Data for 2019 *** Data for 2014. Source: Eurostat ('Labour market (including LFS)' database).

Characteristics of minimum wage earners ?

In all countries, they are over-represented among:
- the low-qualified,
- youngsters,
- immigrants from transition and developing countries, and
- women.

Also, over-represented in:
- part-time jobs, and
- traditional sectors.

To sum up:
- great diversity in scale, eligibility and operational details of minimum wages, but
- strong stability in features on minimum wage earners across countries.

Theoretical consequences of minimum wages ?

Competitive framework

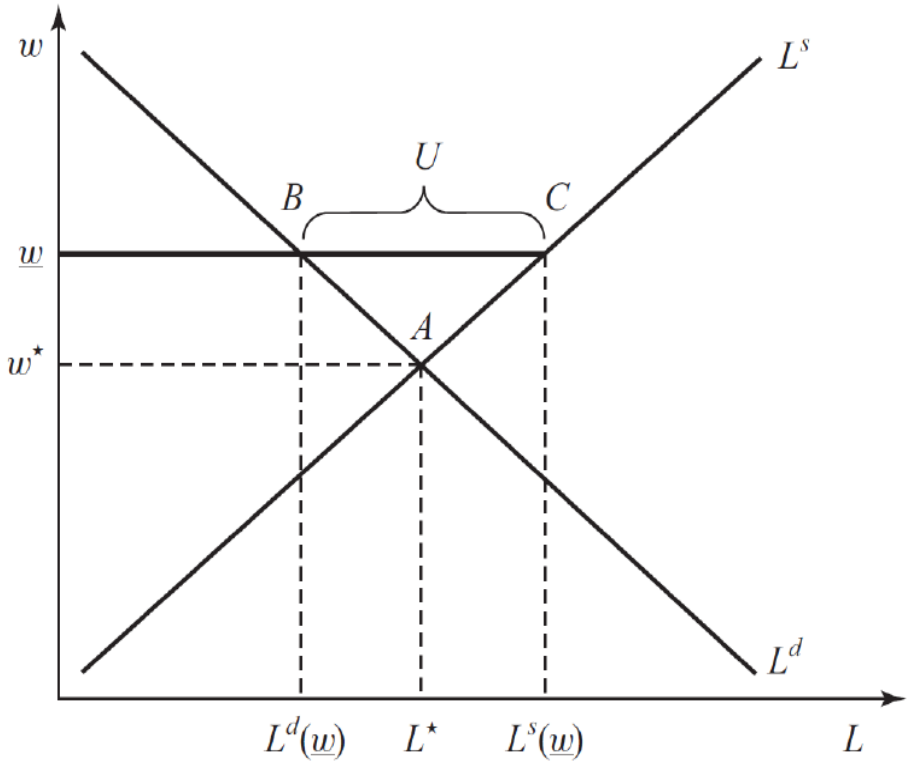


FIGURE 2.2 The minimum wage in a competitive labor market

Source : Boeri and van Ours (2013)

Non-competitive framework

Dual Labour market

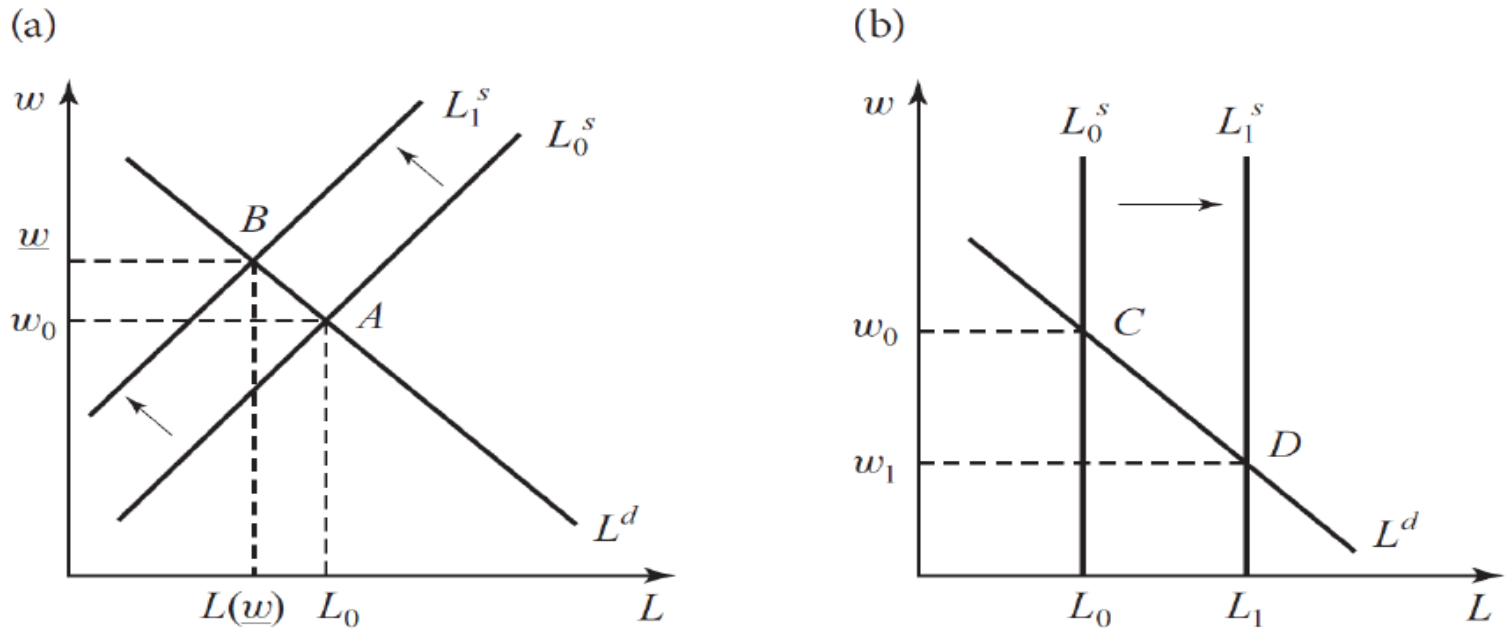


FIGURE 2.4 A dual labor market and the minimum wage: (a) formal sector;

Under the assumption of perfect labour mobility from the formal to the informal sector, the minimum wage has *no effect on* total (formal + informal) employment but creates a gap between formal and informal sector wages.

Monopsony

When employers have monopsony power in wage-setting, the **introduction of a minimum wage** – at a relatively low level - **may *increase* employment**.

An employer has monopsonistic power when it is the sole provider of work in an entire employment area (for example, a region).

Monopsonistic power can also be the prerogative of a company that dominates a profession that requires a particular skill that is difficult to valorise in other activities.

The monopsonistic power of certain companies violates the hypothesis of the atomicity of economic agents $\Rightarrow$ first illustration of a "**transformed equilibrium**".

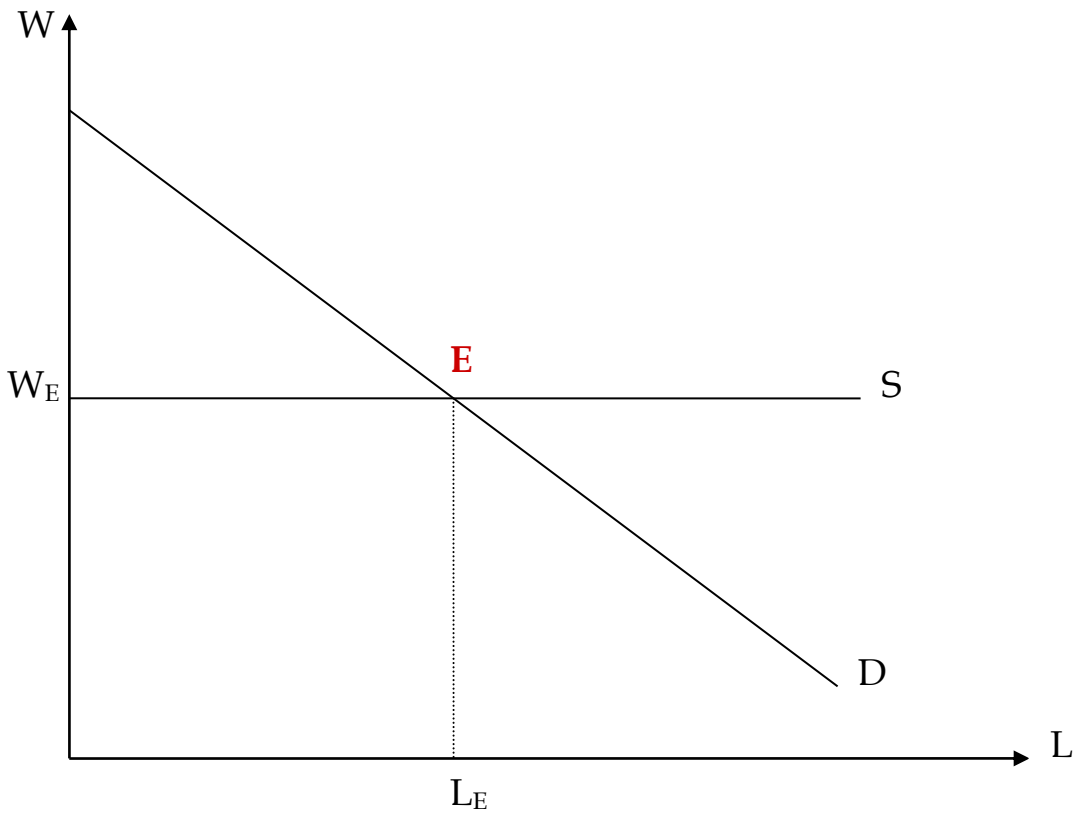
The monopsony model assumes :

– Limited mobility (geographical and professional) of workers.
– Existence of entry costs that allow the incumbent company to avoid competition.

Classic example: a mining company in a remote region (a single employer, high entry costs that prevent competition from other companies, little or no labour mobility).

Modern description: many employers, but few job vacancies and excess labour supply.

Reminder : Equilibrium of a company in perfect competition



Under perfect competition :

- The demand for labour represents the marginal product value of labour.

- A firm's labour supply is perfectly elastic.

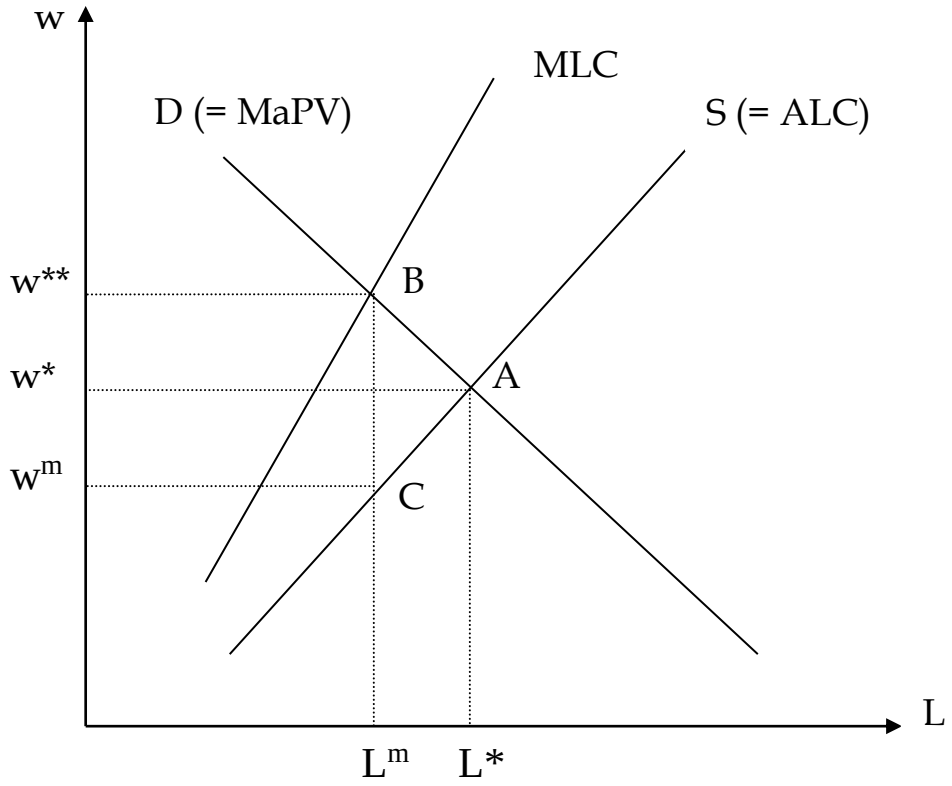
- The supply of labour represents the average and marginal cost of labour.

