
Labor Market Equilibrium

From EE211 or EE 311

- We know that the most efficiency of resource allocation comes from **competitive market** (no deadweight loss)
 - We don't think about the cooperation between agent in market
 - Sources of market failure → Price Mechanism doesn't work
 - Market power → High Price → Antitrust law
 - Public good → Free Rider Problem
 - Externality → Reallocation / Mutual Benefit
 - Asymmetric information → Moral Hazard + Adverse Selection
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Introduction

- Labor market equilibrium coordinates the desires of firms and workers, determining the wage and employment observed in the labor market.



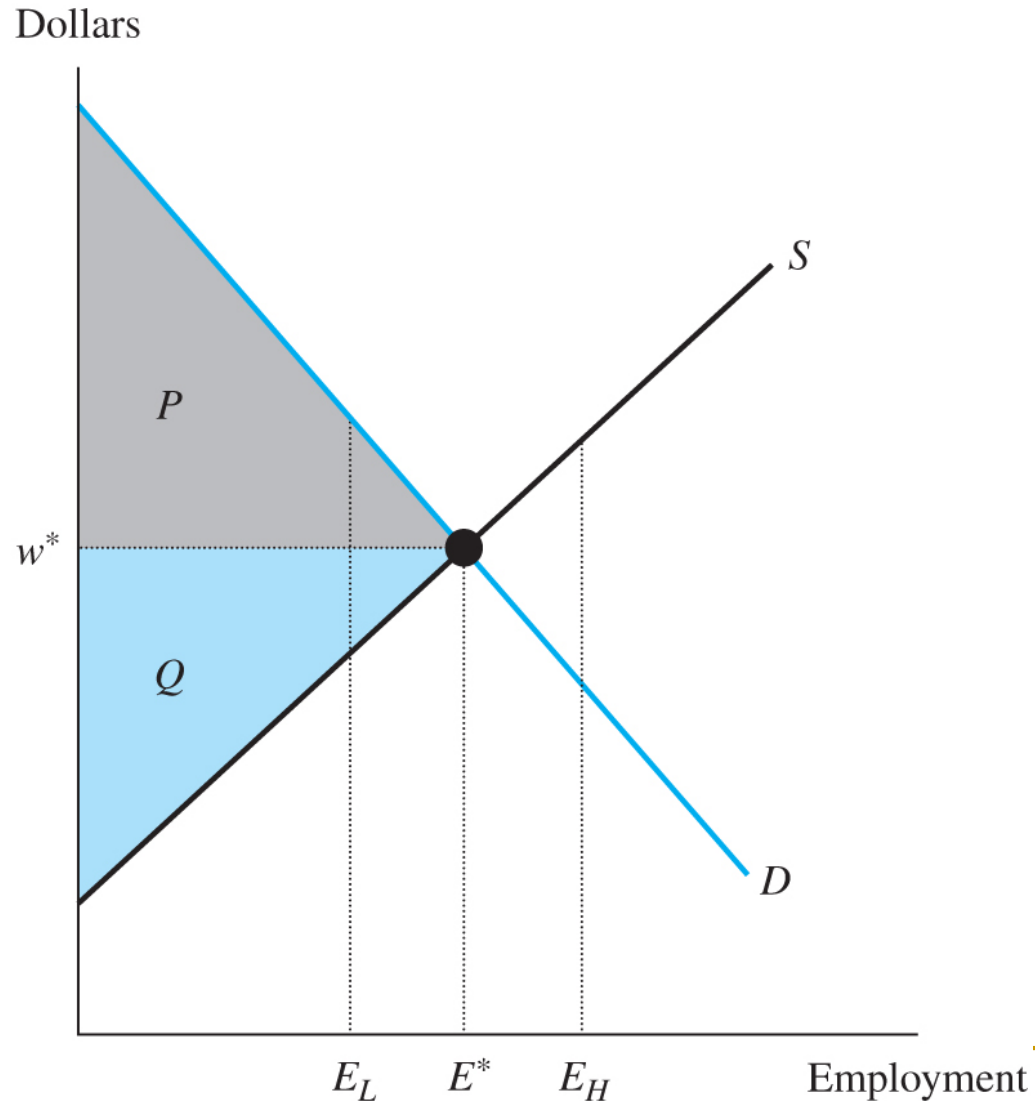
Equilibrium in a Single Competitive Labor Market

- Competitive equilibrium occurs when supply equals demand, generating a competitive wage and employment level.
 - It is unlikely that the labor market is ever in an equilibrium, since supply and demand are dynamic.
 - The model suggests that the market is always moving toward equilibrium.
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(Pareto) Efficiency

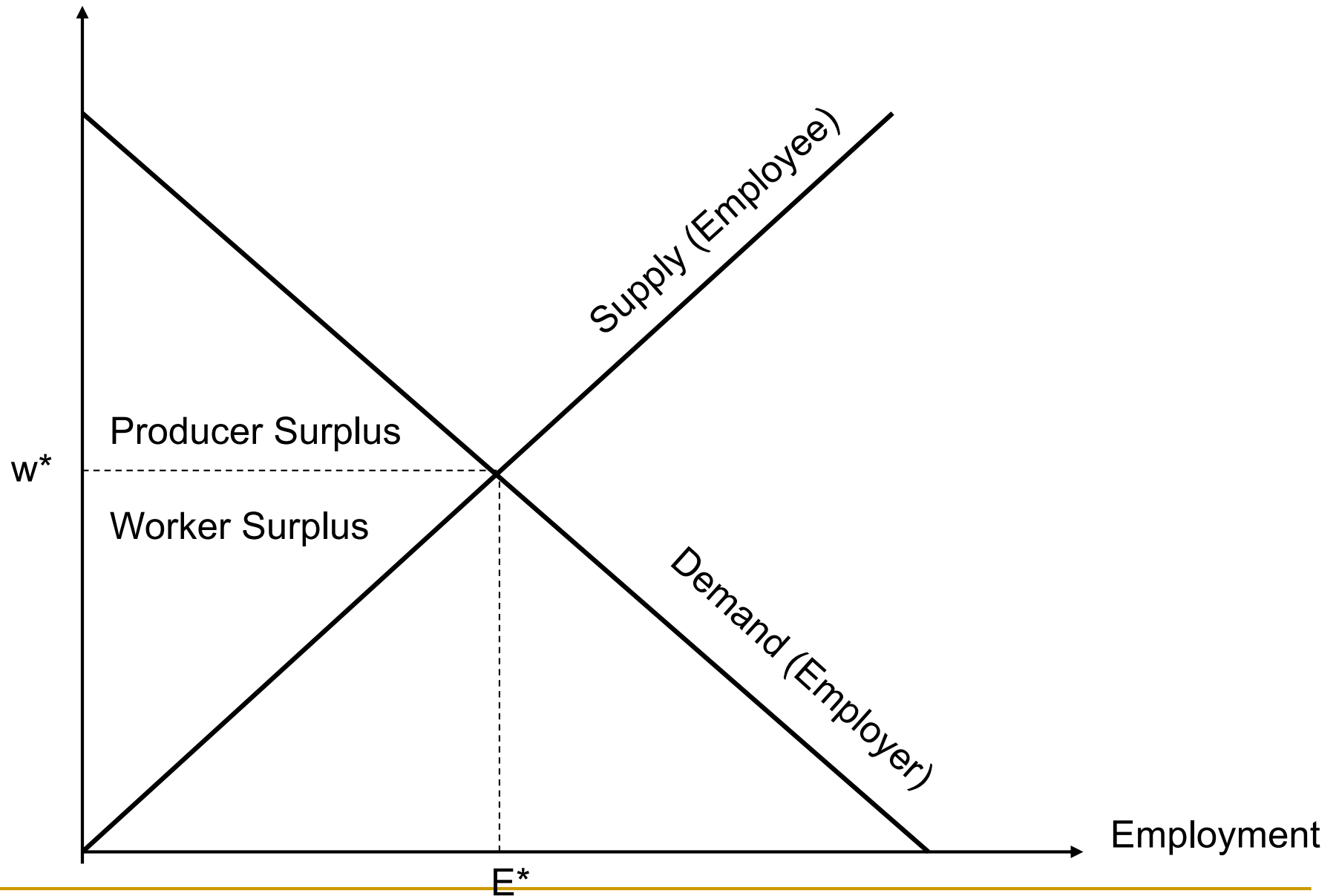
- Pareto efficiency exists when all possible gains from trade have been exhausted.
 - When the state of the world is Pareto Efficient, to improve one person's welfare necessarily requires decreasing another person's welfare.
 - In policy applications, ask whether a change can make any one better off without harming anyone else. If the answer is yes, then the proposed change is said to be “Pareto-improving”.
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Equilibrium in a Competitive Labor Market



The labor market is in equilibrium when supply equals demand; E^* workers are employed at a wage of w^* . In equilibrium, all persons who are looking for work at the going wage can find a job. The triangle P gives the producer surplus; the triangle Q gives the worker surplus. A competitive market maximizes the gains from trade, or the sum $P + Q$.

