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Macroeconomics 1

Lecture 3: The WS-PS Model: the PS curve. Equilibrium in the model.

2025-2026

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Lecture 3

Class outline:

- The price setting curve(PS)
- Equilibrium in WS-PS model.

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Lecture 3

Readings:

- The CORE Team. (2023). *The Economy 2.0: Macroeconomics* (módulos 1.7-1.8)

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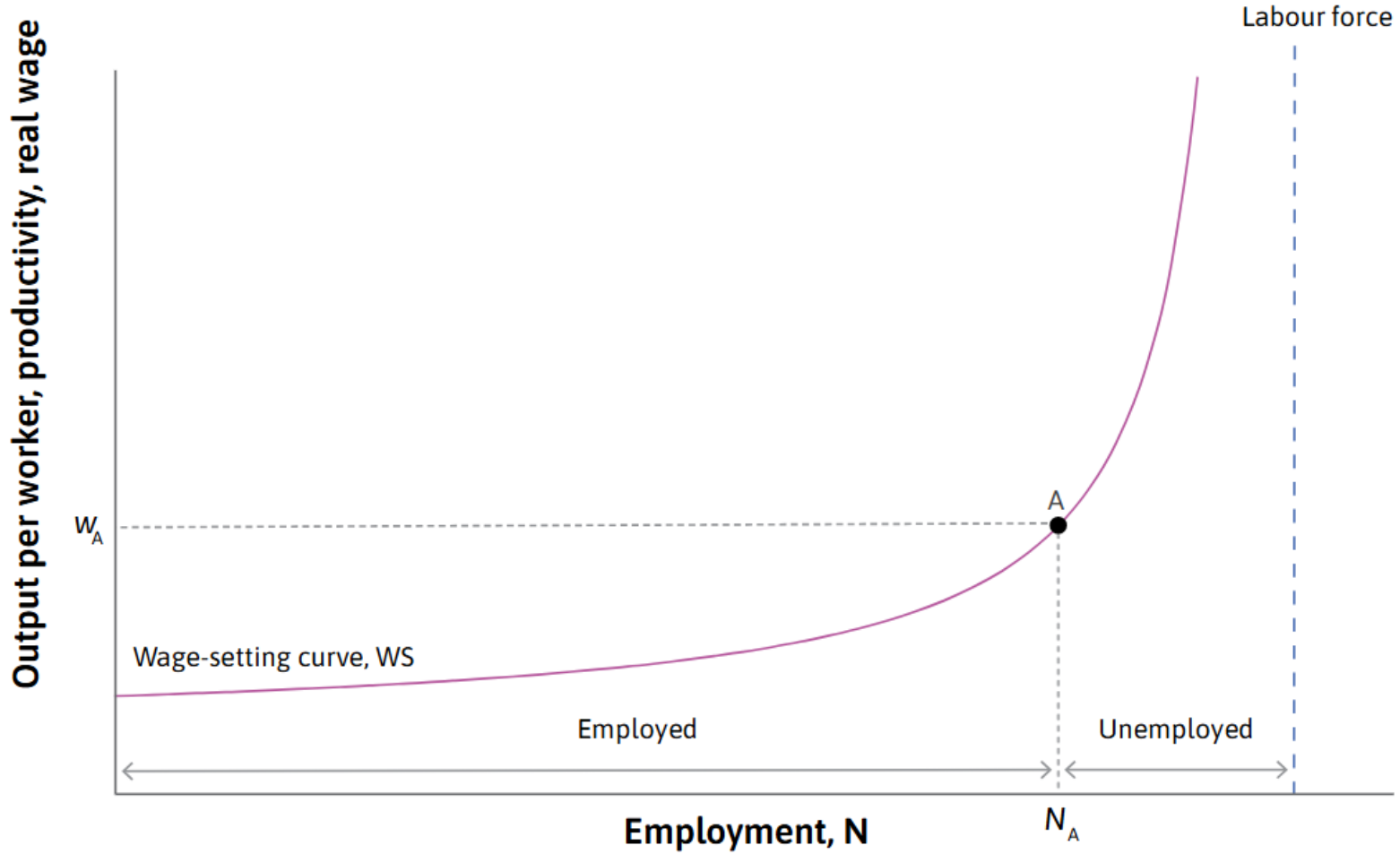
The price setting curve (PS)

In the previous lecture, we looked at the wage setting (WS) curve



The price setting curve (PS)

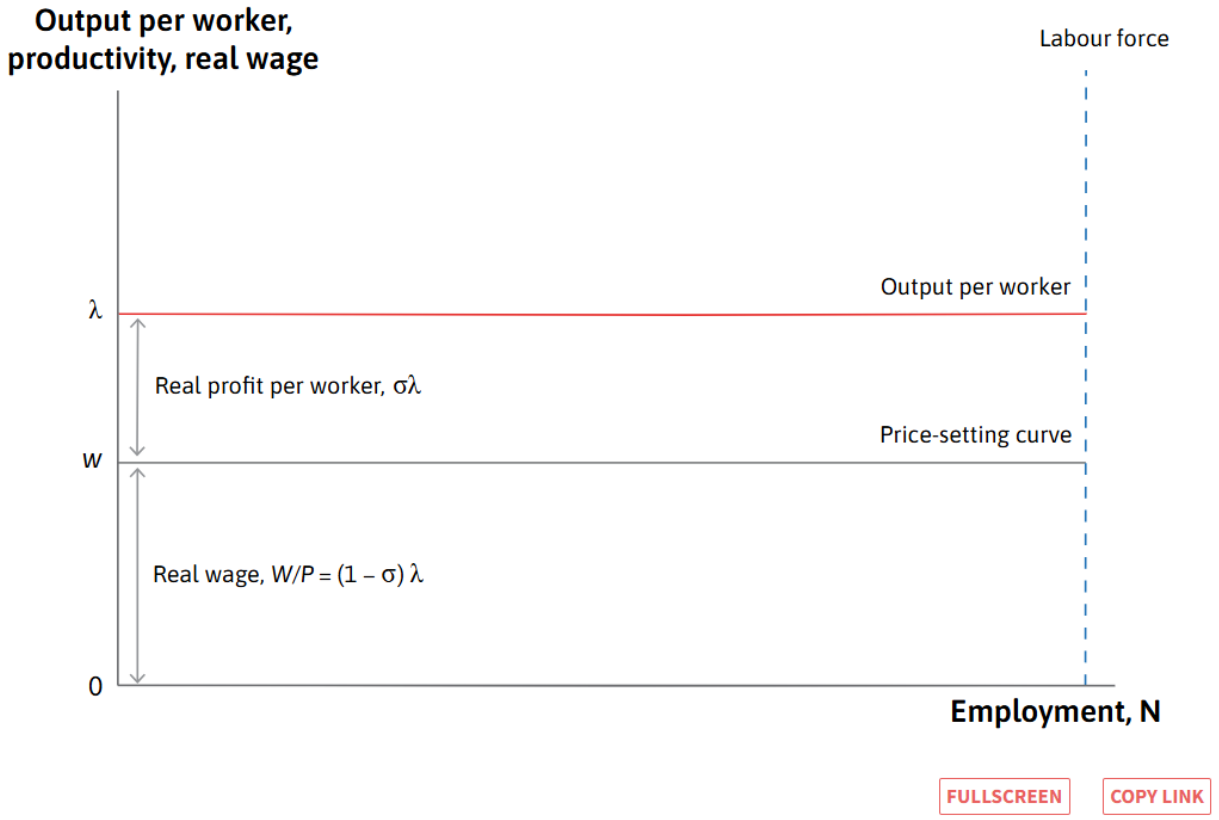


Figure 1.22 Determinants of the PS real wage.