- The marginal cost of labour is constant and equal to the market wage.

- In equilibrium, labour supply and demand equalise.

  The marginal cost of labour equals the marginal product value of labour.

Monopsonistic equilibrium



A monopsonistic company faces an upward sloping labour supply curve (i.e. the aggregate labour supply curve) → marginal labour cost (MaC) is higher than the average labour cost (AC) given by the supply curve (S) (at any level of employment). (see following slides).

The marginal cost of labour (MLC) of a monopsonistic firm lies above the labour supply curve (O) and deviates further and further from it.

Intuition: the marginal cost of hiring a worker is higher than the reservation wage of any additional worker (i.e. the wage that must be paid by the firm to be able to attract/hire an additional worker) because the wage increase needed to encourage the individual to provide work must be granted not only to the marginal worker but also to the workers already employed by the firm.

Example

1) Monopsonistic company hires 1st worker for a wage of 1 EUR
   ⇒ ALC = MLC = 1 EUR.

1) Monopsonistic company hires a 2nd worker for a wage of 1,5 EUR
   ⇒ ALC = 1,5 EUR (because both workers earn the same)
   ⇒ MLC = 1,5 EUR (price to pay to hire the 2nd worker)
   +
   0,5 EUR (additional cost passed on to the 1st worker)
   = 2 EUR.
   ⇒ MLC > AC (Δ = 0,5 EUR)

2) Monopsonistic company hires a 3rd worker for a wage of 2 EUR

⇒ ALC = 2 EUR (because all three workers earn the same)

⇒ MLC = 2 EUR (price to pay to hire the 3rd worker)

+

0,5 EUR (additional cost passed on to the 1st worker)

+

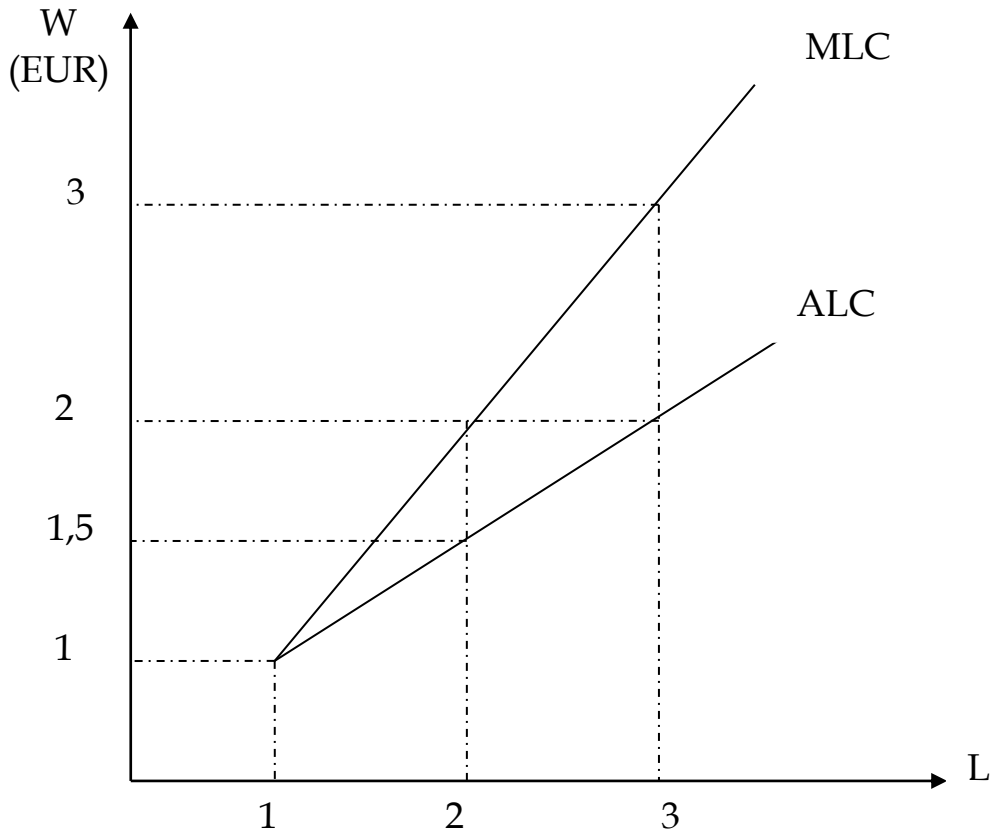
0,5 EUR (additional cost passed on to the 2nd worker)

= 3 EUR.

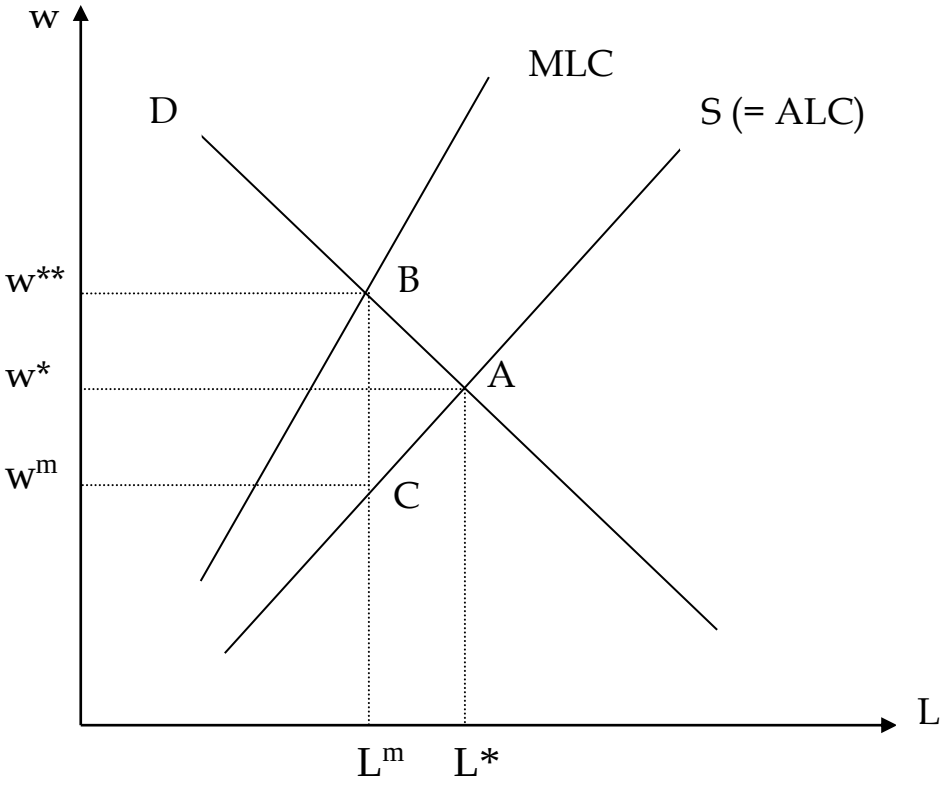
⇒ MLC > ALC (Δ = 1 EUR)

And so on…

Graphical representation :



The monopsonistic equilibrium



Monopsonistic equilibrium at point C (w^m, L^m): wages and employment lower than at perfect competition equilibrium (au point A: w*, L*).

Consequences of the minimum wage on employment in the presence of a monopsony?

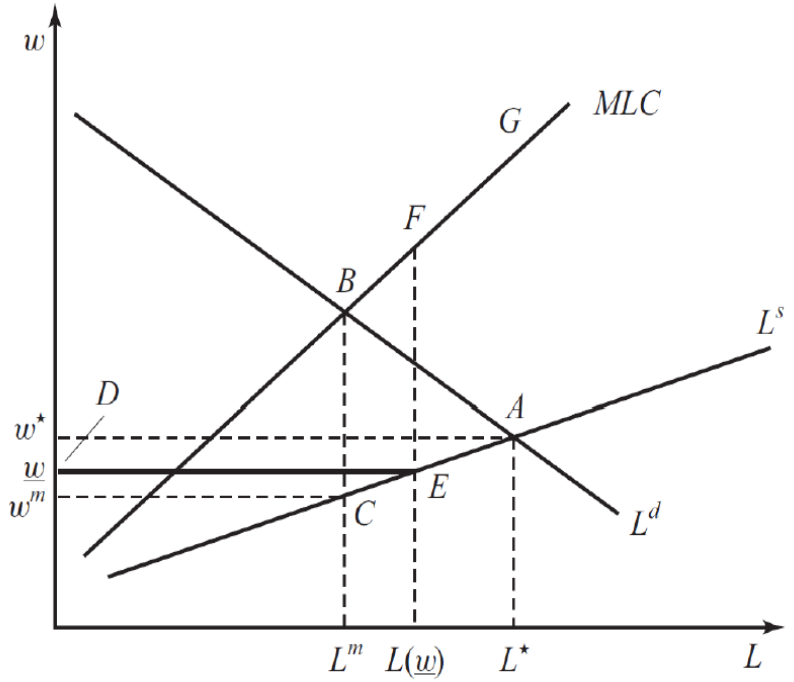


FIGURE 2.3 Monopsony and the minimum wage

Boeri and van Ours (2013).

New marginal labour cost curve (after introduction of minimum wage): DEFG segment. A minimum wage between w^m et w** (the y-coordinate of point B) increases employment (relative to C, the monopsonistic equilibrium). A minimum wage equal to w* maximises the volume of employment.

In the end ?

It's the *level* rather than the presence of a minimum wage that really matters.

Although the standard prediction of economic theory is that a minimum wage should reduce employment, certain market imperfections may allow the introduction of a minimum wage, set at a reasonable level, to lead to higher levels of employment and welfare.

Empirical studies ?

In general, empirical studies conclude that the impact of minimum wages on employment is limited, except for certain groups of workers, particularly young people.

Examples of studies based on panels of firms and/or countries:

OECD (1998): 9 industrialised countries, 1975-1996. A 10% increase in the minimum wage leads to a fall in employment of between 2 and 4% for the under-20 age group. Negative impact but close to zero for 20-24 year olds. No effect for the 25+ age group.

Dolado *et al.* (1996), OCDE (2006) : similar results.

More recent studies, based on matched data of workers and firms, show that some individual firms face an upward labour supply curve, highlighting the power of the market and the potentially positive effects of minimum wages on employment (Staiger et al. 2010: hospitals in the United States; Falch 2010: teachers' labour market in Norway; Ransom and Sims 2010: public schools in Missouri).