Wage rate



Assume that labor is the only factor in the production function

Competitive Equilibrium Across Labor Markets

- If workers were mobile and entry and exit of workers to the labor market was free, then there would be a single wage paid to all workers.
 - The allocation of workers to firms equating the wage to the value of marginal product is also the allocation that maximizes national income (this is known as allocative efficiency).
 - The “invisible hand” process: self-interested workers and firms accomplish a social goal that no one had in mind, i.e., allocative efficiency.
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Efficiency Revisited

The **single wage** property of a competitive equilibrium has important implication for economic efficiency

- ❑ The wage equals the value of marginal product of labor
 - ❑ As firms and workers move to the region that provides the best opportunities, they eliminate regional wage differentials
 - ❑ Workers of given skills have the same value of marginal product of labor in all market
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Efficiency

- The total **gain from trade** accruing to the national economy are given by the sum of the producer surplus and worker surplus
 - The competitive market maximizes the total gains from trade accruing to the economy
 - The allocation of persons to firms that maximizes the total gains from trade in the labor market is called an **efficient allocation**
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Competitive Equilibrium across Labor Markets

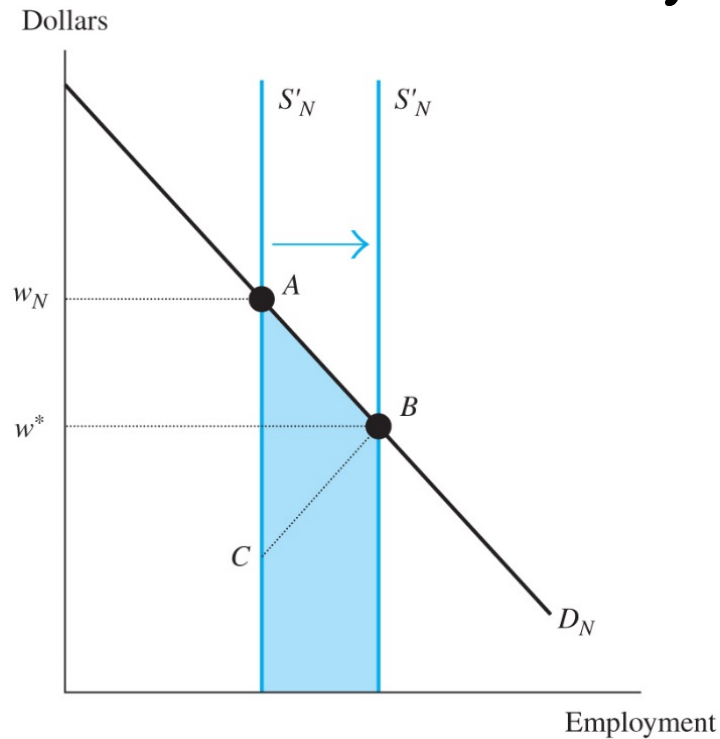
Two markets

- Assume
 - Two markets employ workers of similar skills
 - Workers can move across regions freely
 - Wage differential are not in long run, there is an adjustment process → migration
 - Wages across the two labor markets would be equalized
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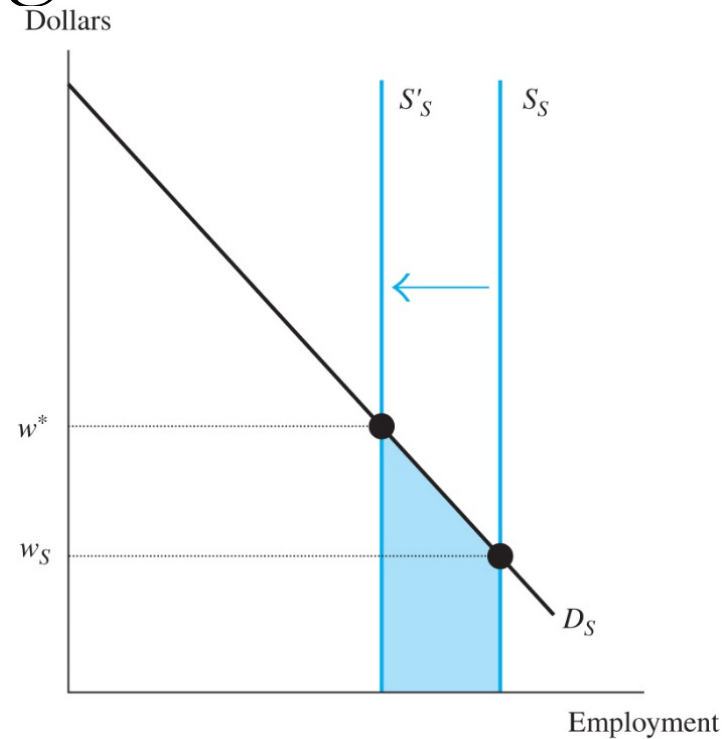
Wages and International Trade: NAFTA

- NAFTA created a free trade zone in North America.
 - Free trade reduces the income differential between the United States and other countries in the zone, such as Mexico.
 - Total income of the countries in the trade zone is maximized as a result of equalized economic opportunities across the countries in the zone.
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Competitive Equilibrium in Two Labor Markets Linked by Migration



(a) The Northern Labor Market



(b) The Southern Labor Market

Suppose the wage in the northern region (w_N) exceeds the wage in the southern region (w_S). Southern workers want to move North, shifting the southern supply curve to the left and the northern supply curve to the right. In the end, wages are equated across regions at w^* .

Policy application

- ❑ Minimum wage
 - ❑ Payroll Taxes and Subsidies
 - ❑ Payroll Taxes versus Mandated Benefits
 - ❑ The labor market impact of immigration
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Effect of Minimum Wage

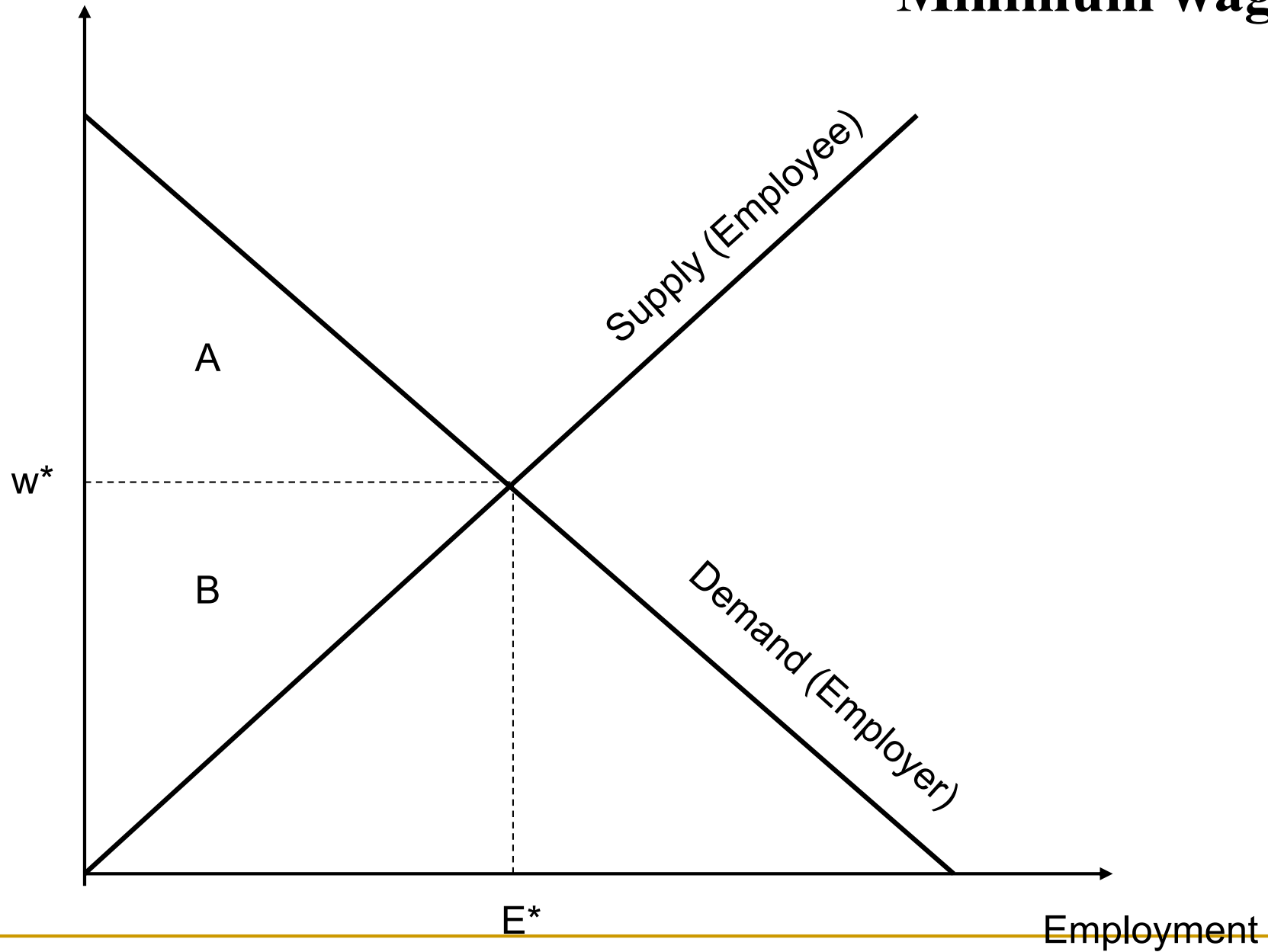
- Covered all industry + All worker
 - Minimum wage $>$ Equilibrium Wage
 - Excess supply of labor \rightarrow unemployment
 - New labor into market \rightarrow replacing old unemployed
 - Unemployment depends on
 - Level of minimum wage
 - Elasticity of demand and supply
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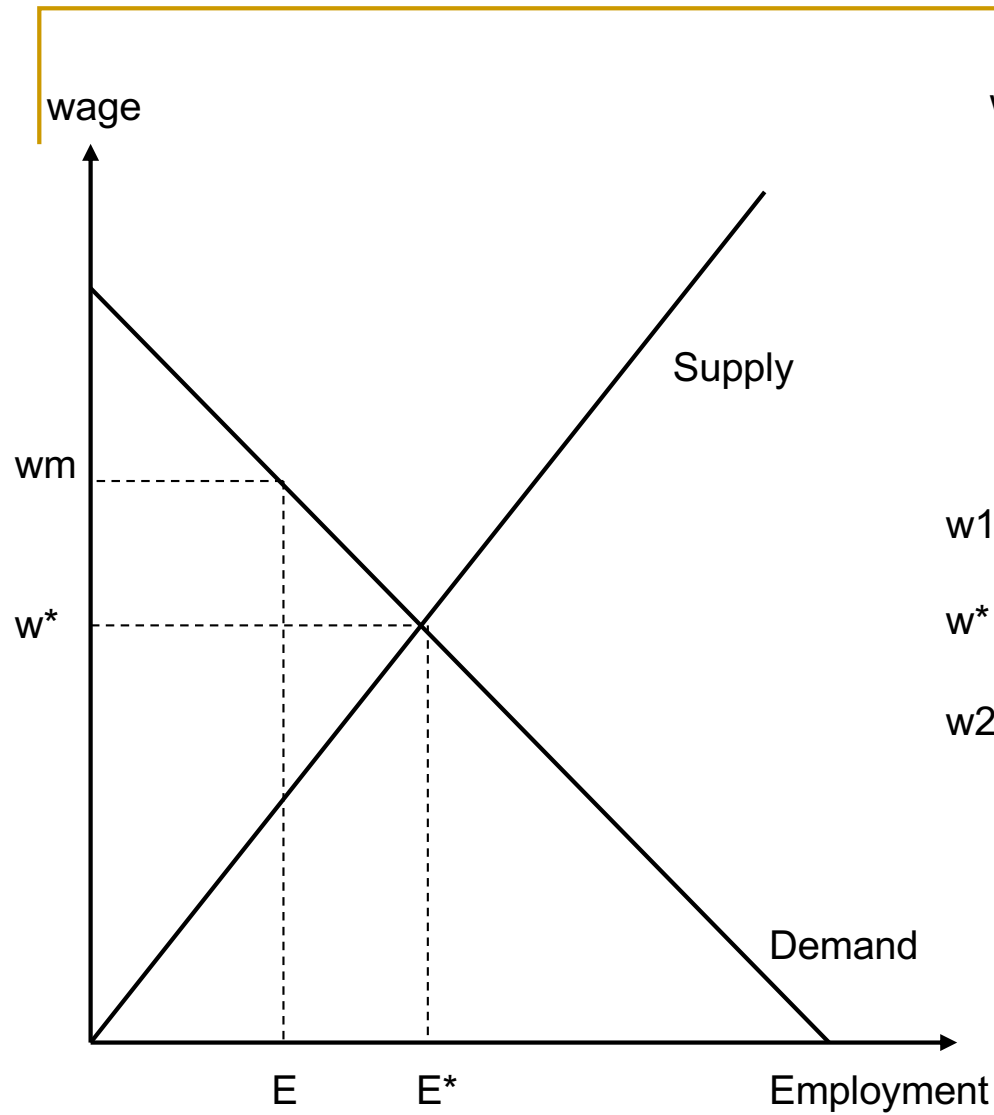
Effect of Minimum Wage