Graphically, the price-setting (PS) curve is very simple.

It corresponds to a **horizontal line drawn** at the **level of the real wage w** that represents the distribution of output per worker λ between wages and profits.

The portion above the line **(σ·λ) is real profit per worker**. The portion below the **line ((1 – σ)·λ) is the real wage per worker**.

The price setting curve (PS)

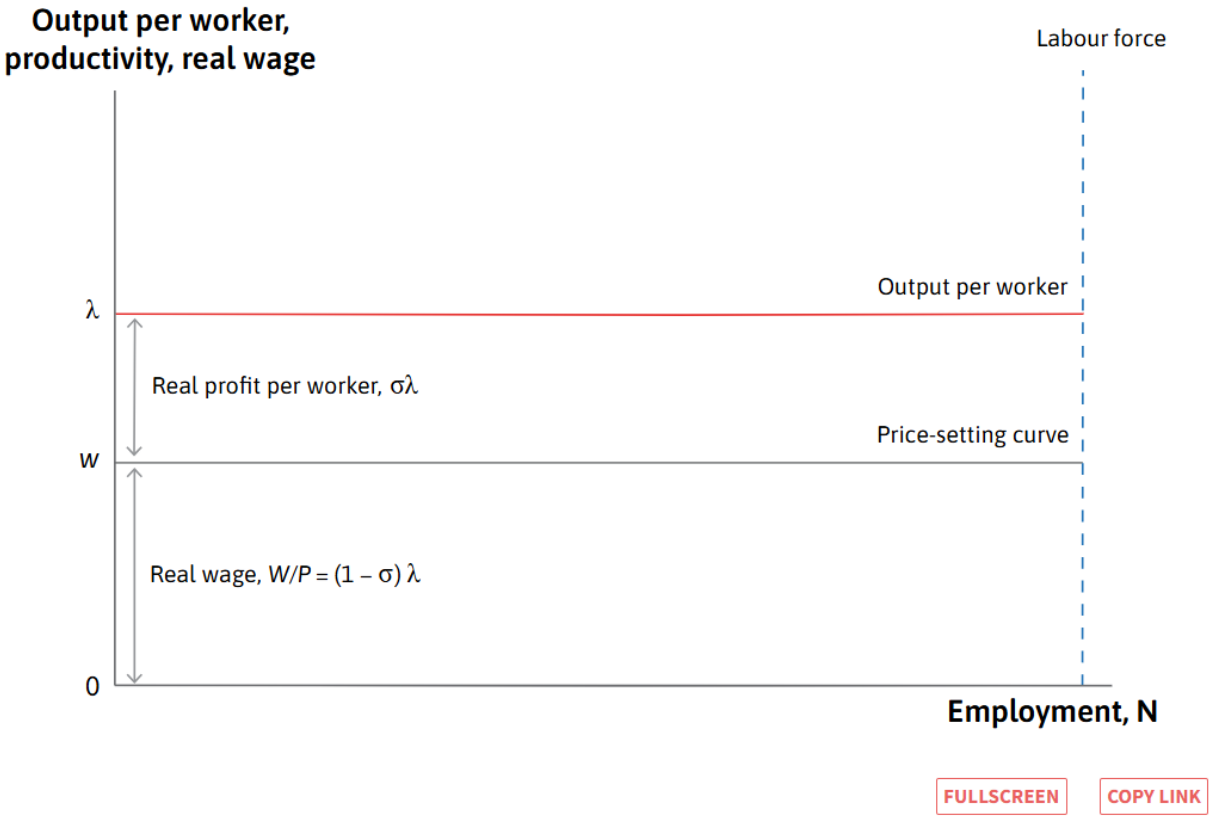


Figure 1.22 Determinants of the PS real wage.

The **real wage w may be lower** either because the **nominal wage W is lower** or because **the price level P is higher**.

Ceteris paribus, increasing prices (or reducing the nominal wage W) leads to a reduction in w (w = W / P).

The price setting curve (PS)

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Each **individual firm** sets a **nominal wage W and a price P for its product in order to maximize profit**.

This depends on **the firm's market power**, both in the **labor market** (monopsony) and in the **goods market** (monopoly).

- If the firm has substantial power (little competition) in the goods market, it can raise P to increase profit.
- If it has substantial power (little competition) in the labor market, it can reduce W to increase profit.
- Both actions reduce the real wage w (w = W / P), and workers receive a smaller share of output per worker.

Therefore**, the position of the PS curve (**higher or lower) is **a function of firms' market power** (degree of competition) in the economy, in both labor and goods markets

The price setting curve (PS)

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A **firm's market power in the goods market** is given by the **markup, denoted by μ ("mu").** It indicates how much above marginal cost the firm is able to set its price.

A **firm's market power in the labor market** is given by the **markdown, denoted by η ("eta").** It depends on the degree of competition/monopsony in the labor market and indicates how far below output per worker the firm is able to set the wage level.

For a given level of output per worker λ:

- The higher μ, the higher the price P
- The higher η, the lower the wage W

The price setting curve (PS)

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We can therefore **summarize the PS curve** through the following expression:

$$W/P = (1-\sigma)\,\lambda$$

where,

$$(1-\sigma) = \frac{1-\mu}{1+\eta}.$$

That is, the **wage share** of output $(1-\sigma)$ depends **negatively on both μ and η.**

The real wage prevailing in the economy (throughout the economy, since firms are identical), W / P, depends on (i) **the level of productivity λ**, and (ii) **firms' market power in the goods and labor markets, μ and η**.

The price setting curve (PS)