Examples of studies based natural experiments:

Card et Krueger (1994):

- Data on employment in 410 fast-food restaurants in New Jersey and Pennsylvania, which are two bordering states in the US with similar economic structures.
- The minimum wage (MW) was initially the same ($4.25 per hour) in both states and was raised in 1992, only in New Jersey, to $5.05 per hour.

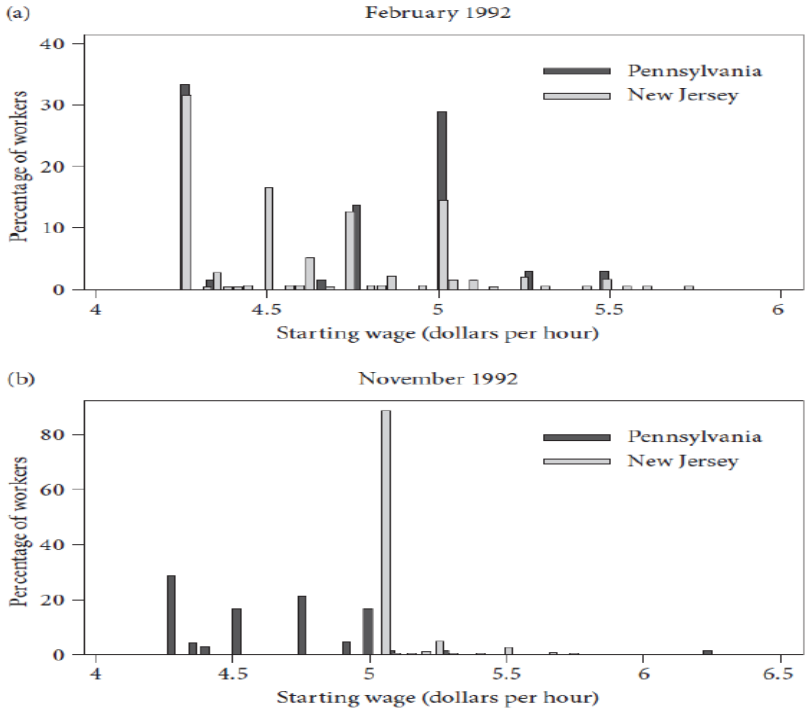


FIGURE 2.5 The wage distribution (a) before and (b) after an increase in the minimum wage

The data were collected in February-March 1992 (when both states had the same MW) and in November-December 1992 (after the increase of the MW in New Jersey).

Impact on employment estimated by taking the difference between the November-December 1992 and February-March 1992 employment variations in the two states ⇒ Difference-in-differences estimator

	Employment	
	New Jersey	Pennsylv
Mar 1992	20.4	23.3
Dec 1992	21.0	21.2
Δ	0.6	-2.1
ΔΔ	2.7	

Note: Employment = number of full-time equivalents working in a **fast-food restaurant**.

ΔMW of 80 cents, increases employment of 2.7 workers in every fast-food restaurant
⇒ ΔMW of $1 creates 3.4 (i.e. 2.7/0.80) more jobs in every firm.

Conclusion: increase in the MW can lead to an increase in employment when this wage is sufficiently low to start with.

Various replication studies based on other US states that did also increase their MW in the 1990s end up to **similar conclusions** (Card et Krueger, 1995, 2000 ; Neumark and Wascher, 2000)

Draca, Machin and van Reenen (2011):

- National Minimum Wage (NMW) introduced in 1999 in the UK
- Comparison of low- and non low-wage firm using firm level data
- Expectation: low-wage firms are more likely to be affected by the NMW
- Before = April 1 1996- March 31 1999 – After = April 1 1999- March 31 2002
- Difference-in-differences estimator

	Log(average wage)		Profit margin	
	Low	Non low	Low	Non low
Pre-NMW	2.149	2.775	0.128	0.070
Post-NMW	2.378	2.893	0.089	0058
Δ	0.229	0.118	-0.039	-0.012
ΔΔ	0.111		-0.027	

Note: NMW = National Minimum Wage; Profit margin = Ratio of profits to sales

Conclusions:

- Findings consistent with "no behavioral response"
- Firms do not adjust employment
- Wage gains from minimum wages map into profit reductions, i.e. wages (profits) increased (decreased) faster in low-wage firms.

To sum up:

- Empirical studies generally conclude that the employment effects of minimum wages are negative but rather small and essentially concentrated on youngsters.

- However, there are also some studies suggesting slight positive (e.g. Card and Krueger, 1994) or no employment effects (e.g. Draca et al., 2011)

6.2.3. The ‘transformed’ equilibrium

Economic agents **no longer** assumed to be **price-takers**

a) Firms with **monopsony power** e.g. because many employers but only few vacancies to apply for.

b) Wages and working conditions collective bargained by **trade unions and employers’ associations**.

Trade unions and collective bargaining: a micro-economic perspective

The "union monopoly" model

Dunlop (1944).

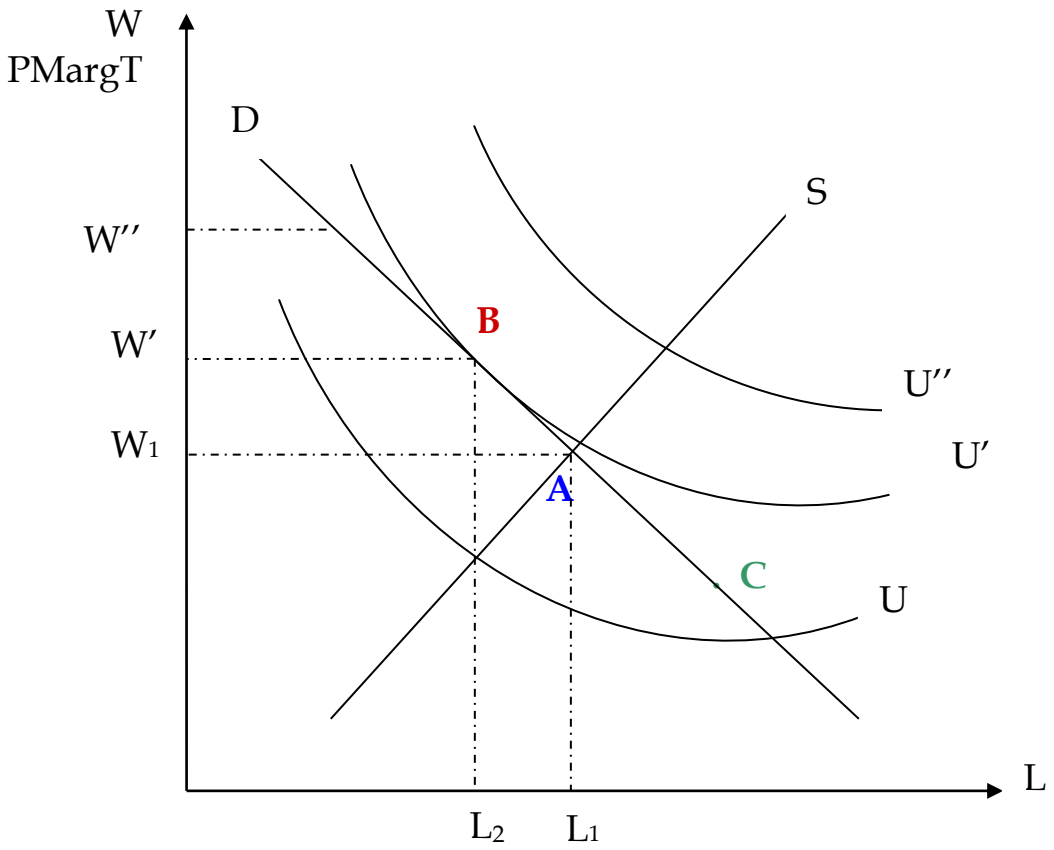
Bilateral monopoly in which the union set the wage unilaterally and the company determines employment by taking the wage as a given.

The union chooses the wage unilaterally, constrained by the demand for labour from the company (i.e. knowing that at the next stage the company will maximise its profits given the wage).

The solution lies on the labour demand curve → in equilibrium, there is an inverse relationship between wages and employment.

Trade union preferences for employment and wages are represented by a *collective* utility function → indifference curves (non-intersecting, convex and ranked with respect to the origin).

Graphical representation :



The "right-to-manage" model

Nickell and Andrews (1983). Generalises the Dunlop model (1944).

Firms choose employment unilaterally, while wages are negotiated between the firm and the union.

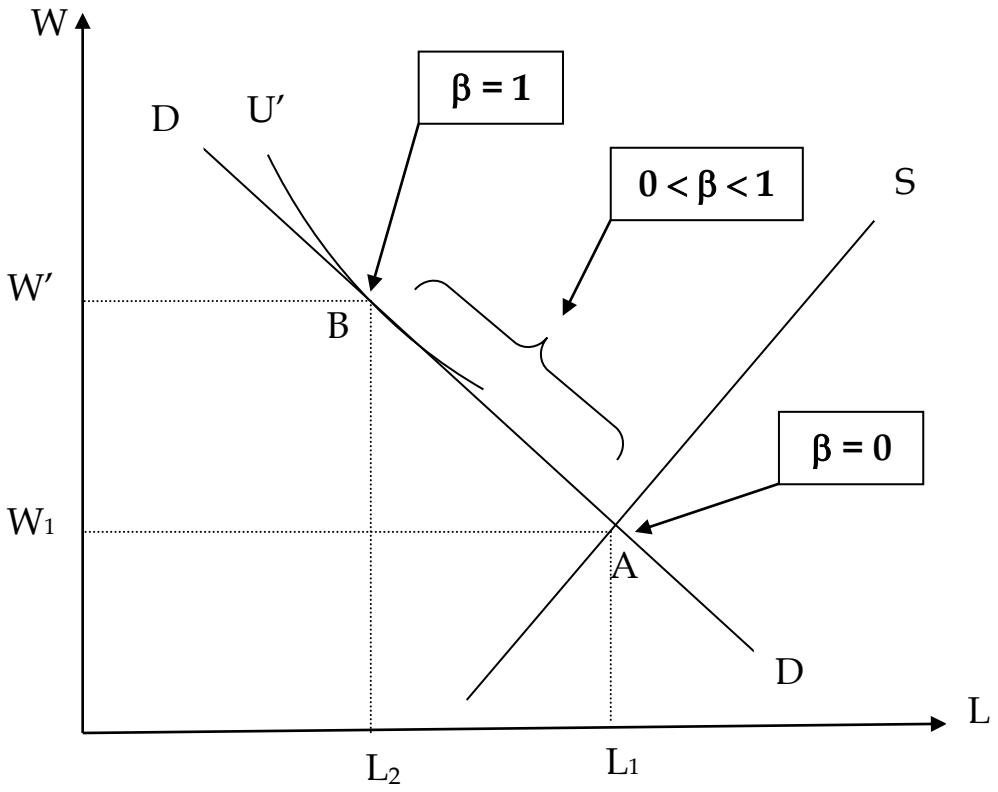
The equilibrium lies on the labour demand curve (marginal product value of labour is equal to the marginal cost of labour).

The relative bargaining power of unions in wage negotiations is represented by the parameter $\beta \in [0,1]$.

If $\beta = 0$: pt. A, “perfect competition” solution (wage min., employment max.).

If $\beta = 1$: pt. B, « union monopoly model » solution (wage max., employment min.).