- Covered one industry + All worker
 - Uncovered Industry
 - Competitive Rate
 - Move to covered industry because of higher wage rate
 - Covered Industry
 - Unemployed
 - Move to uncovered industry
 - Supply Shifting depends on mobility of both
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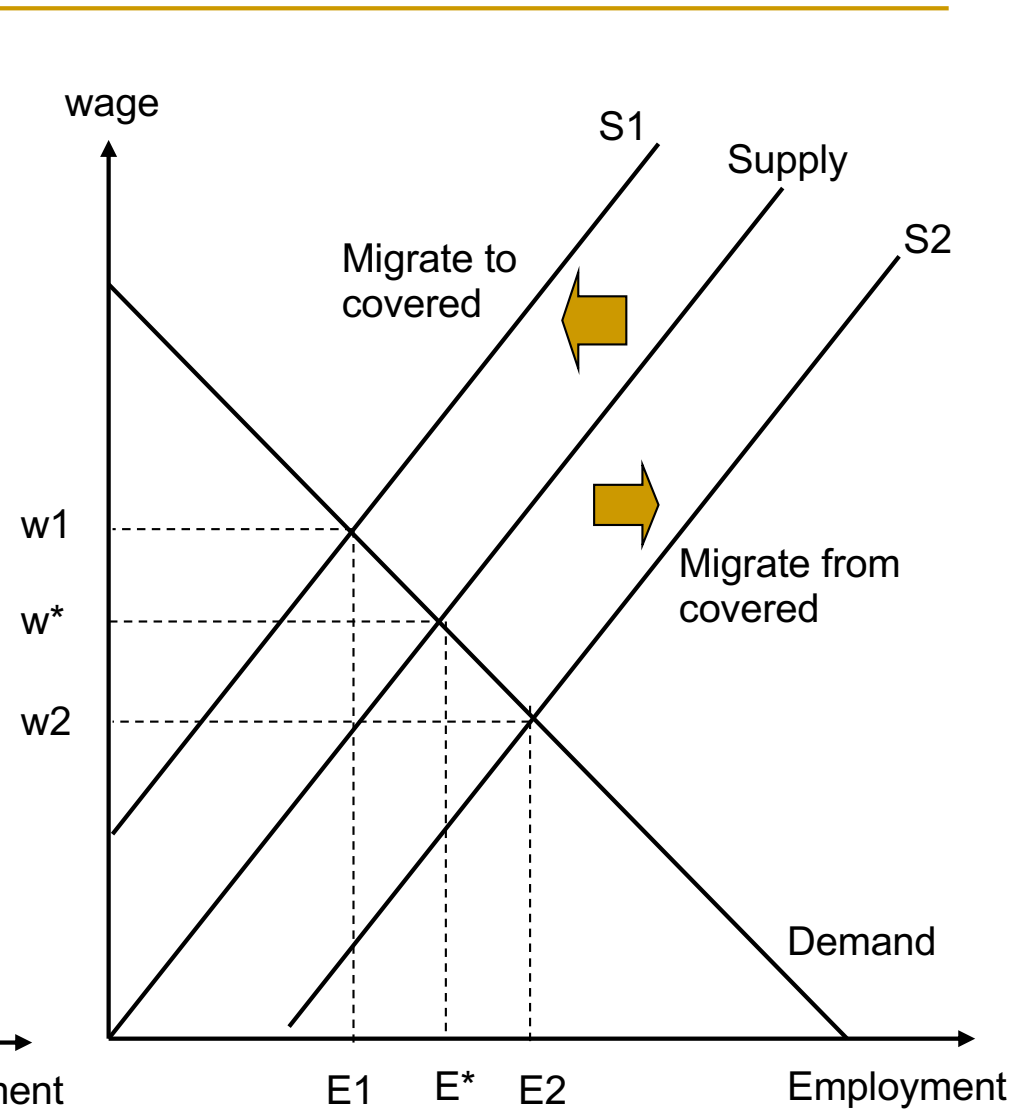
Wage rate

Minimum wage





Covered Sector



Uncovered Sector

Payroll Taxes and Subsidies

- Payroll taxes assessed on employers lead to a downward, parallel shift in the labor demand curve.
 - The new demand curve shows a wedge between the amount the firm must pay to hire a worker and the amount that workers actually receive.
 - Payroll taxes increase total costs of employment, so these taxes reduce employment in the economy.
 - Firms and workers share the cost of payroll taxes, since the cost of hiring a worker rises and the wage received by workers declines.
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- Payroll taxes result in deadweight losses.