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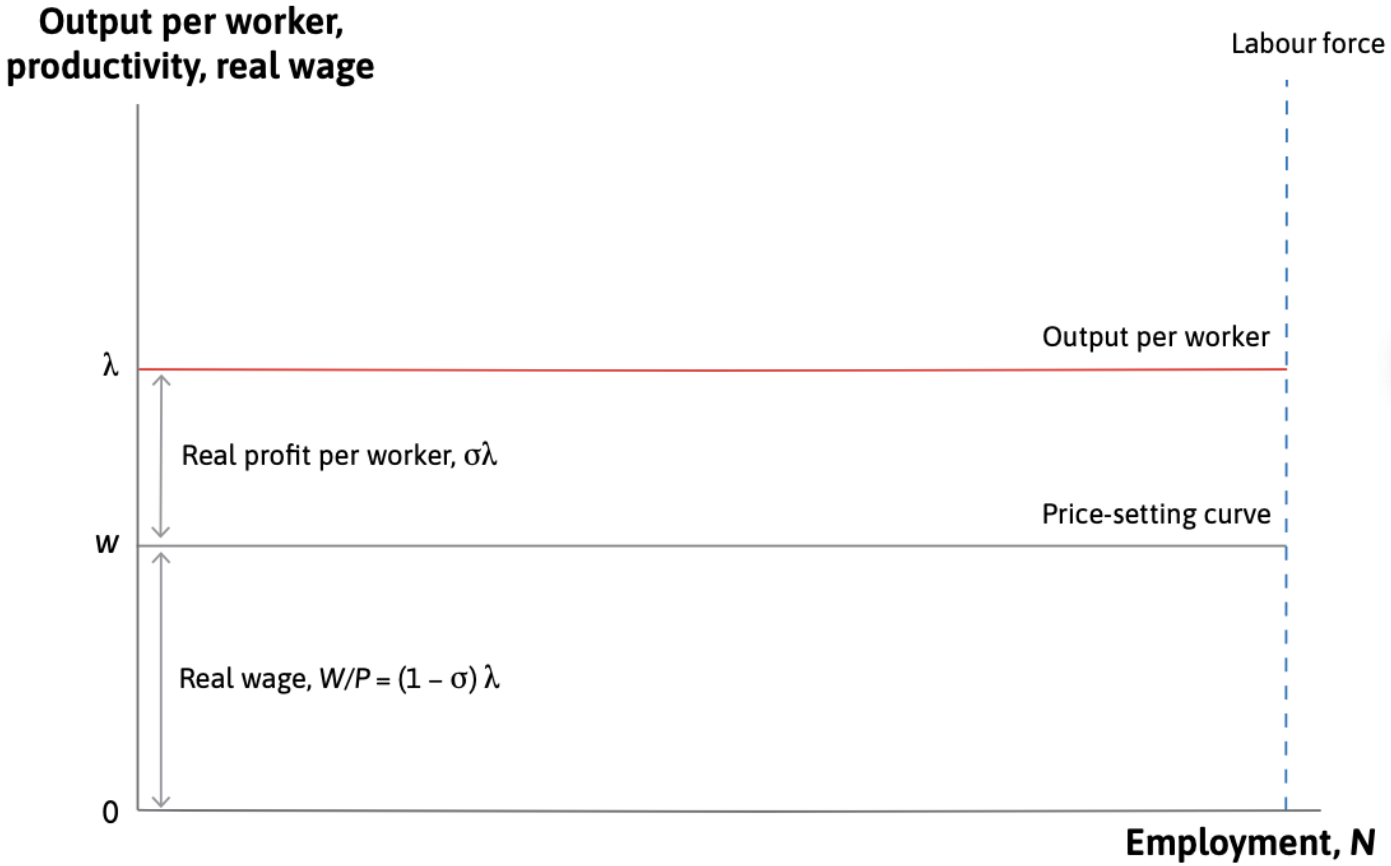
To sum up: the price-setting (**PS**) curve represents the level of the **real wage that firms are able to pay**, given the level of productivity and their market power (markup and markdown).



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Equilibrium in the WS-PS model

Equilibrium in the WS-PS model

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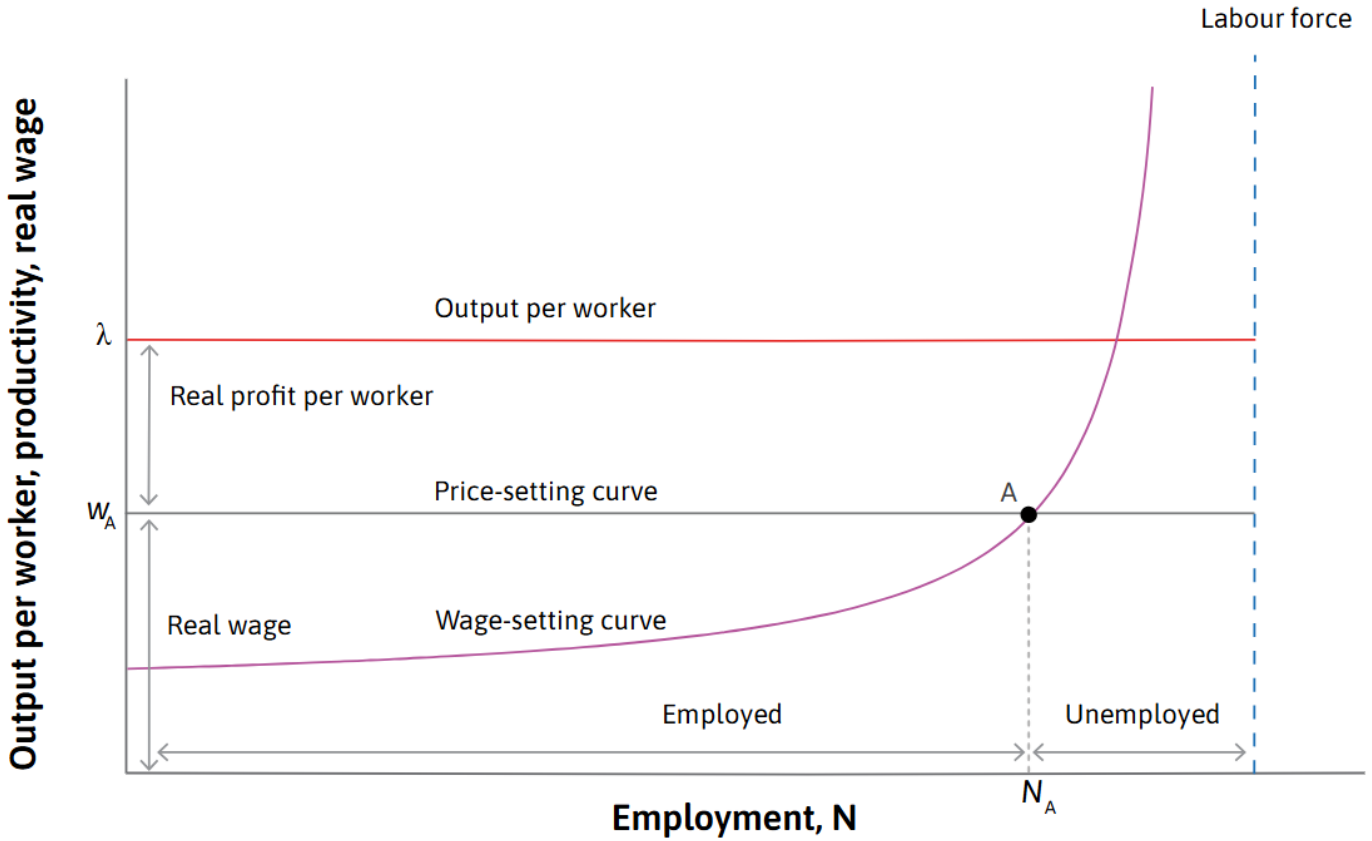
The intersection of the **WS** and **PS** curves (point **A**) corresponds to the equilibrium of the model.

It is the specific (and unique) combination of **w** and **N** at which firms pay the real wage $\mathbf{w_a}$ required to recruit and motivate the desired number of workers $\mathbf{N_a}$ (as given by the WS curve).

While at the same time paying a real wage $\mathbf{w_a}$ that is consistent with productivity **λ** and with profit-maximizing behavior, given their market power in the goods market (**μ**) and the labor market (**η**).