Graphical representation :

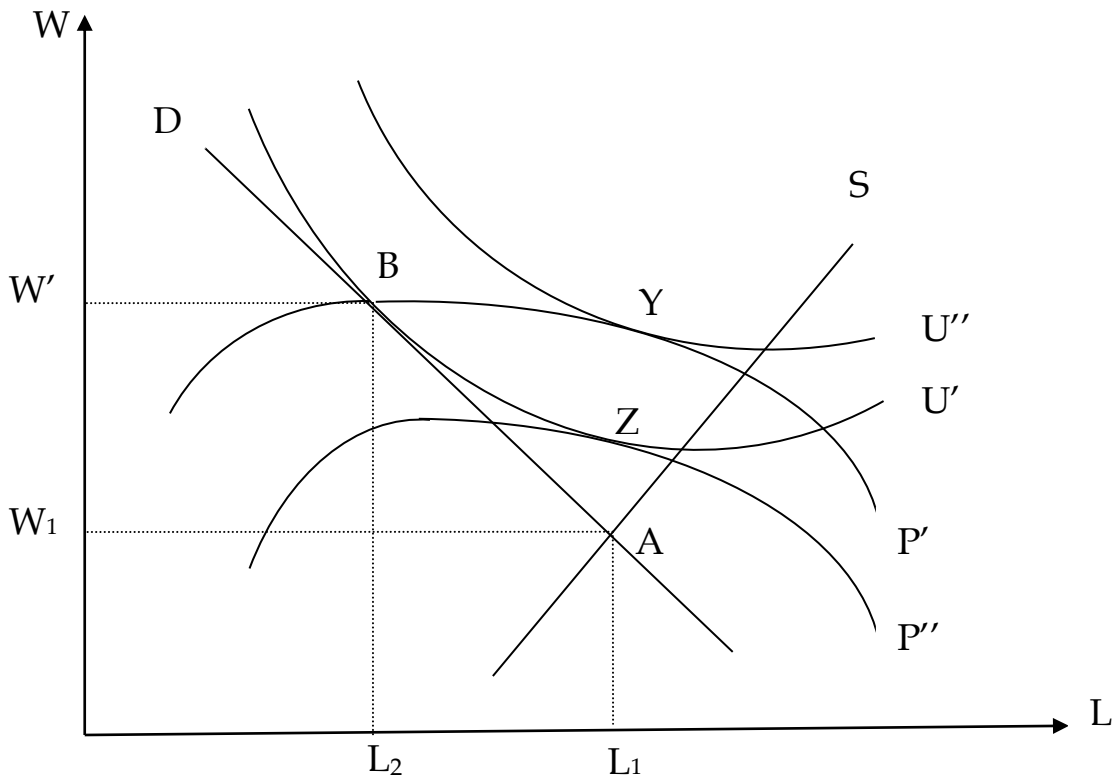


Any change in the balance of power (β) in favour of the union leads to higher wages and lower employment.

Solutions in the "right to manage" model are not Pareto optimal.

In other words, there are alternative solutions that improve the well-being (profit or utility) of one of the two protagonists without worsening that of the other.

Pareto and the right-to-manage model :



(Starting point : point B, union monopoly solution)

The set of tangency points between the indifference curves of the union and the iso-profit curves of the firm, within the space formed by the curves P' and U', are preferred in the Pareto sense.

Contract curve = set of tangency points between the union indifference curve and the firm iso-profit curve, within the space formed by the P' and U' curves.

Leontief (1946) demonstrated that Pareto optimal allocations, which are found on the contract curve, can be obtained when the scope of bargaining is extended to employment.

$\Rightarrow$ « Efficient bargaining » model.

The « efficient bargaining » model

McDonald and Solow (1981).

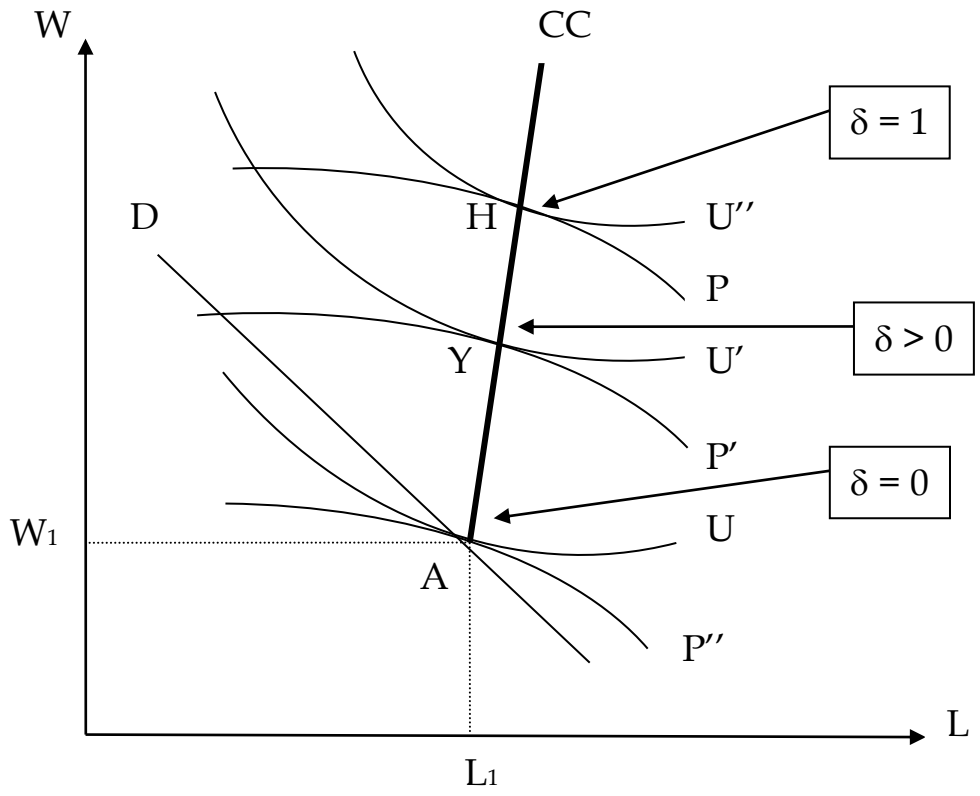
The firm and the union negotiate employment and wages simultaneously.

The equilibrium lies on the contract curve (CC). It is Pareto optimal: it is not possible to improve the welfare of one of the parties without reducing that of the other.

The slope of the contract curve depends on the characteristics of the unions' utility function. If the union is risk averse (concave utility curve), the contract curve has a positive slope.

δ represents the relative bargaining power of unions in collective bargaining over wages and employment.

Graphical representation :



When the slope of the CC is positive, the union exerts a positive influence on wages and employment.

The « global bargaining » model

Manning (1987).

The model takes place in two stages. Bargaining takes place first on wages and then on employment.

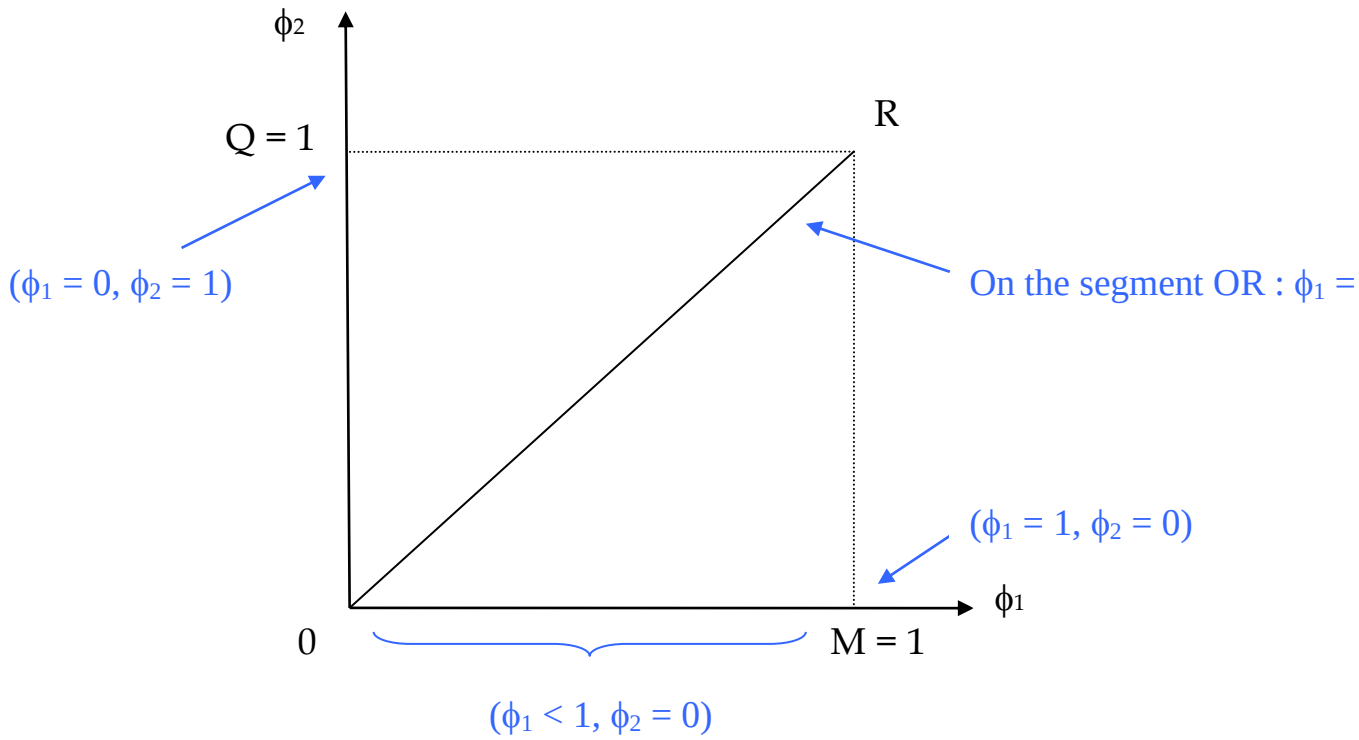
Unlike the efficient bargaining model, union bargaining power is not necessarily identical at each stage of bargaining.

The unions' influence on employment is not necessarily negative. An increase in union influence on wages (employment) reduces (increases) the volume of employment.

ϕ_1 (ϕ_2) measures the relative bargaining power of unions on wages (employment). ϕ_1 et ϕ_2 ϵ [0,1].

If $\phi_1 = 1$ and $\phi_2 = 0$: "union monopoly" model (point M).
If $\phi_1 < 1$ and $\phi_2 = 0$: "right to manage" model (segment 0M).
If $\phi_1 = \phi_2$: "efficient bargaining" model (bisector 0R).

Graphical representation :



Solution set of the Manning (1987) model: 0MRQ.
Includes the usual bargaining models (RMM and EBM) and identifies a new family of solutions.

Empirical results

Generally, the analysis is limited to the usual bargaining models (RMM and EBM).

2 options :

- Determine whether the bargaining solution lies on the labour demand curve. Is marginal product value of labour equal to wages? If so, the right-to-manage model is the most appropriate → unions have a negative influence on employment.

- Check whether the equilibrium lies on the contract curve. If so, the unions have a positive influence on employment (if the CC has a positive slope).

The empirical results are often contradictory (Plasman and Rycx, 2001; Boeri, 2013) and do not allow us to draw any clear conclusions as to the most relevant bargaining model. The relationship between union power and employment is clearly more complex than that suggested by the usual bargaining models (Cahuc and Zylberberg, 1996).

Trade unions and collective bargaining: a macro-economic perspective

Impact of trade unions and collective bargaining on (un)employment performance of advanced economies?