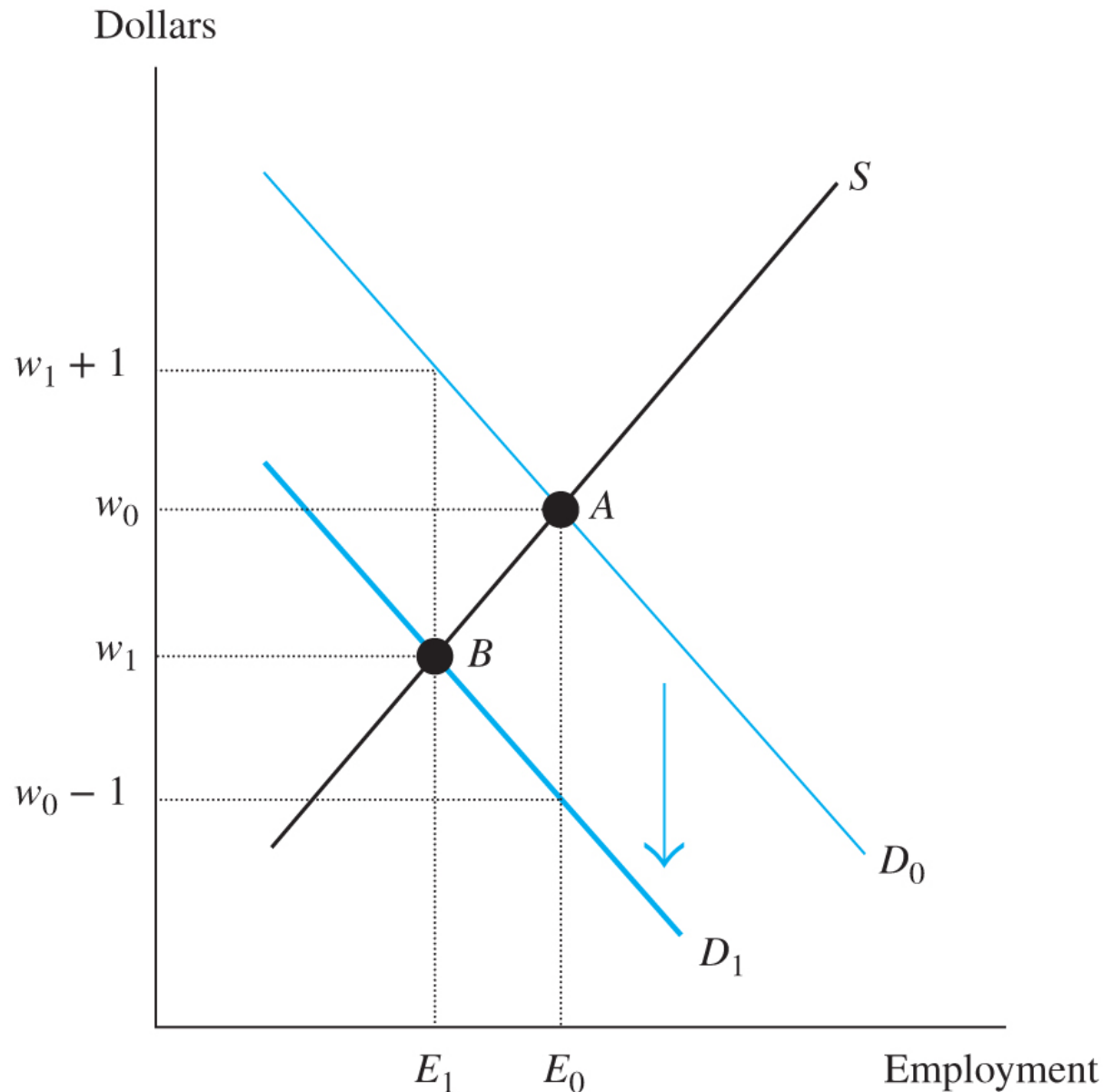
Payroll tax

- Government collects the payroll tax (tax from payroll) t unit per unit of working hour
 - Collection either comes from employer or employee
 - Are these results the same?
 - Check welfare impact (Deadweight loss + tax Burden)
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Payroll tax assessed on employers

- Leads to downward parallel shift in the labor demand curve to D_1
 - The number of workers hired declines to E_1
 - The equilibrium wage rate falls to w_1 , but the total cost of hiring a worker rises to $w_1 + t$
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The impact of a Payroll Tax Assessed on Firms

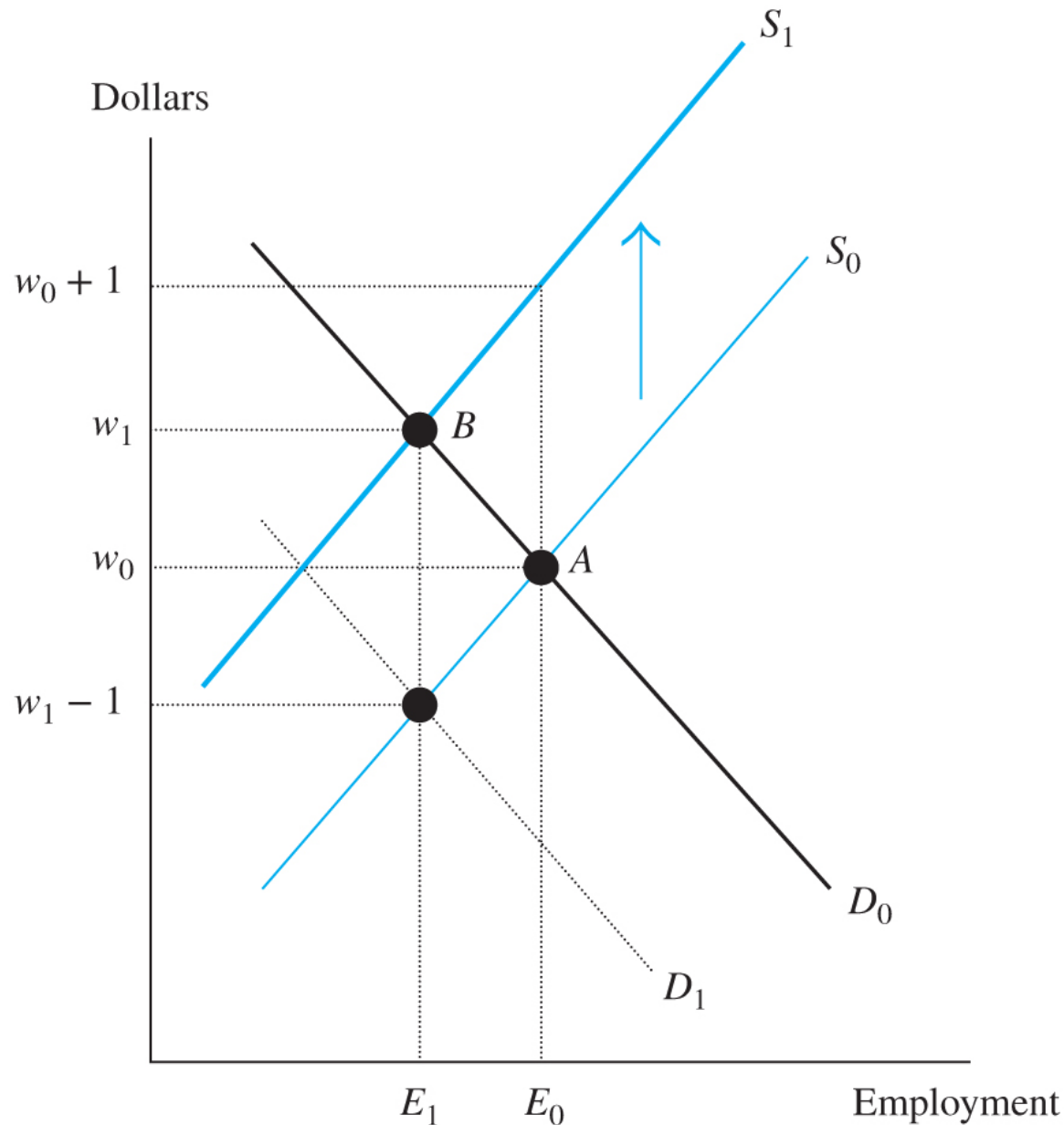


A payroll tax of \$1 assessed on employers shifts down the demand curve (from D_0 to D_1). The payroll tax decreases the wage that workers receive from w_0 to w_1 , and increases the cost of hiring a worker from w_0 to $w_1 + 1$.