Equilibrium in the WS-PS model

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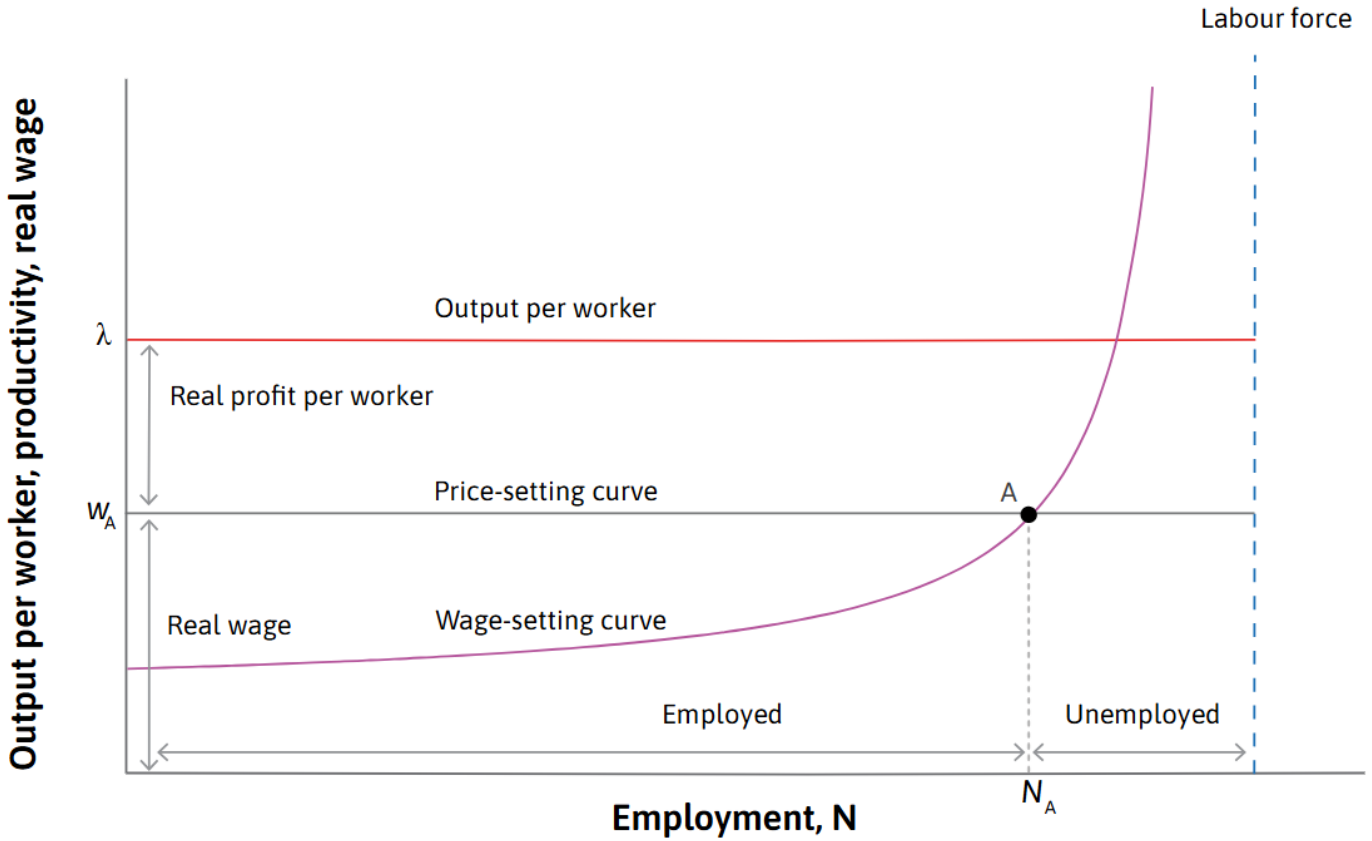
This equilibrium is:

- **A general equilibrium**, in the sense that it links equilibrium in more than one market (in this case, the labor market and the goods market); and
- **A Nash equilibrium**, in the sense that no agent can unilaterally improve their situation by changing their behavior.



Equilibrium in the WS-PS model

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Note, in particular, that the model generates **involuntary unemployment**:

There are unemployed individuals who would be willing to work at the wage $\mathbf{w_a}$, but are unable to secure a job (because the WS curve lies to the left of the reservation wage curve due to motivation effects).

However, even these unemployed workers cannot unilaterally improve their situation (for example, by accepting a lower wage), since doing so would not be consistent with firms' incentive and motivation considerations related to preventing shirking.

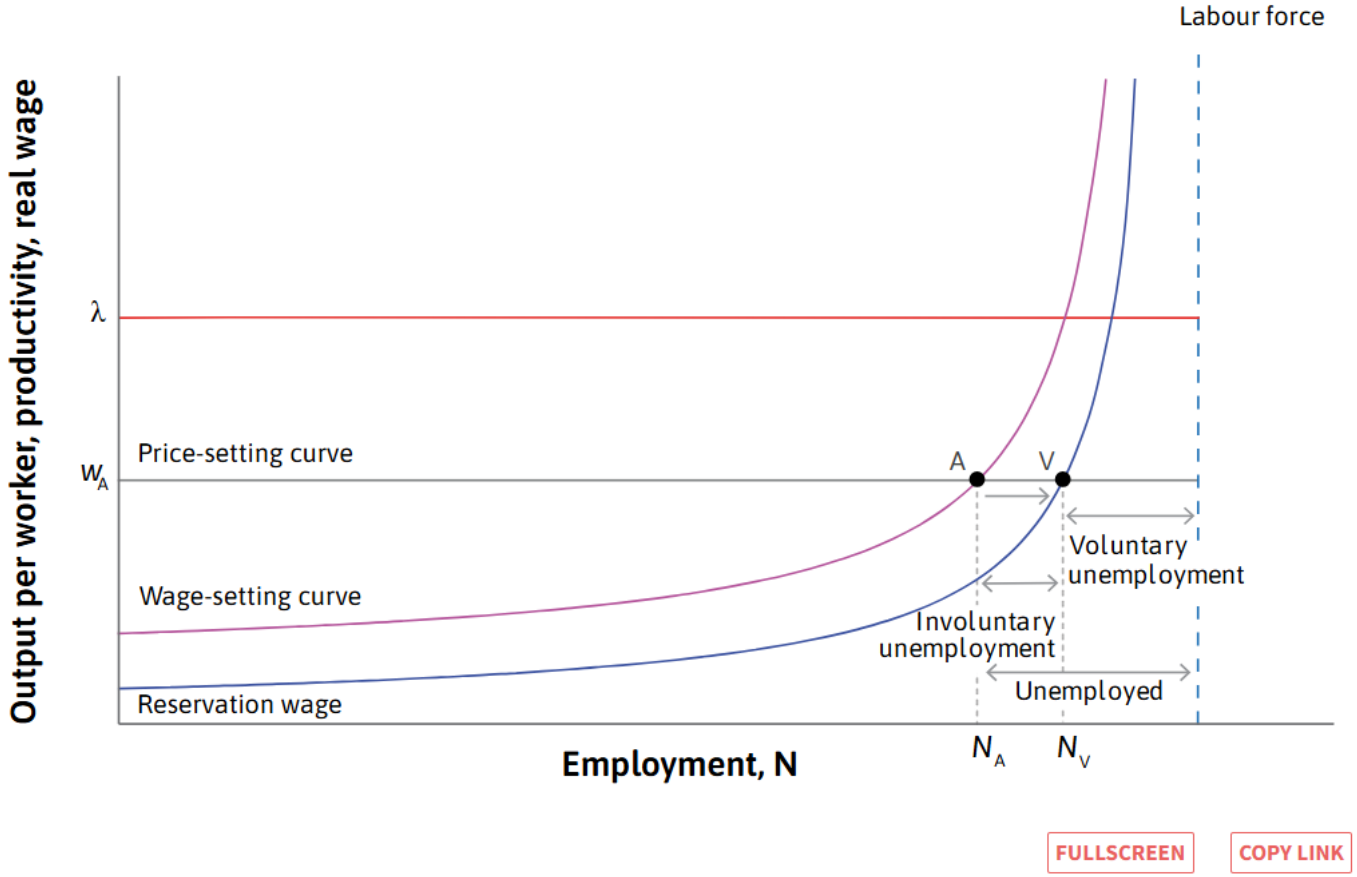

Figure 1.23 Equilibrium (structural), and involuntary and voluntary unemployment.