Some stylised facts for 2022 (& 2007)

Western Europe* vs. USA :

- Unemployment rate: 6.3 vs. 3.7% (6.7 vs. 4.6%)
- Proportion of long-term unemployed (12 months or more): 33 vs. 15.1% (33.1 vs. 10%)
- From the early 1980s to 2008, from 2012 to 2019 and again since 2021: unemployment rate in Western Europe > USA.
- Employment rate was structurally lower in Western Europe than in the US between 1975 and 2019. At present, the difference is less pronounced.

Source : OCDE (2020), *Perspectives de l'emploi*, Paris.
Western Europe' refers to the EU(14) & UK.

✓ Key issue

Why do economies which are subject to broadly similar external developments (such as oil shocks, technological progress, competition from low-wage countries) and which have comparable production capacity **show such diverse labour market performances?**

– Many economists and policy makers consider that Europe's poor record on employment and unemployment can be attributed to the institutional characteristics of the labour market and especially to industrial relations.

a)**Rent-seeking face** of unions:

Trade unions would only represent the interests of their employed members.

They are expected to push wage above the market-clearing level and to resist (real) downward wage adjustments even after a substantial negative productivity shock, e.g. an oil shock.

b) **Efficiency-enhancing face** of unions

- Trade unions enhance efficiency when they counteract, at least to some level, the excessive bargaining power of employers.

  In the absence of collective bargaining, monopsonistic firms would offer inferior wages and working conditions than those prevailing on a competitive labour market → trade unions may reduce wage discrimination and increase employment.

- Trade unions provide collective voice to atomistic agents.

  Without such a voice, workers asking in vain for higher pay when productivity increases would have only the option of quitting the job and to search for another job with better pay (exit option).

  Unions provide workers the option to continue to stay on the job and to bargain collectively for better pay, which is less costly for the firm as it creates no disruption in the production process

- By transmitting complaints and demands, it is argued that trade unions can improve and correct the work relationship, which in the end may improve productivity.

  For instance, unions can force employers to provide more on-the-job training. They may also help achieve higher efficiency by reducing transaction costs associated to individual bargaining.

To sum up:

Economists usually characterize unions as organisations with a good (efficiency-enhancing) face and a bad (rent-seeking face).

- **Empirical results**

Are trade unions too powerful in Western Europe?

Reality is much more complex !

Not very suprising given :

a) Heterogeneity of industrial relations in Western Europe.

b) Diversity of characteristics that may affect the outcome of collective bargaining.

Diversity of collective bargaining systems

✓ Dominant bargaining level (i.e. bargaining centralization)

3 : Strong centralisation combined with central or inter-sectoral/professional bargaining.

Examples: Belgium, Finland, Norway.

2 : Average centralisation represents bargaining at sector or industry level.

Examples : Spain, France, Italy, Netherlands, Sweden, Germany.

1 : Weak centralisation is the result of the introduction of negotiations at company or establishment level.

Examples : Australia, Ireland, United Kingdom, United States, Japan, Greece.

Table : Dominant bargaining level (i.e. bargaining centralization)

Pays	1990	2017
Autria	2	2
Australia	3	1
Belgium	3	3
Canada	1	1
Germany	2	2
Denmark	2	2
Spain	2	2
Finland	3	3
France	2	2
UK	1	1
Greece	3	1
Ireland	3	1
Italy	2	2
Japan	1	1
Netherlands	2	2
Norway	3	3
Sweden	2	2
USA	1	1

Notes : 3: strong centralisation; 2: medium centralisation; 1: weak centralisation. Source : OCDE et ICTWSS.

✓Degree of coordination among the social partners

Ability of trade unions and employers' organisations to coordinate their decisions horizontally (within a given bargaining level) and vertically (between bargaining levels).

3 : Strong wage coordination is associated with national guidelines or government imposition of minimum wages or wage increases (minimum and/or maximum).

Examples : Belgium (national and sectoral minimum wages, automatic wage indexation and 'wage norm'), Germany ('pattern bargaining'), Sweden, Finland, Norway, Japan, Netherlands.

2 : Weak wage coordination is associated with wage formation guidelines.

Examples : Australia, Spain, Italy, France, Ireland.

1 : Lack of co**ordination refers to fragmented wage bargaining or, more accurately, a lack of coordination between work units.**

Examples : United Kingdom, United States, Canada, Greece.

Table. : Degree of coordination among social partners

Country	1990	2017
Autria	3	3
Australia	3	2
Belgium	3	3
Canada	1	1
Germany	3	3
Denmark	3	3
Espagne	2	2
Finland	3	3
France	2	2
UK	1	1
Greece	2	1
Ireland	3	2
Italy	1	2
Japan	3	3
Netherlands	2	3
Norway	3	3
Sweden	3	3
USA	1	1

Notes : 3 : strong coordination ; 2 : weak coordination ; 1 : lack of coordination. Source : OCDE et ICTWSS.

a) Strong *coordination* does not necessarily imply strong *centralisation.*

Examples : Germany, Japan.

b) Strong *centralisation* does not necessarily imply *coordination.*

‘Wage dift’…

In most countries, collective labour agreements set wages that apply only to a subset of workers.

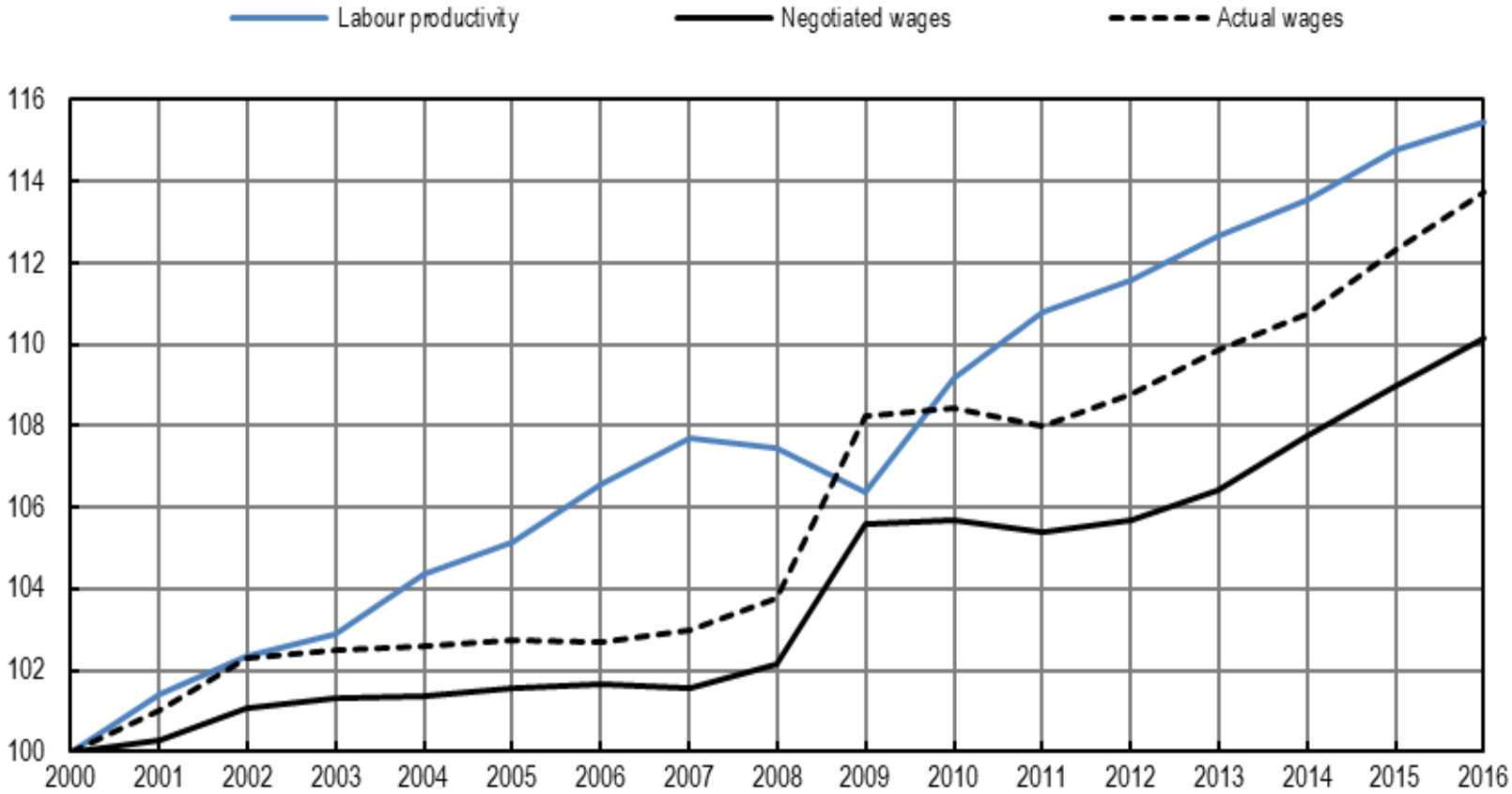
In other words, not all workers are covered by collective labour agreements (see below).

Real wages therefore also reflect wage trends among workers who are not covered.

In addition, they include supplements at company, establishment or individual level (e.g. bonuses or overtime pay).

The difference between the 'Actual wage' and the 'Negotiated wage' is generally referred to as 'Wage drift', i.e. the increase in wages above the collectively bargained level.

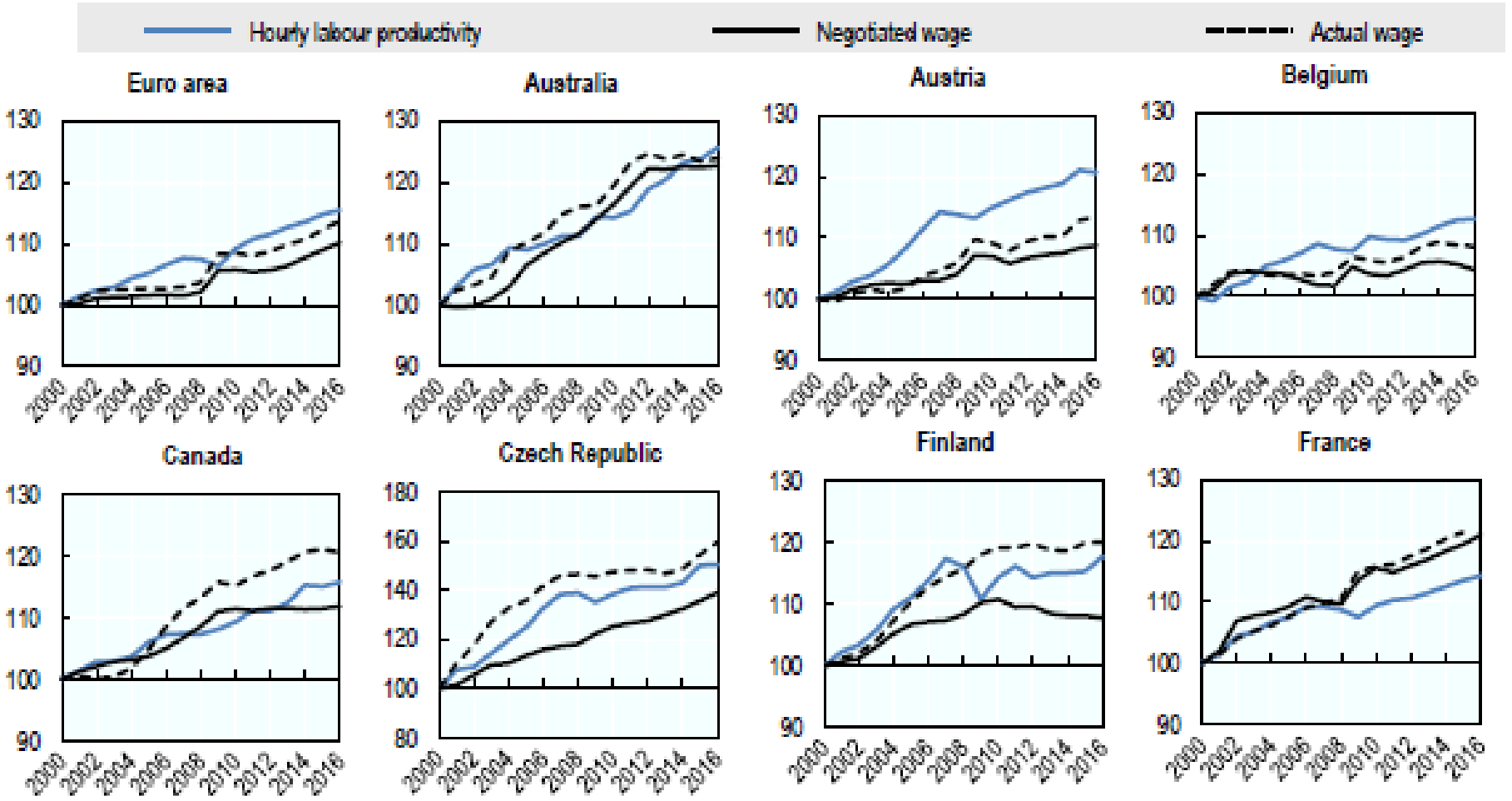
Tab. : Negotiated wages, actual wages and labour productivity in the Euro zone (base 100 in 2000)