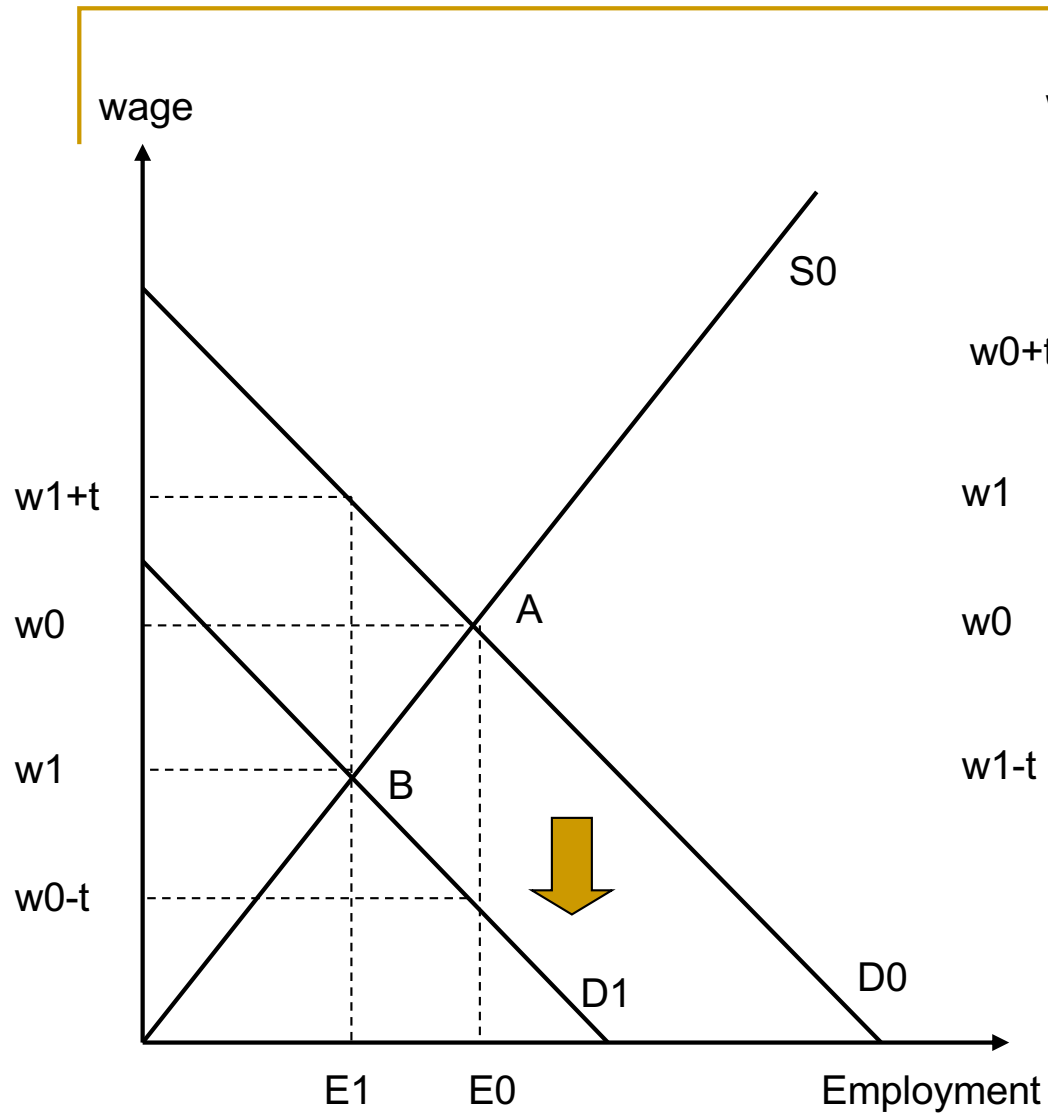
Payroll tax assessed on employees

- Leads to upward parallel shift in the labor supply curve to S_1
 - The number of workers hired declines to E_1
 - Workers receive a wage of w_1 from the employer, however, worker must pay t tax per hour worked, the actual after tax wage of the worker falls to $w_1 - t$
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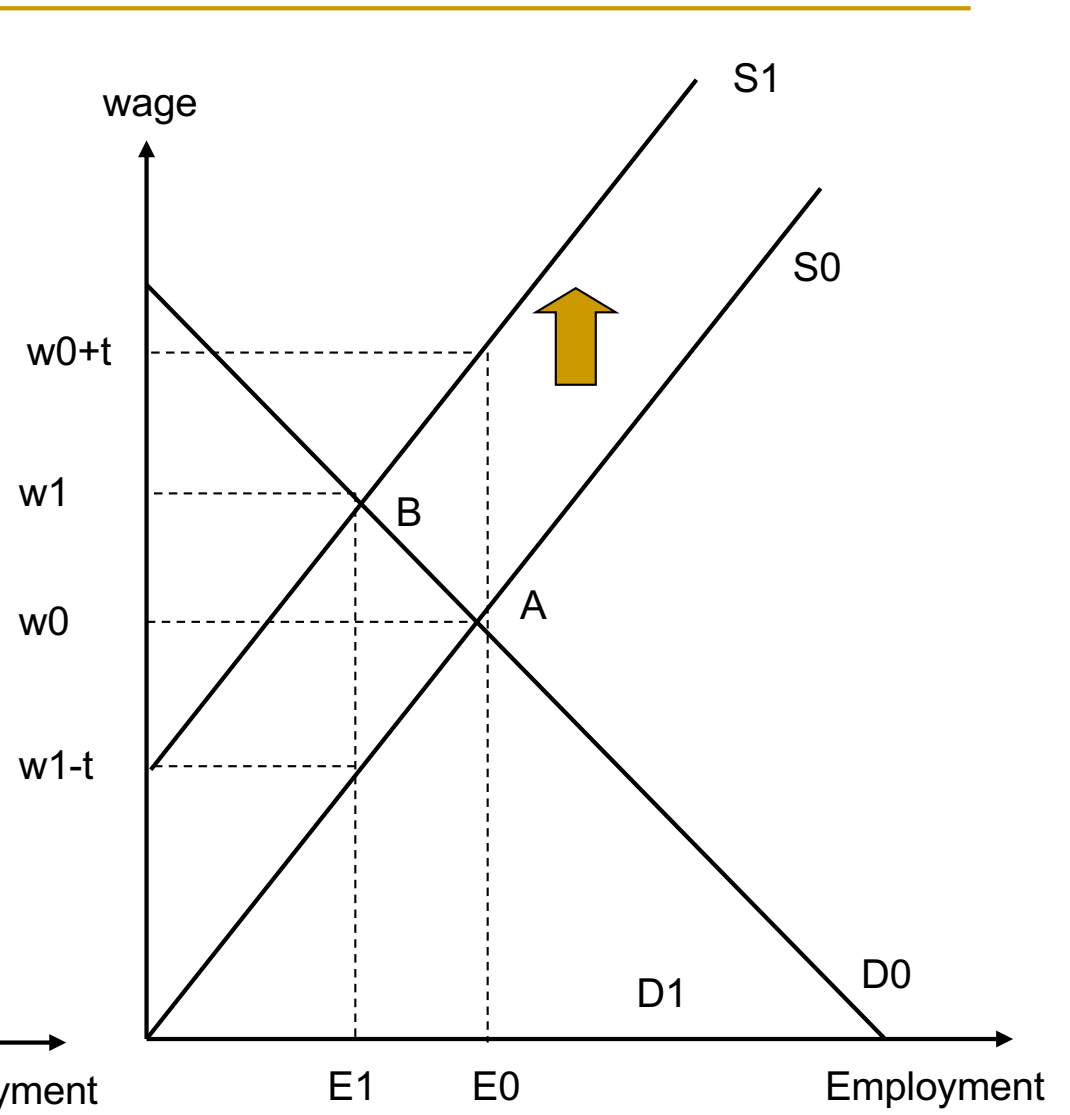
The Impact of a Payroll Tax Assessed on Workers



A payroll tax assessed on workers shifts the supply curve to the left (from S_0 to S_1). The payroll tax has the same impact on the equilibrium wage and employment regardless of who it is assessed on.