Disequilibrium in the WS-PS model

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Suppose we are **out of equilibrium**, with firms paying a higher real wage, w^B. Firms will hire N^B workers (with $N^B > N^A$) and, consequently, will be producing and selling more than at equilibrium.

Given these strong sales, firms have an incentive to increase prices **P**, which reduces the real wage **w** (**w = W / P**), so the real wage gradually falls.

This process continues until **w** reaches the level consistent with firms' profit-maximizing behavior, given their market power, which occurs at w^A.

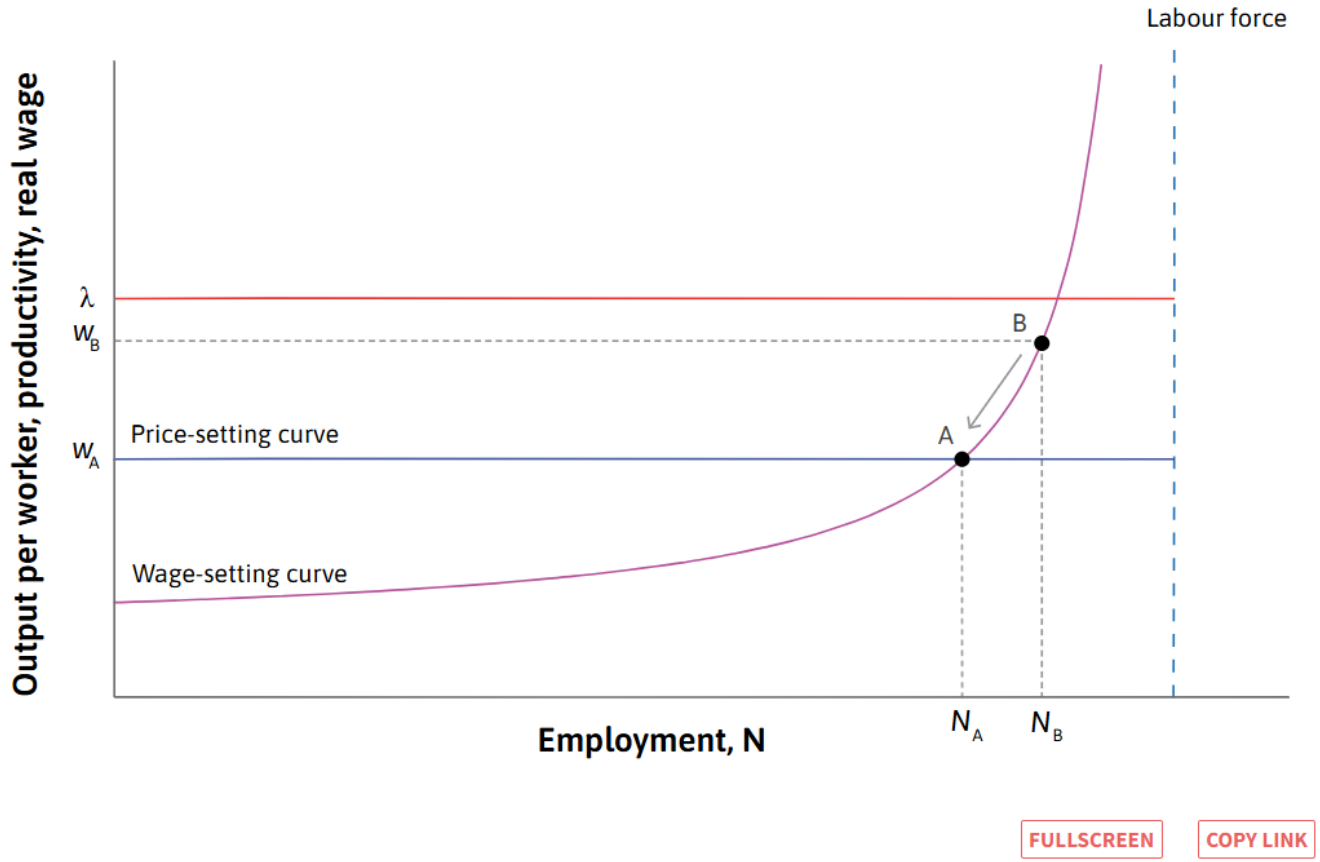

Figure 1.24 The WS–PS model, case 1: employment above equilibrium.

Disenquilibrium in the WS-PS model

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By contrast, if the real wage is **below the equilibrium level**, as at point **C**, firms are earning a higher profit per worker but are producing and selling a lower quantity (than at equilibrium).

Given the extraordinary profit per worker they are earning, firms will try to increase production and sales, which—under conditions of market power—implies accepting a reduction in price.

As prices fall, the real wage **w** (**w = W / P**) gradually increases. This process continues until point **A** is reached.