Note: Negotiated and actual wages are deflated using the private final consumption price index.
Source: OCDE (2018), *Perspectives de l'emploi*, Paris.

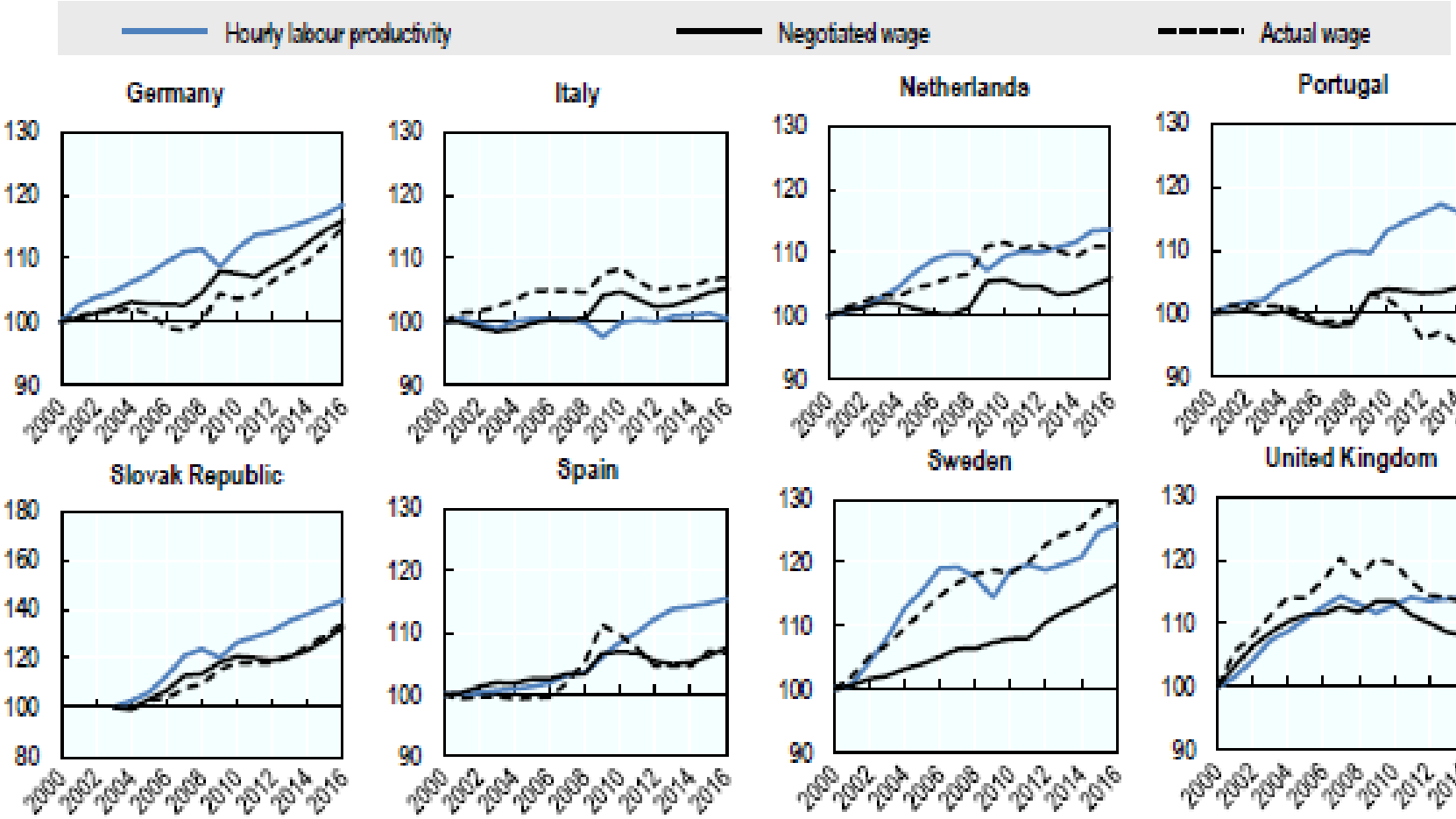
Wage drift is the difference between 'actual wages' and 'negotiated wages'.

Tab. : Negotiated wages, actual wages and labour productivity (base 100 in 2000)



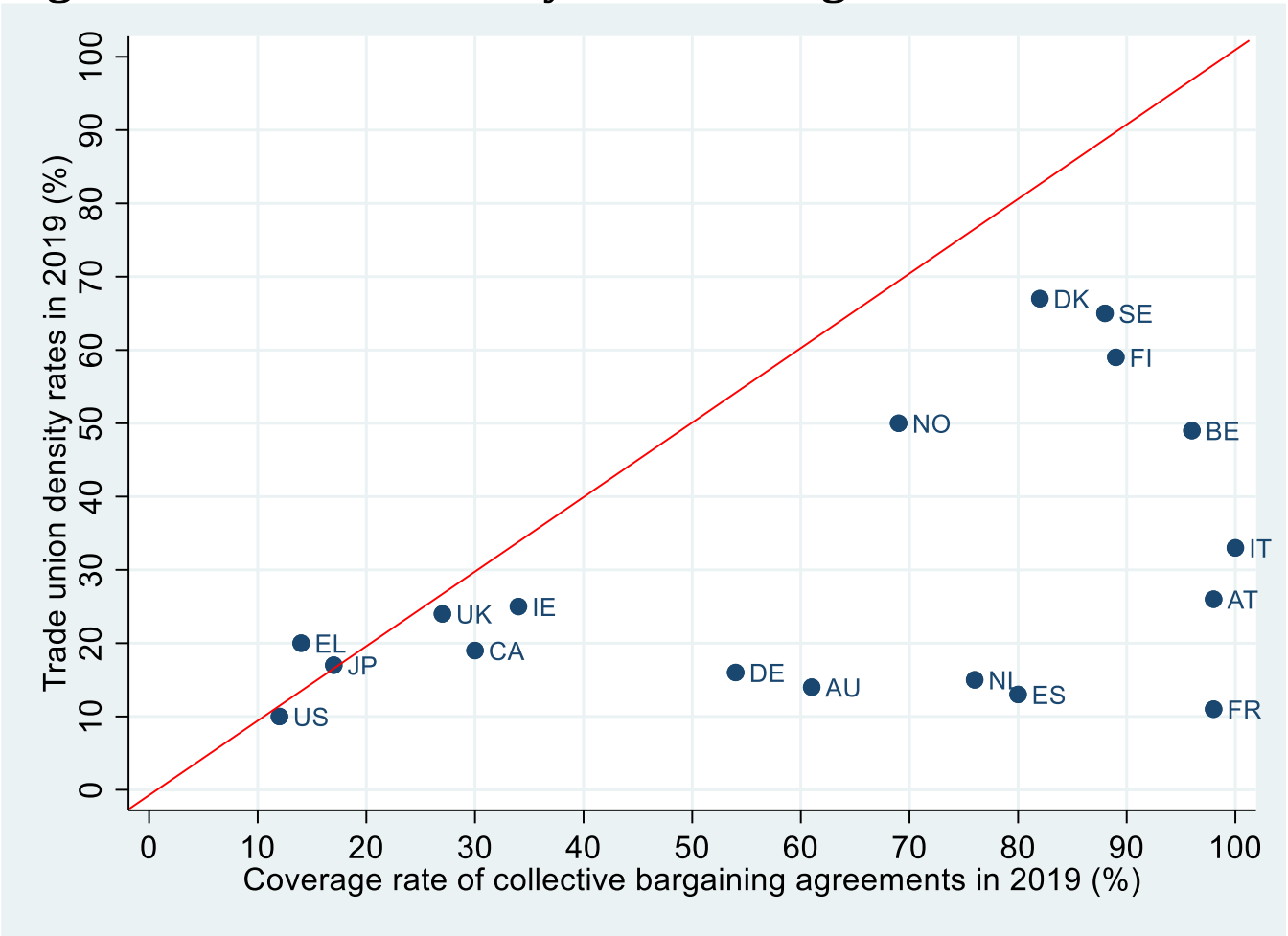
Note: Negotiated and actual wages are deflated using the private final consumption price index. Hourly productivity refers to real GDP divided by total hours worked and actual wages to total wages divided by total hours worked by employees. Australia: negotiated wage refers to the average weekly total cash earnings. Belgium: negotiated wage refers to all private sector employees registered at the national Social Security Office. Source: OCDE (2018), *Perspectives de l'emploi*, Paris.

Tab. : Negotiated wages, actual wages and labour productivity (base year 2000)



Note: Negotiated and actual wages are deflated using the private final consumption price index. Hourly productivity refers to real GDP divided by total hours worked and actual wages to total wages divided by total hours worked by employees. Source: OCDE (2018), *Perspectives de l'emploi*, Paris.

Fig. : Trade union density and coverage rate in 2019



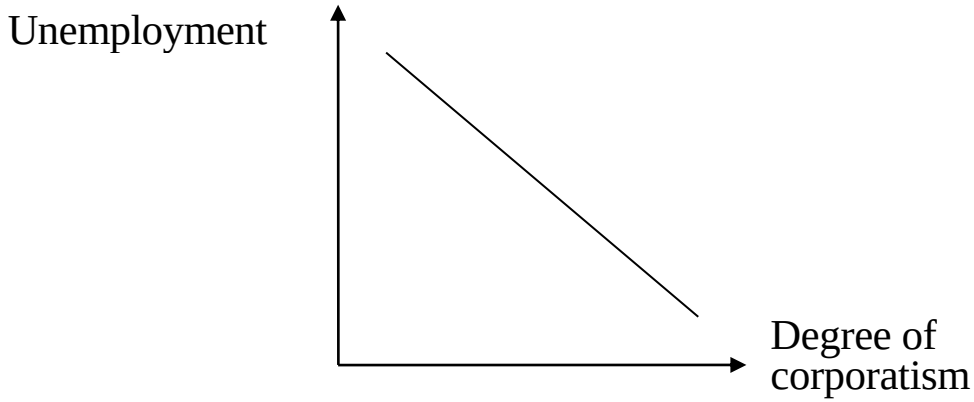
Notes : For some countries, the year of observation differs slightly.
Source : OECD (2023).