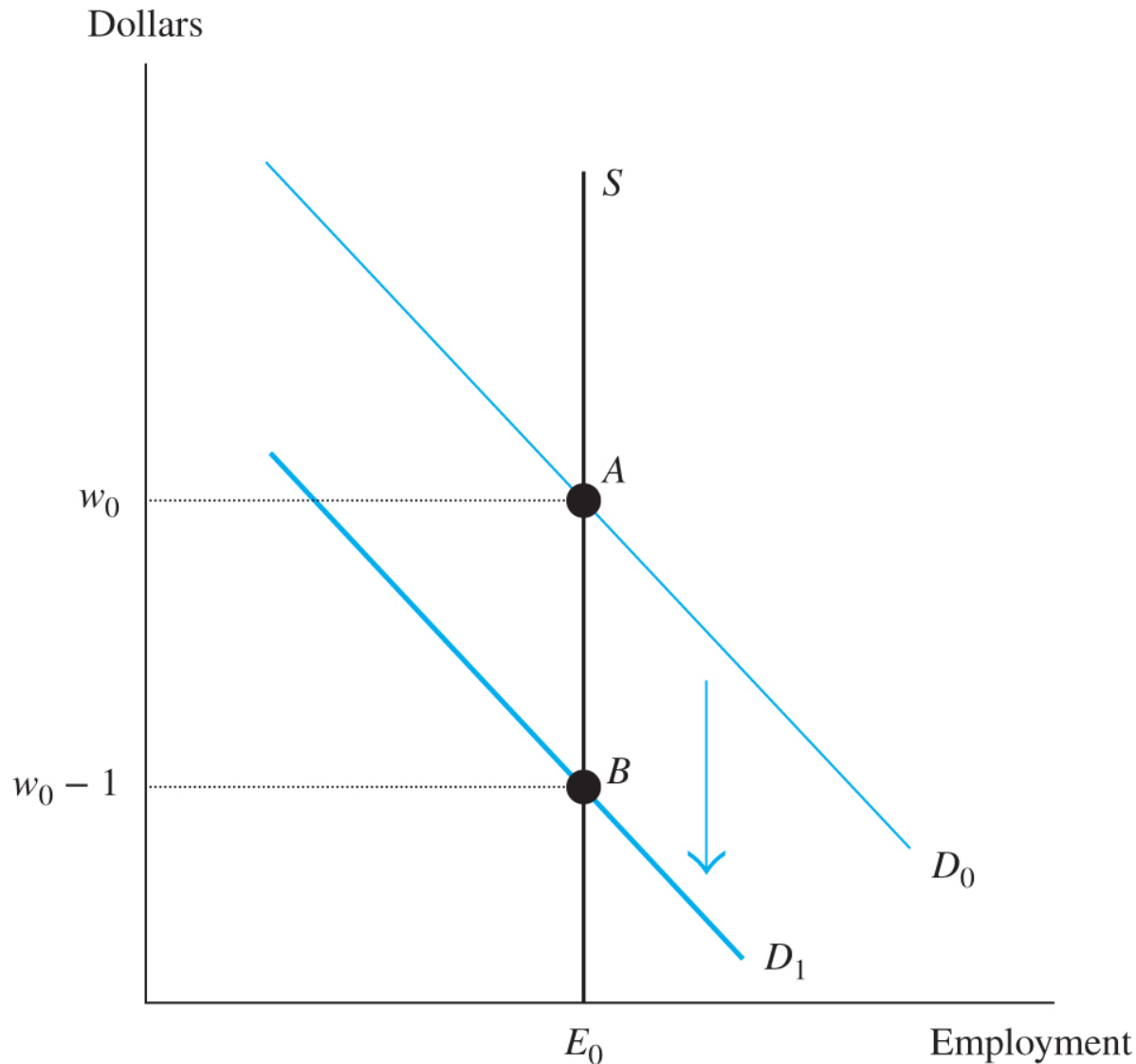
Firms



Workers

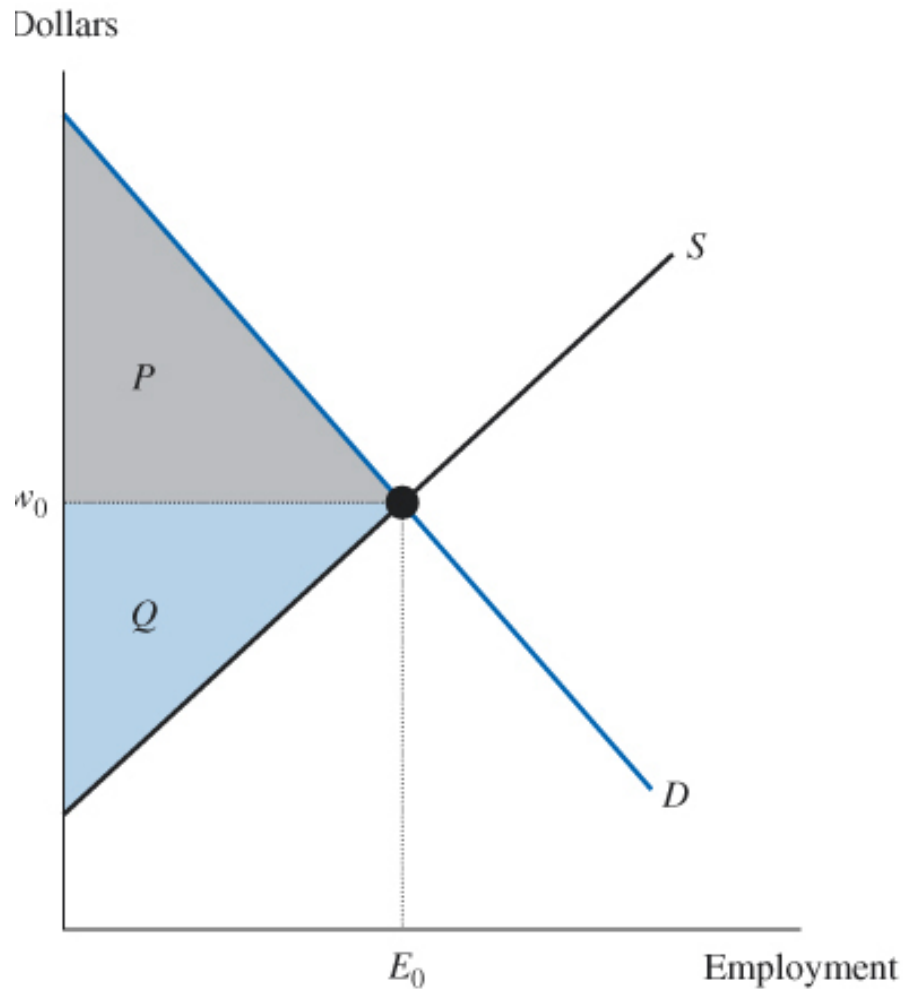
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- Both taxes reduce the take-home pay of workers, increase the cost of an hour of labor to the firm, and reduce employment
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The Impact of a Payroll Tax put on Firms with Inelastic Supply

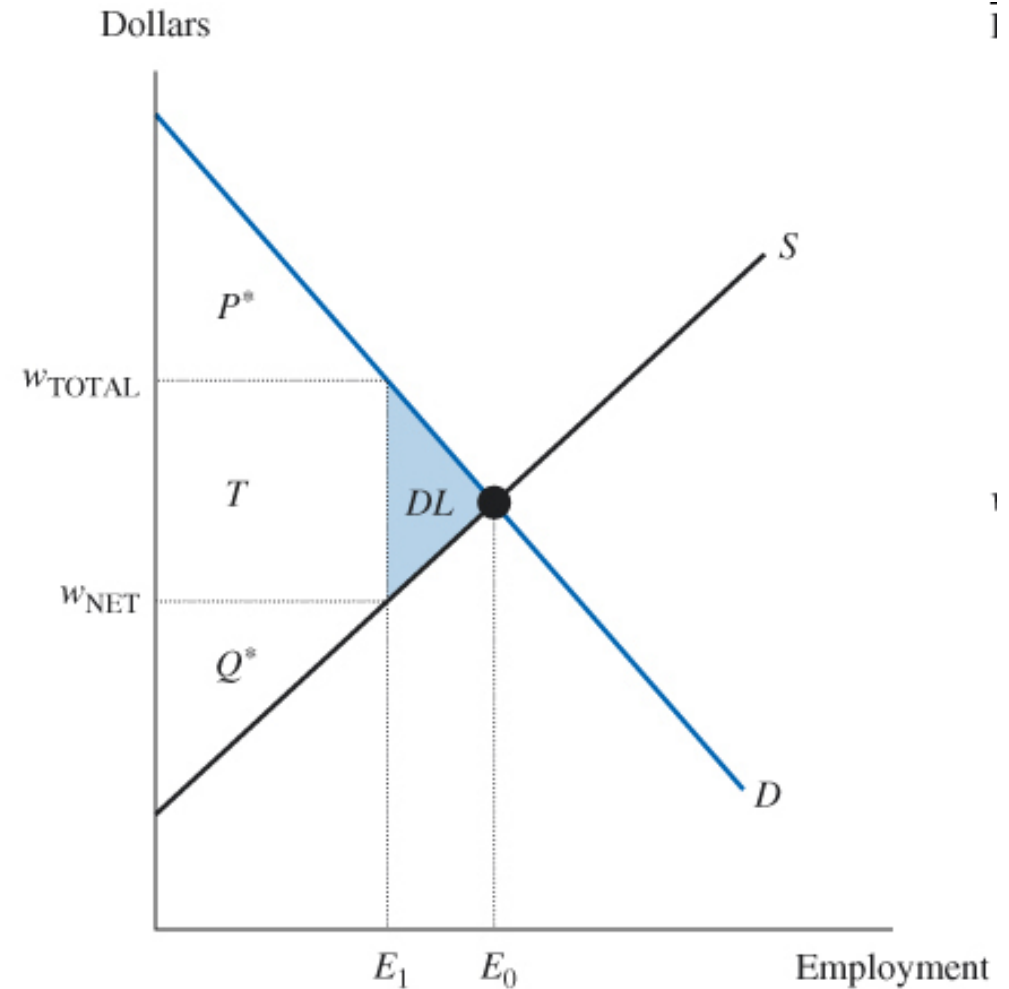


A payroll tax assessed on the firm is shifted completely to workers when the labor supply curve is perfectly inelastic. The wage is initially w_0 . The \$1 payroll tax shifts the demand curve to D_1 , and the wage falls to $w_0 - 1$.

Deadweight loss of a payroll tax



(a) No-Tax Equilibrium



(b) Payroll Tax Equilibrium

Welfare implications of a payroll tax

	No-Tax Equilibrium	Payroll Tax Equilibrium
Producer surplus	P	P^*
Worker surplus	Q	Q^*
Tax revenues	—	T
Total gain from trade	$P + Q$	$P^* + Q^* + T$
Deadweight loss	—	DL