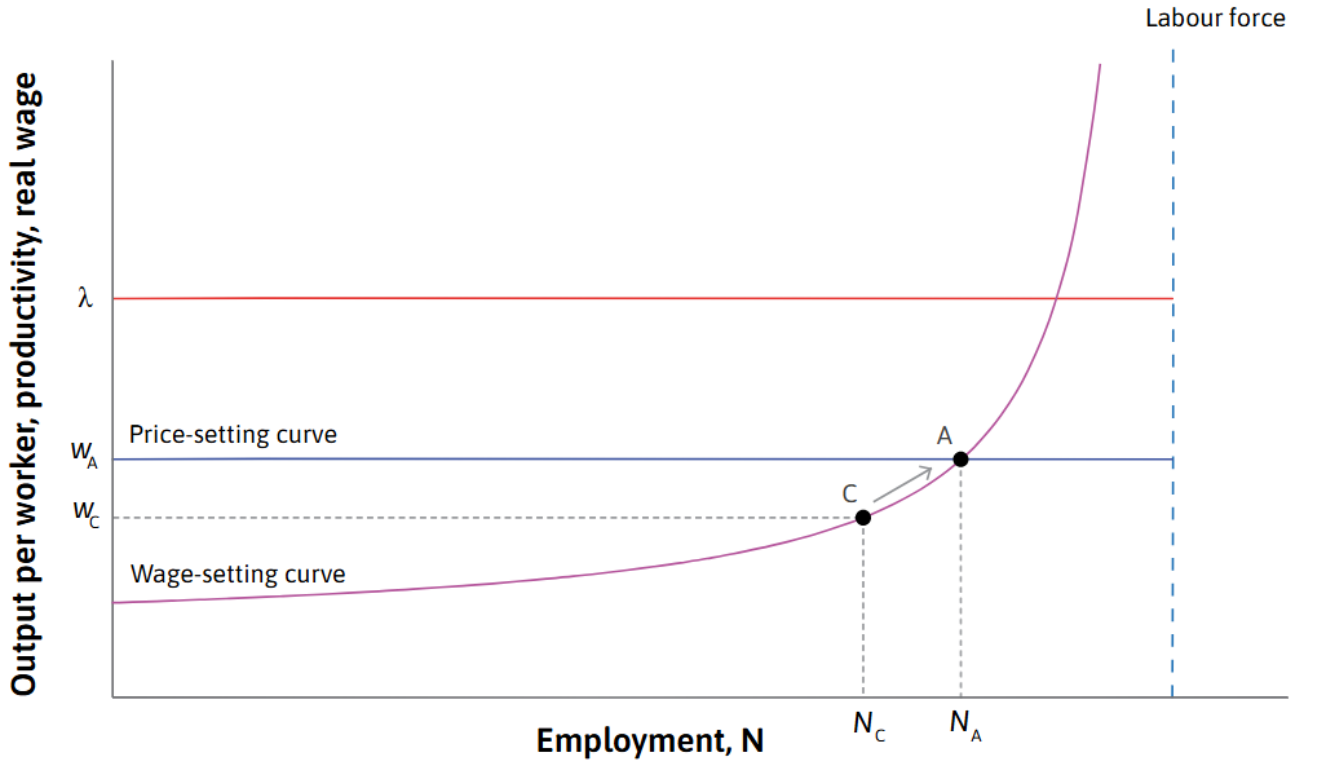

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Figure 1.25 The WS–PS model, case 2: employment below equilibrium.

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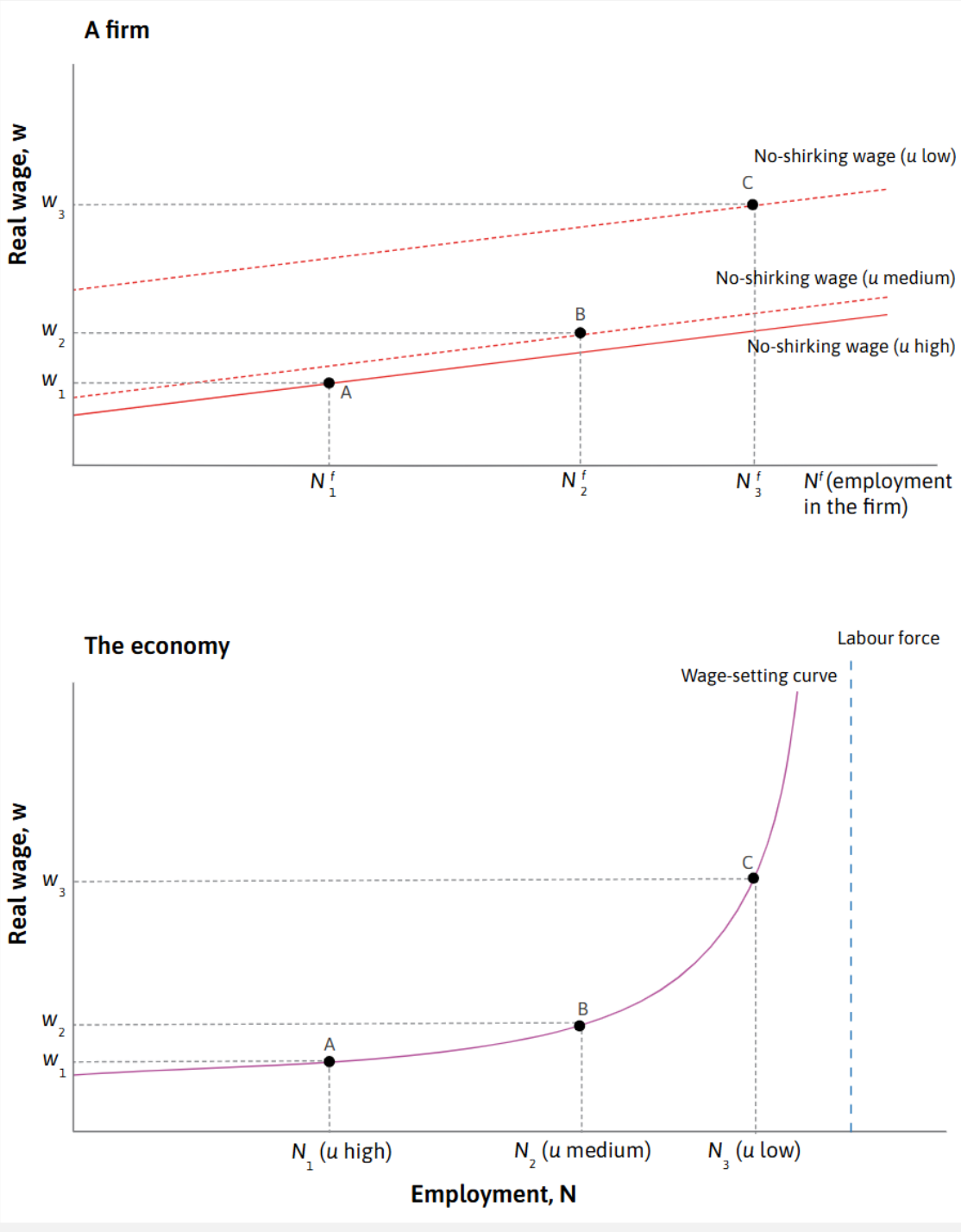
Macroeconomics and the aggregation paradox

Aggregation paradox:

When we studied the **WS curve**, we saw that its asymptotic nature—which always generates involuntary unemployment—results from an **interaction effect between firms**.

If each firm tries to raise the wage it pays in order to recruit more workers, the overall wage level increases and the overall level of unemployment decreases, shifting the (economy-wide) no-shirking curve upward.



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Aggregation Paradox

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This type of effect occurs frequently in macroeconomics.

Keynes's paradox of thrift is a classic example: if all agents try to save more (by spending less), aggregate expenditure falls, aggregate income declines, and each agent may end up being unable to save as much as planned, because although spending is reduced, income also falls (under certain conditions).

Adam Smith's **"invisible hand"** can also be seen as an aggregation effect: the widespread pursuit of self-interest generates positive aggregate outcomes (under certain conditions).

These are examples of **aggregation effects or paradoxes**, which we must always take into account. **Emergent effects** arise when we aggregate the behavior of many agents.

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The WS-PS model: summary and revision

The WS-PS model: revision

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Model: a simplified representation of reality, used to analyze or describe specific processes.

The WS–PS model aims to explain the determination of employment, unemployment, and real wage levels in the economy.