Table. : Trade union density and coverage rate (%)

Country	Trade union density			Coverage rate		
	1990	2019	Δ	1990	2019	Δ
France (FR)	11	11°°	0	95	98++	+3
Autria (AT)	**47**	**26**	**-21**	98	98	0
Belgium (BE)	**51**	**49**	**-2**	**96**	**96**	**0**
Spain (ES)	14	13	-1	90	80++	-10
Finland (FI)	73	59	-14	83+	89++	+6
Denmark (DK)	74	67	-7	83	82++	-1
Italy (IT)	39	33	-6	100	100	0
Netherlands (NL)	25	15	-10	82	76	-6
Norway (NO)	59	50	-9	75	69++	-6
Australia(AU)	**41**	**14++**	**-27**	**77**	**61++**	**-16**
Sweden (SE)	**82**	**65**	**-17**	91	88++	-3
Germany (DE)	31	16	-15	**85**	**54++**	**-31**
Ireland (IE)	**51**	**25**	**-26**	**63**	**34++**	**-29**
Canada (CA)	34	19	-8	38	30	-8
Grece (EL)	**38°**	**20°°**	**-18**	**100**	**14++**	**-86**
Japan (JP)	25	17	-8	25	17	-9
UK (UK)	**40**	**24**	**-16**	58	27	-8
USA (US)	16	10	-6	18	12	-6
Average$	44	30	**-14**	74	63	**-11**

Notes : Trade union density: percentage of employees affiliated to a trade union. Collective bargaining coverage rate: percentage of employees covered by a collective bargaining agreement. Δ: change between 1990 and 2019 (in % points).
Column average. ° 1992, °° 2016, + 1995, ++ 2018. Source: OECD and ICTWSS.

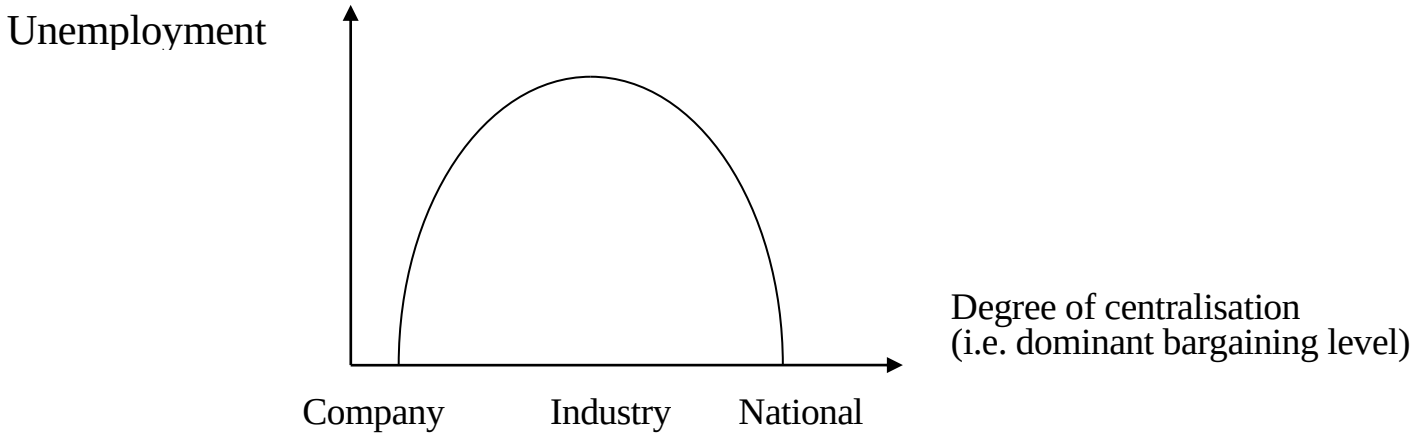
Corporatist hypothesis



Intuition : High degree of corporatism, and particularly of coordination among employers' organisations and trade unions, prompt the economic players to *internalise* the negative *externalities* of their agreements, mainly on pay.

Exemples : McCallum (1983, 1986), Cameron (1984), Bruno et Sachs (1985), Tarantelli (1986), Bean *et al.* (1986), Newell and Symons (1987), Golden (1993).

Hump-shaped relationship (or bell-shaped)



Intuition : Sectoral pay bargaining less efficient because :

a) Unlike at national level, there is insufficient co-ordination of decision making at sectoral level to encourage the trade unions to internalise *all* the externalities arising from pay increases.

b) Competitive pressure (and elasticity between employment and wages) is weaker between sectors than between firms.

Exemples : Calmfors et Driffill (1988), Freeman (1988), Rowthorn (1992).

Really?

- The OECD (1997, 2018) updates of the Calmfors and Driffill results, for the periods 1986-1996 and 1990-2014 respectively, fail to confirm the existence of a hump-shaped relationship among the advanced economies.

- Hypothesis according to which the demand for labour is inevitably less elastic at sectoral than at company level has been questioned (international competition).

- Reservations because Calmfors and Driffill ignore the degree of co-ordination among the social partners.

More recent evidence…

Employment performance of an economy with both high bargaining coordination and high unionization is *ceteris paribus*, superior to that of an economy with low coordination and unionization.

When coordination is lacking, better employment outcomes are observed under either centralized or decentralized regimes, with intermediate regimes offering the worst performance.

Exemples : Nickell (1997), Flanagan (1999), Traxler et Kittel (2000), Traxler and Brandl (2012), OECD (2004), Lesueur et Sabatier (2008), Boeri and van Ours (2013), Zavakou (2018).

What about pay inequality ?

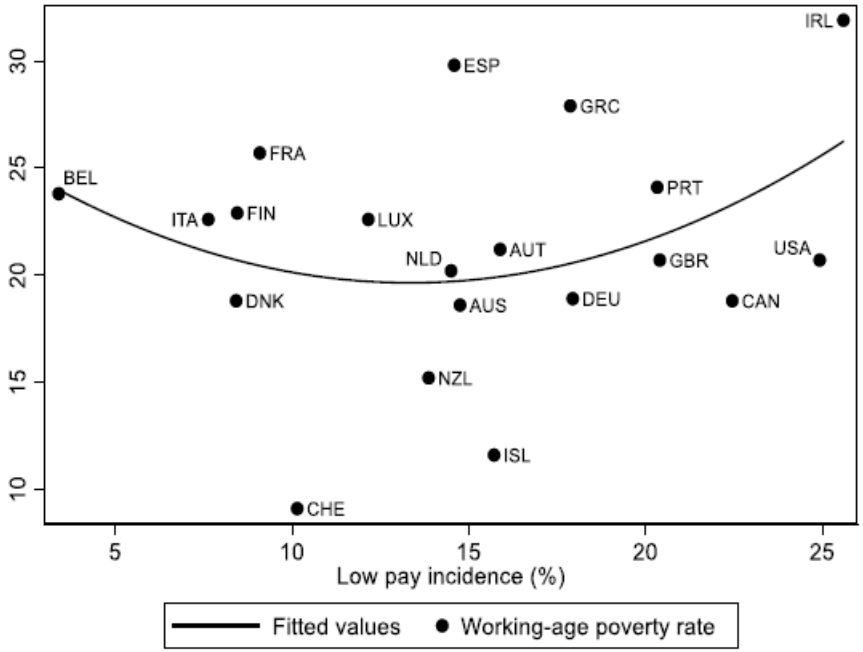
Tableau : Degree of centralisation and wage inequality in 24 OECD countries (1990-2014)

	D5/D1			D9/D5			D9/D1		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A. Level of bargaining									
Low centralization (Firm bargaining)	Reference			Reference			Reference		
Medium centralization (Sector or industry bargaining)	-0.264*** (0.085)	-0.257*** (0.073)	-0.262*** (0.071)	-0.206*** (0.025)	-0.198*** (0.071)	-0.205*** (0.069)	-0.847*** (0.065)	-0.818*** (0.226)	-0.842*** (0.218)
High centralization (Central or cross-industry bargaining)	-0.288*** (0.092)	-0.263*** (0.067)	-0.266*** (0.073)	-0.173*** (0.033)	-0.152 (0.094)	-0.147 (0.098)	-0.829*** (0.086)	-0.740*** (0.256)	-0.732*** (0.271)
Estimator	**Pooled OLS**	**Pooled OLS**	**IV-Pooled OLS**	**Pooled OLS**	**Pooled OLS**	**IV-Pooled OLS**	**Pooled OLS**	**Pooled OLS**	**IV-Pooled OLS**
Control variables[1]	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Year fixed effects[2]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	446	446	431	446	446	431	446	446	431
Adjusted R-squared	0.35	0.48	0.48	0.14	0.33	0.33	0.29	0.48	0.48

Source : Pineda-Hernadez, Rycx and Volral (2022, BJIR).

Does this imply more poverty (before taxes and transfers)?

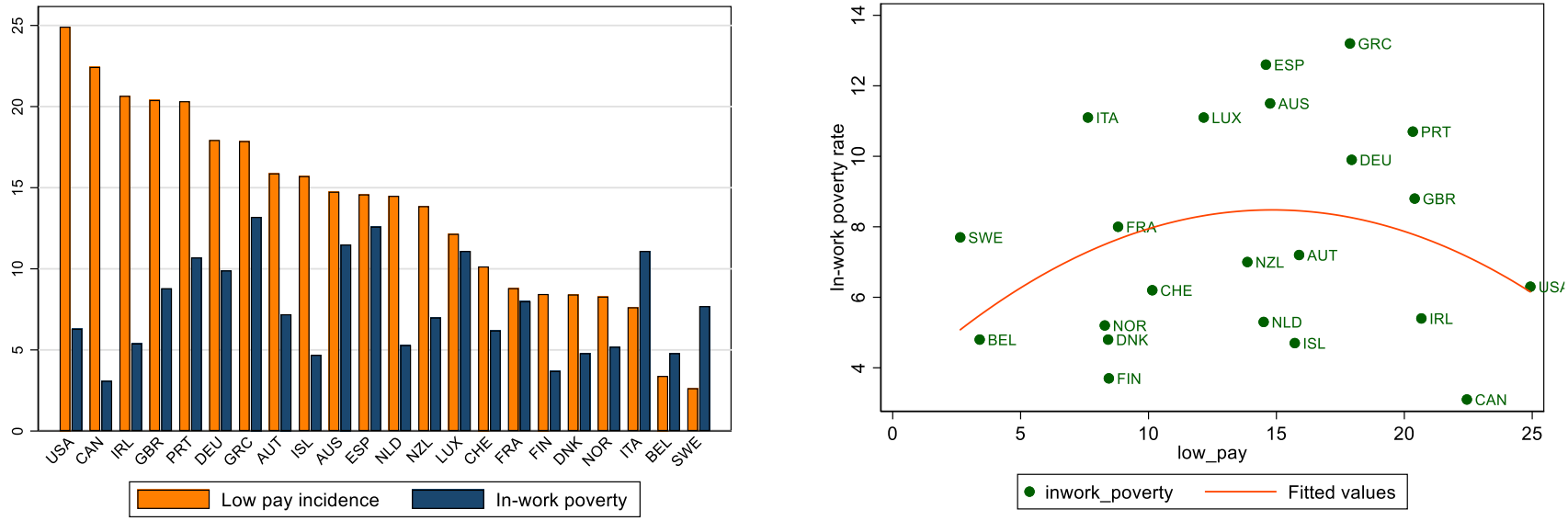
Figure 1 – Poverty and low pay incidence, 2014



Notes: Working-age poverty rate is the ratio of the number of people among the working-age population whose household market income per equivalent household member falls below the poverty line, which is set at 50% of the median market income of the working-age population. The low pay incidence refers to the share of full-time workers earning less than two-thirds of median earnings.