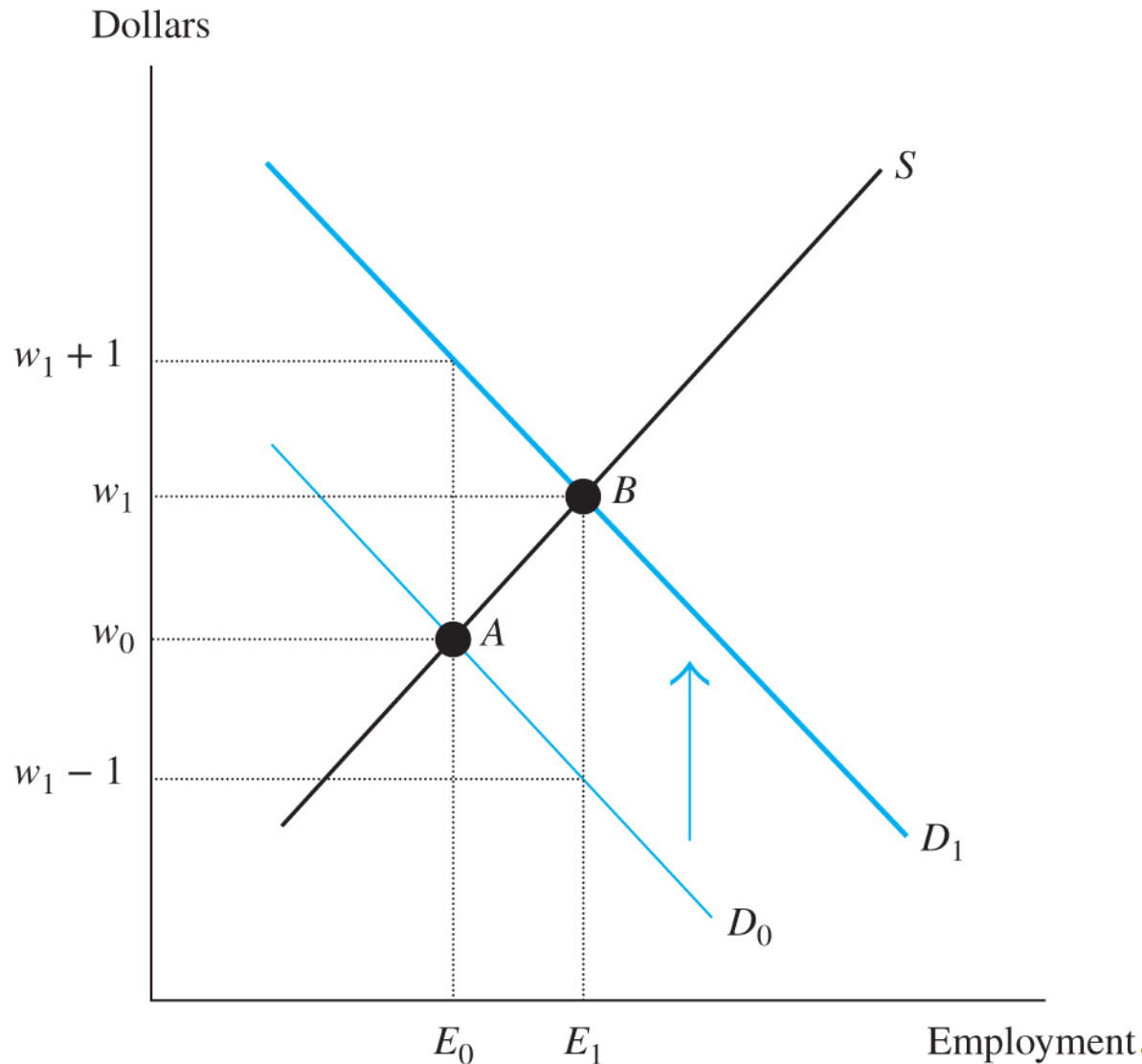
Payroll Subsidies

- An employment subsidy lowers the cost of hiring for firms.
 - This means payroll subsidies shift the demand curve for labor to the right (up).
 - Total employment will increase as the cost of hiring has fallen.
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Employment Subsidies

- Leads to upward parallel shift in the labor demand curve to D_1
 - The subsidy increases the wage that workers actually receive and reduces the wage that firms actually have to pay out of their own pocket
 - There is more employment
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The Impact of an Employment Subsidy



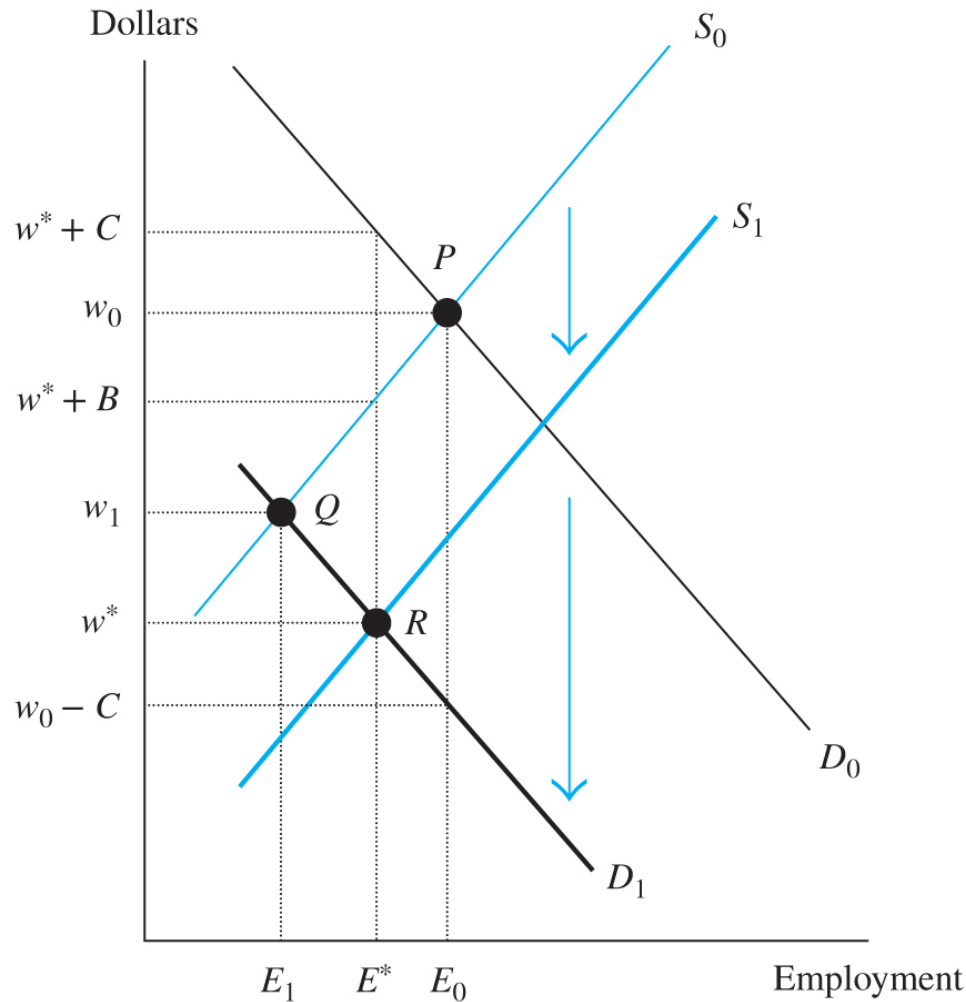
An employment subsidy of \$1 per worker hired shifts up the labor demand curve, increasing employment. The wage that workers receive rises from w_0 to w_1 . The wage that firms actually pay falls from w_0 to $w_1 - 1$.

Mandated Benefit

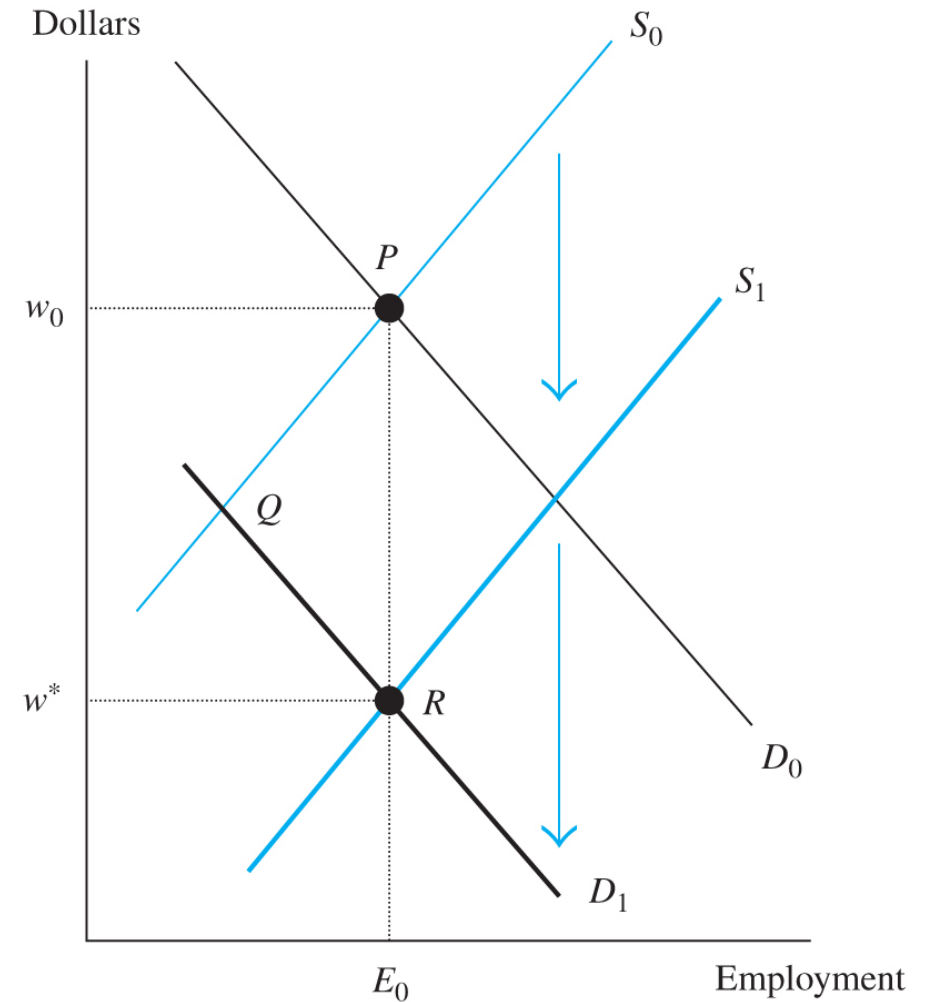
- The government can ensure that workers receive particular benefits e.g. health insurance