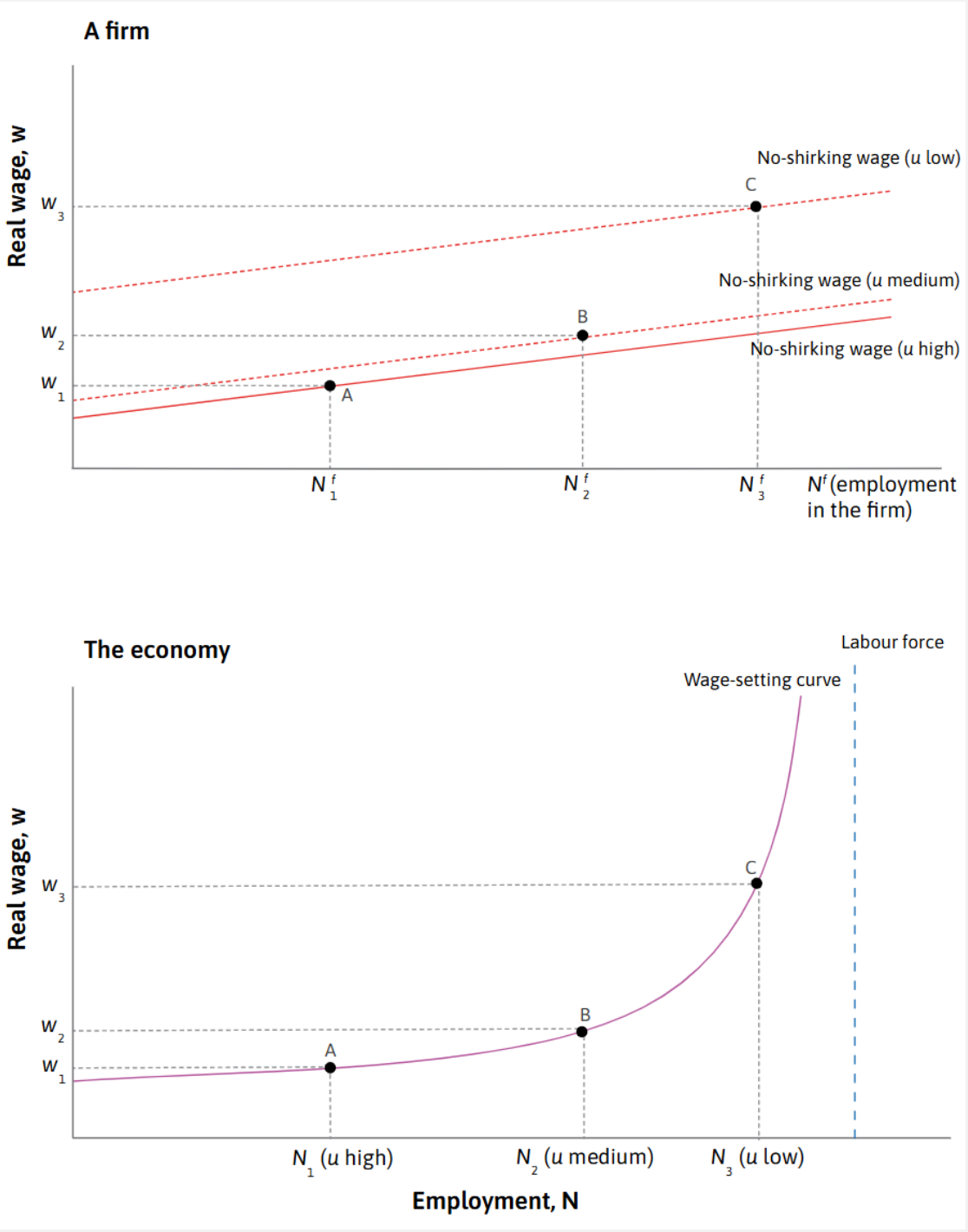
It incorporates the behavior of firms (as employers and as producers and sellers of goods and services) and of individuals/households (as workers and as consumers of goods and services).

The resulting equilibrium is a **general equilibrium**, linking equilibrium in the labor market and the goods market.

The WS-PS model: revision

The first central component of the model is the **WS curve.**

It is a **relationship** between the **real wage** level and the **number of workers that firms are able to recruit** and motivate, given workers' preferences, labor market conditions and institutions, and interaction effects



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The **WS curve** tends asymptotically to **+∞** as unemployment approaches zero, and therefore always generates involuntary unemployment, regardless of the wage level.

The WS-PS Model: revision

The second central component of the model is the **PS curve.**

It indicates the real **wage level w** that firms are able to set **as a function of output per worker in the economy and firms' market power** in the goods and labor markets (**markup and markdown**).

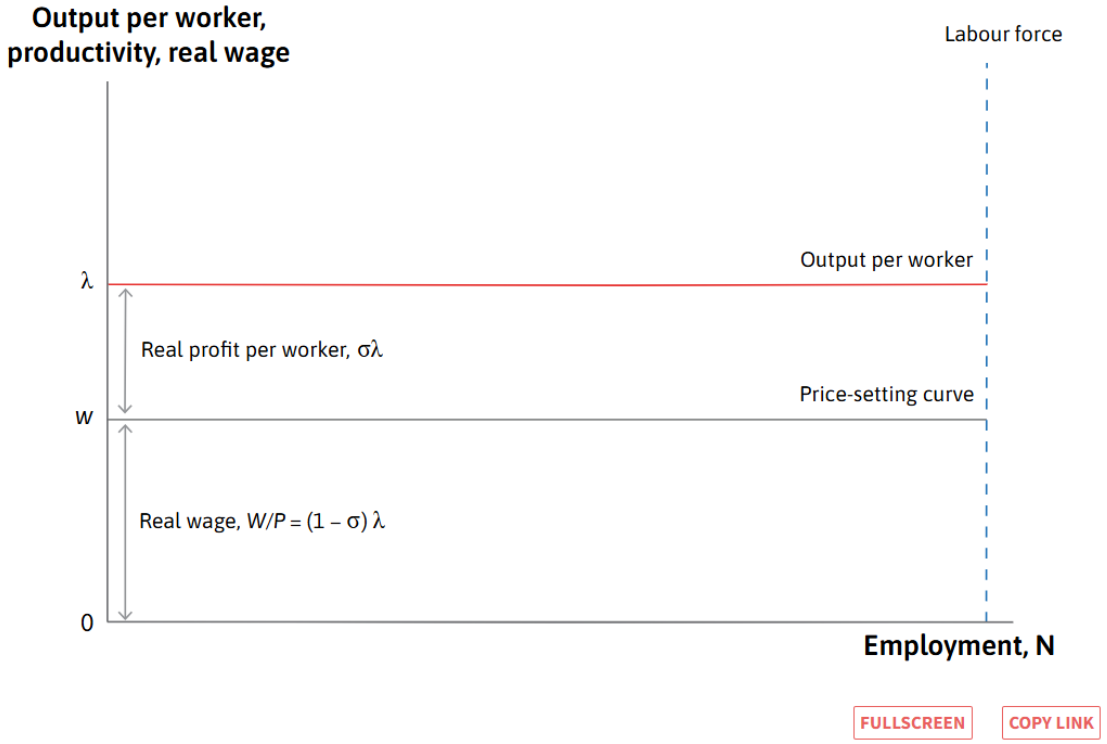

Figure 1.22 Determinants of the PS real wage.

That wage level **w** will be higher:

- the **higher output per worker** is;
- the **lower the markup** is;
- the **lower the markdown** is.