Source : Pineda-Hernadez, Rycx and Volral (2022, BJIR).

Figure 2 – Incidence of low-paid employment (%) and in-work poverty rate (after taxes and transferts, 2014)



Notes: **In-work poverty rate** refers to the share of persons who are at work and have an equivalized disposable income below the risk-of-poverty threshold, which is set at 60 % of the national median equivalized disposable income (after social transfers). Notice that Australia, Canada and the United States use official country-specific measures to calculate in-work poverty. **Low pay incidence** refers to the share of workers earning less than two-thirds of median earnings. Eurostat, OECD and National Statistical Offices databases, 2014.

Source : Pineda-Hernadez, Rycx and Volral (2022, BJIR).

Definition of poverty ?

An individual is generally considered to be poor if his or her 'adult equivalent income' is less than 50% of the median 'adult equivalent income' for the population as a whole.

The adult equivalent income is obtained by dividing the total annual income of a household, before taxes and transfers, by the number of adult equivalents in that household. *Disposable* adult equivalent income is calculated on the basis of a household's total annual income after tax and transfers.

The number of equivalent adults in a household is calculated using a standard scale (or modified OECD scale). This assigns a weighting to each member of the household. The weights are as follows: 1 for the first adult, 0.5 for each household member aged 14 and over, and 0.3 for children under 14.

Example

Assuming a family consisting of a father (EUR 6,000 gross annual income), a mother (EUR 30,000 gross annual income) and a child under the age of 14 (no income).

Number of adult equivalents: 1 + 0.5 + 0.3 = 1.8.

Adult equivalent income = (30,000 + 6,000 +0) / 1.8 = EUR 20,000 per year.

The members of this household will be considered poor if EUR 20,000 is less than 50% of the median 'adult equivalent income' for the population as a whole.

The same analysis can be made after taxes and transfers on the basis of *disposable* adult equivalent income.

Collective bargaining and poverty ?

Table 5 - Collective Bargaining and Poverty

	Working-age poverty rate, before taxes and transfers			Working-age poverty rate, after taxes and transfers			Government social spending on the working-age population as a % of GDP		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A. Level of bargaining									
Low centralization (Firm bargaining)	Reference			Reference			Reference		
Medium centralization (Sector or industry bargaining)	-0.006 (0.014)	-0.008 (0.012)	-0.011 (0.012)	-0.025** (0.011)	-0.025** (0.011)	-0.026** (0.011)	0.023** (0.010)	0.024*** (0.007)	0.023*** (0.007)
High centralization (Central or cross-industry bargaining)	0.022 (0.014)	0.018 (0.014)	0.034* (0.018)	-0.022 (0.013)	-0.021* (0.012)	-0.020* (0.012)	0.032** (0.013)	0.030*** (0.008)	0.033*** (0.009)
Estimator	**Pooled OLS**	**Pooled OLS**	**IV-Pooled OLS**	**Pooled OLS**	**Pooled OLS**	**IV-Pooled OLS**	**Pooled OLS**	**Pooled OLS**	**IV-Pooled OLS**
Control variables[1]	No	Yes	Yes	No	Yes[3]	Yes[3]	No	Yes[3]	Yes[3]
Year fixed effects[2]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	492	492	464	502	502	474	594	594	548
Adjusted R-squared	0.04	0.33	0.33	0.22	0.42	0.43	0.17	0.57	0.59

Source : Pineda-Hernadez, Rycx and Volral (2022, BJIR).

At the micro-economic level ?

The two faces of trade unions (company collective agreements) in Belgium: Rent-seeking vs. efficiency-enhancing

Appendix E: The Impact of Firm-Level Collective Agreements on Productivity

Dependent variable = log average hourly productivity[a]	*SYS-GMM*
Firm-level collective agreement[b]	0.021**
	(0.011)
Year dummies	Yes
Individual and job characteristics[c]	Yes
Firm characteristics[d]	Yes
Arellano–Bond test for AR(2), *p*-value	0.191
Hansen over-identification test, *p*-value	0.584
Number of firm-year observations	4,282

Note: Robust standard errors are reported between parentheses.
[a]The dependent variable is the natural logarithm of the firm-level average hourly value added at factor costs.
[b]Dummy equal to one if the firm is covered by a firm-level collective agreement.

Source : Garnero, Rycx and Terraz (2020, BJIR), données pour 1999-2010.

⇒ Firm-level collective agreements improve productivity.

TABLE 2
The Impact of Firm-Level Collective Agreements on Labour Costs

Dependent variable = log average hourly wage cost[a]	*OLS (1)*	*OLS (2)*	*OLS (3)*	*SYS-GMM (4)*	*SYS-GMM (5)*
Log labour productivity[b]			0.397***		0.280***
			(0.031)		(0.050)
Firm-level collective agreement[c]	0.141***	0.051***	0.025***	0.046***	0.037***
	(0.008)	(0.007)	(0.005)	(0.011)	(0.009)
Year dummies	Yes	Yes	Yes	Yes	Yes
Individual and job characteristics[d]	No	Yes	Yes	Yes	Yes
Firm characteristics[e]	No	Yes	Yes	Yes	Yes
Arellano–Bond test for AR(2), p-value				0.67	0.51
Hansen over-identification test, *p*-value				0.48	0.54
R-squared (adjusted)	0.04	0.45	0.68		
Number of firm-year observations	7,419	7,419	7,419	7,419	7,419

Note: Robust standard errors are reported between parentheses.
[a]The dependent variable is the natural logarithm of the firm-level average hourly wage cost.
[b]The natural logarithm of the firm-level average hourly labour productivity.
[c]Dummy equal to one if the firm is covered by a firm-level collective agreement.

Source : Garnero, Rycx and Terraz (2020, BJIR), données pour 1999-2010.

⇒ Firm-level collective agreements increase labour costs.

Appendix F: The Impact of Firm-Level Collective Agreements on the Productivity–Wage Gap

Dependent variable = log (average hourly productivity/average hourly wage cost)[a]	*SYS-GMM*
Firm-level collective agreement[b]	−0.010***
	(0.004)
Year dummies	Yes
Individual and job characteristics[c]	Yes
Firm characteristics[d]	Yes
Arellano–Bond test for AR(2), *p*-value	0.309
Hansen over-identification test, *p*-value	0.527
Number of firm-year observations	4,282

Notes: Robust standard errors are reported between parentheses.
[a]The dependent variable is the natural logarithm of the ratio between firm-level average hourly value added at factor costs and firm-level average hourly wage costs.
[b]Dummy equal to one if the firm is covered by a firm-level collective agreement.

Source : Garnero, Rycx and Terraz (2020, BJIR), données pour 1999-2010.

⇒ Firm-level collective agreements decrease gross profits.

TABLE 3
Estimates According to the Degree of Product Market Competition — Herfindhal–Hirschman index[d,e]

Dependent variable = log average hourly wage cost[a]	*OLS* (1)	*OLS* (2)	*OLS* (3)	*SYS-GMM* (4)	*SYS-GMM* (5)
Log average labour productivity[b]			0.390***		0.281***
			(0.031)		(0.050)
Firm-level collective agreement[c] × strong competition[d]	0.106***	0.038***	0.012**	0.032***	0.025***
	(0.010)	(0.008)	(0.006)	(0.011)	(0.009)
Firm-level collective agreement[c] × weak competition[e]	0.164***	0.077***	0.038***	0.065***	0.051***
	(0.015)	(0.013)	(0.009)	(0.016)	(0.012)
Weak competition (dummy)[e]	0.086***	0.035***	0.009	0.065***	0.041***
	(0.012)	(0.009)	(0.008)	(0.016)	(0.013)
Year dummies	Yes	Yes	Yes	Yes	Yes
Individual and job characteristics[f]	No	Yes	Yes	Yes	Yes
Firm characteristics[g]	No	Yes	Yes	Yes	Yes
Arellano–Bond test for AR(2), *p*-value				0.784	0.494
Hansen over-identification test, *p*-value				0.528	0.428
R-squared (adjusted)	0.06	0.44	0.68		
Number of firm-year observations	7,370	7,370	7,370	7,370	7,370

Note: Robust standard errors are reported between parentheses.
[a]The dependent variable is the natural logarithm of the firm-level average hourly wage cost.
[b]The natural logarithm of the firm-level average hourly labour productivity.

Source : Garnero, Rycx and Terraz (2020, BJIR), données pour 1999-2010.

⇒ Firm-level collective agreements reduce gross profits, especially when competition on the product market is weak (i.e. when companies' profit margins are higher).

Appendix D: The Impact of Firm-Level Collective Agreements on Labour Costs by Skill Level

	Low-skilled firms[b]				*High-skilled firms*[b]			
Dependent variable = log average hourly wage cost[a]	*OLS (1)*	*OLS (2)*	*SYS-GMM (3)*	*SYS-GMM (4)*	*OLS (5)*	*OLS (6)*	*SYS-GMM (7)*	*SYS-GMM (8)*
Log labour productivity[c]		0.358*** (0.017)		0.246*** (0.048)		0.414*** (0.051)		0.254*** (0.065)
Firm-level agreement[d]	0.059*** (0.007)	0.034*** (0.005)	0.059*** (0.011)	0.044*** (0.010)	0.055*** (0.015)	0.018* (0.011)	0.032* (0.019)	0.020 (0.015)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual and job characteristics[e]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm characteristics[f]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Arellano–Bond test for AR(2)			0.213	0.400			0.652	0.651
Hansen test			0.259	0.307			0.511	0.421
R-squared (adjusted)	0.38	0.63			0.34	0.62		
Number of firm-year observations	4,701	4,701	4,701	4,701	2,718	2,718	2,718	2,718

Note: Robust standard errors are reported between parentheses.
[a]The dependent variable is the natural logarithm of the firm-level average hourly wage cost.
[b]High-skilled firms are firms with a proportion of high-skilled workers (i.e. workers with post-secondary education) above the sample average, whereas low-skilled firms are those in which the proportion of high-skilled workers is below the sample average.

Source : Garnero, Rycx and Terraz (2020, BJIR), données pour 1999-2010.

⇒ Firm-level collective agreements increase wages more in companies employing a large proportion of low-skilled workers. The negative effect on gross profits is only observed in these companies.

⇒ In companies employing more skilled workers, the positive effects on productivity and labour costs offset each other, leaving gross profits unaffected.

Interpretation ?

- ✓ Estimates corroborate the existence of a wage compression effect, i.e. a distribution of wages by level of education that is more compressed than the distribution of labour productivity by level of education.

- ✓ They suggest that labour market institutions and in particular firm-level collective agreements contribute to the explanation of this phenomenon.

Consequences ?

- ✓ Wage compression implies a less favourable productivity/labour cost ratio for the low-skilled than for the highly-skilled.

- ✓ It is likely to reduce the employability of less qualified workers and increase the proportion of over-educated/qualified workers.