The WS-PS: revision

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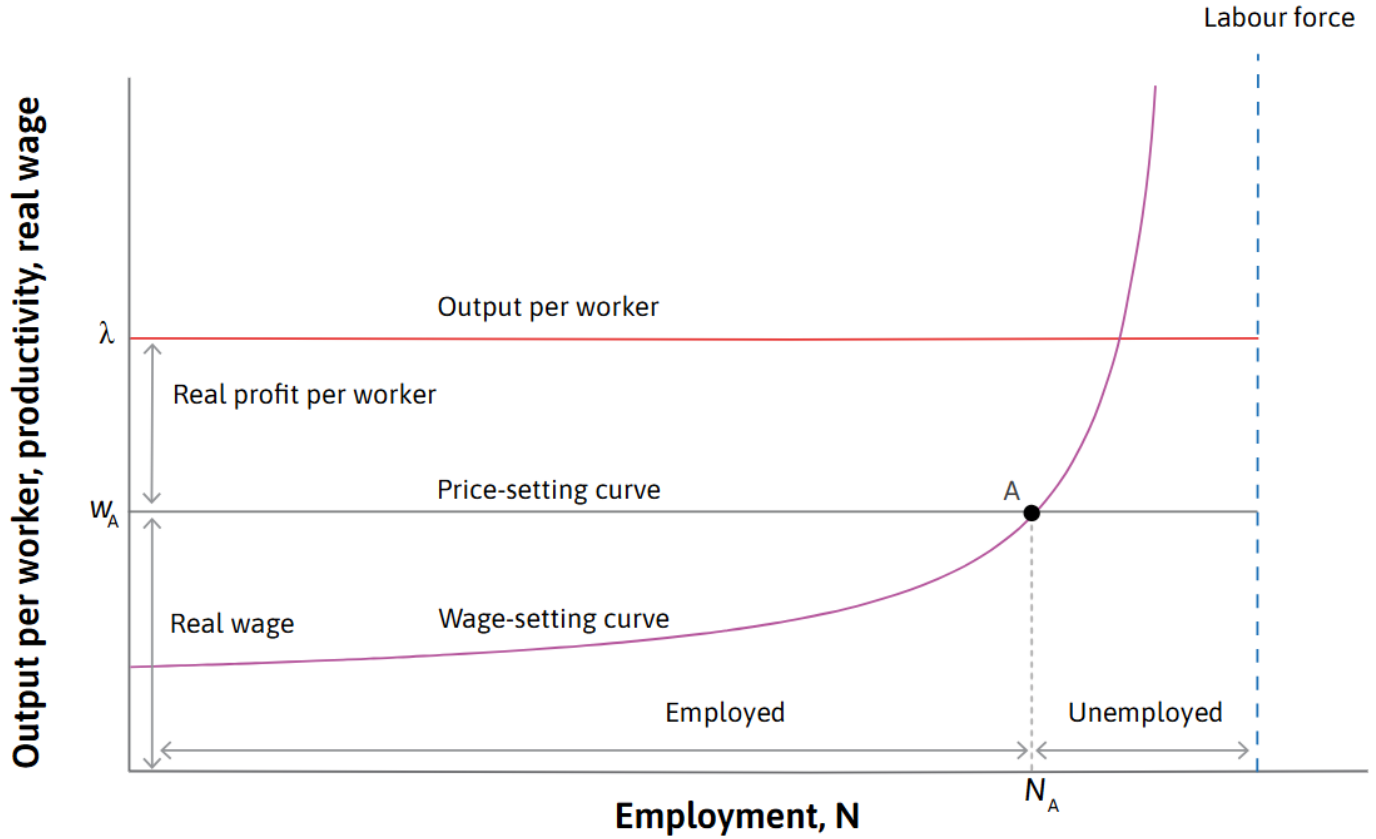
The intersection of the two curves (**WS** and **PS**) produces a **unique equilibrium** (point **A**) in terms of the real wage **w** and the level of employment **N**.

This is the only combination that is simultaneously consistent with firms' recruitment intentions (**WS**) and with firms' productivity level and market power (**PS**).



The WS-PS model: revision

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Outside equilibrium (to the left or to the right):

- **Firms have something to gain** from changing prices and quantities produced,
- They will **trigger an adjustment** process
- The economy will be **back to the equilibrium point.**

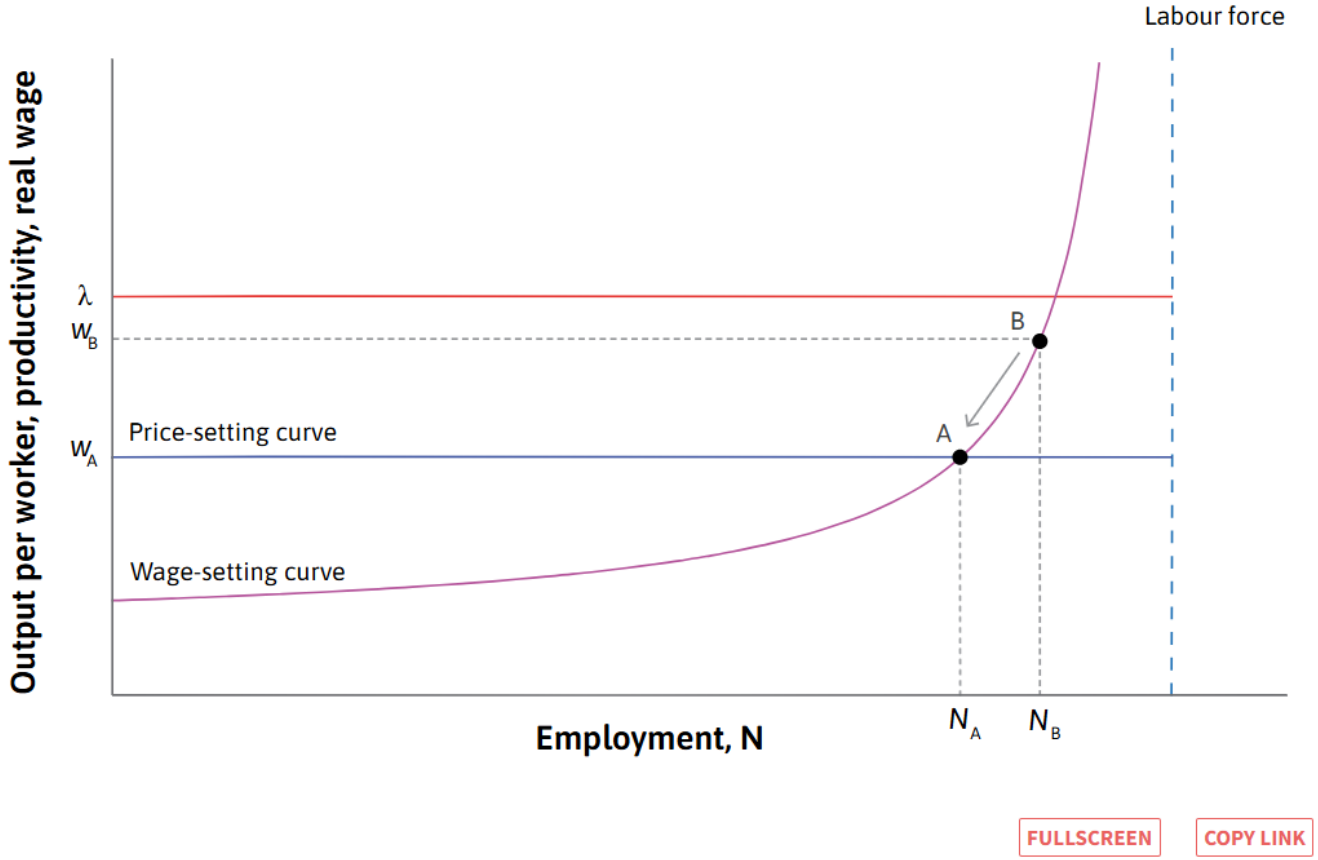

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Figure 1.24 The WS–PS model, case 1: employment above equilibrium.