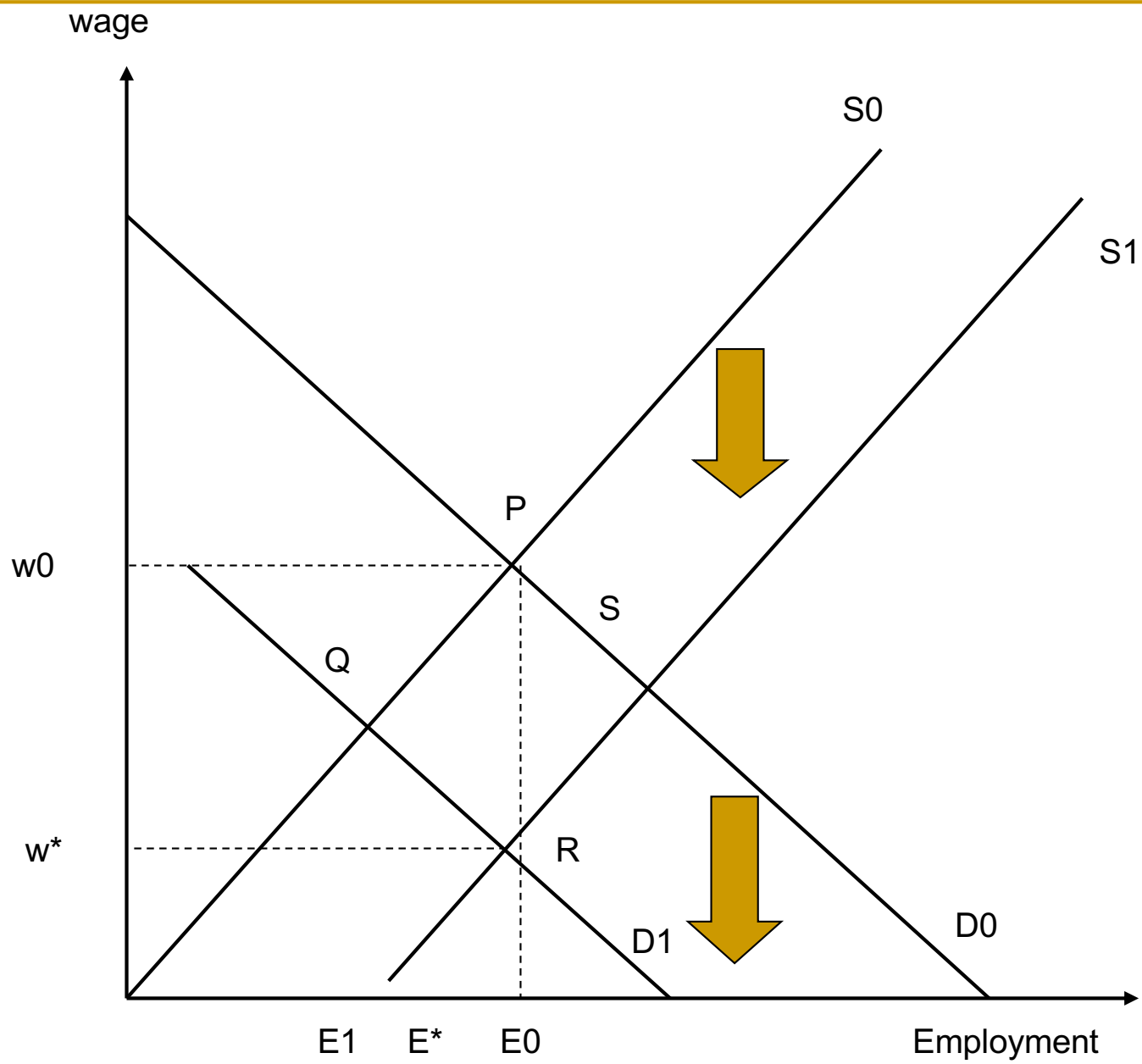
The Impact of a Mandated Benefit



(a) Cost of Mandate Exceeds Worker's Valuation



(b) Cost of Mandate Equals Worker's Valuation



Cost of mandate equals workers' valuation

Immigration

- As immigrants enter the labor market, the labor supply curve shifts to the right.
 - Total employment increases.
 - Equilibrium wage decreases.
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The Labor Market Impact of Immigration

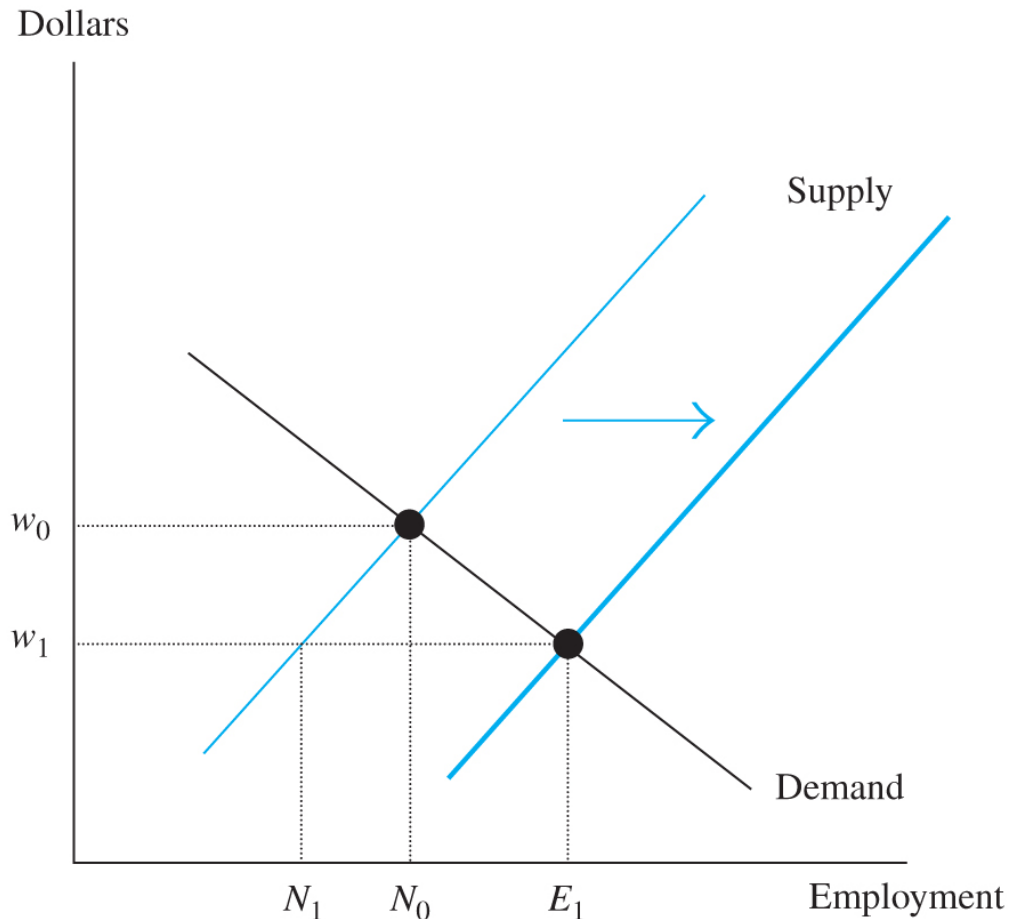
- Short Run versus Long Run Effects
- Benefit from Migration



Effect on Native-born Workers

- Immigration reduces the wages and employment of similarly-skilled native-born workers, but native-born workers may be able to increase their productivity by specializing in tasks better suited to their skills.
 - Competing native workers will have lower wages; complementary native workers will have higher wages.
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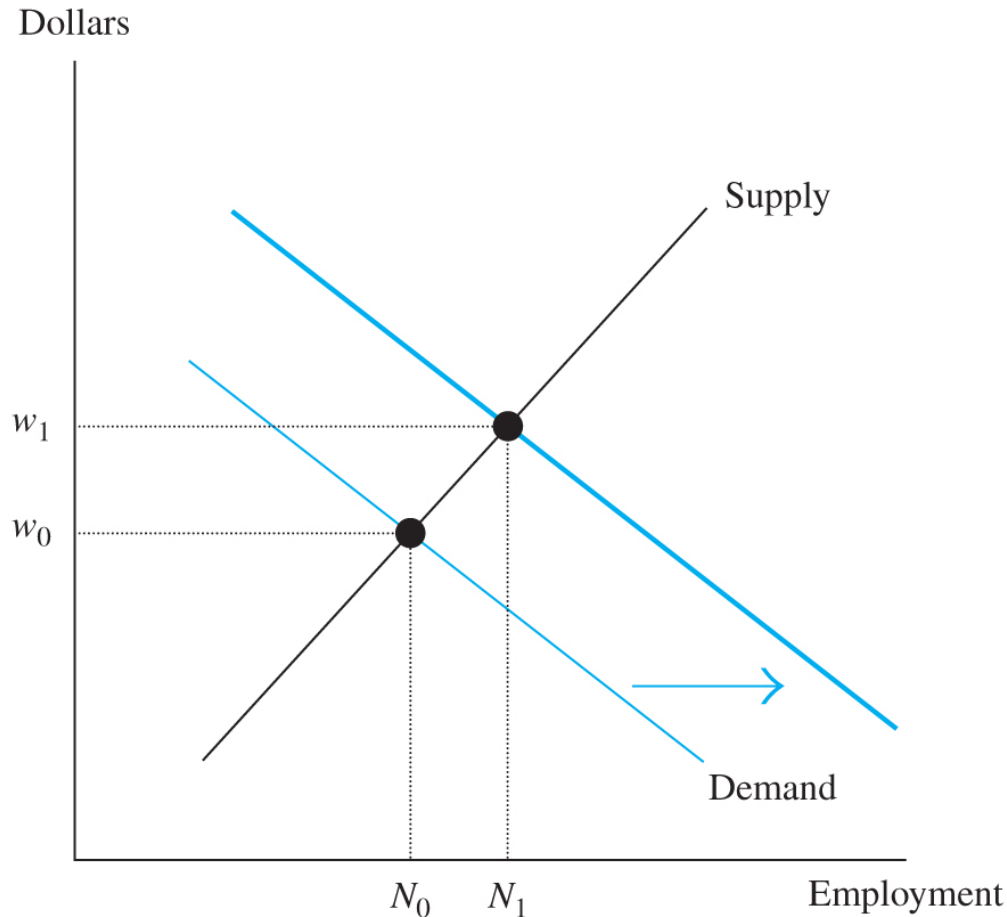
The short run impact of immigration when immigrants and natives are perfect substitutes



(a) Perfect Substitutes

- Immigrants shifts out the Supply curve
- Wage falls
- Total employment increases
- At the lower wage, there is a decline in the number of natives who work

The short run impact of immigration when immigrants and natives are complements

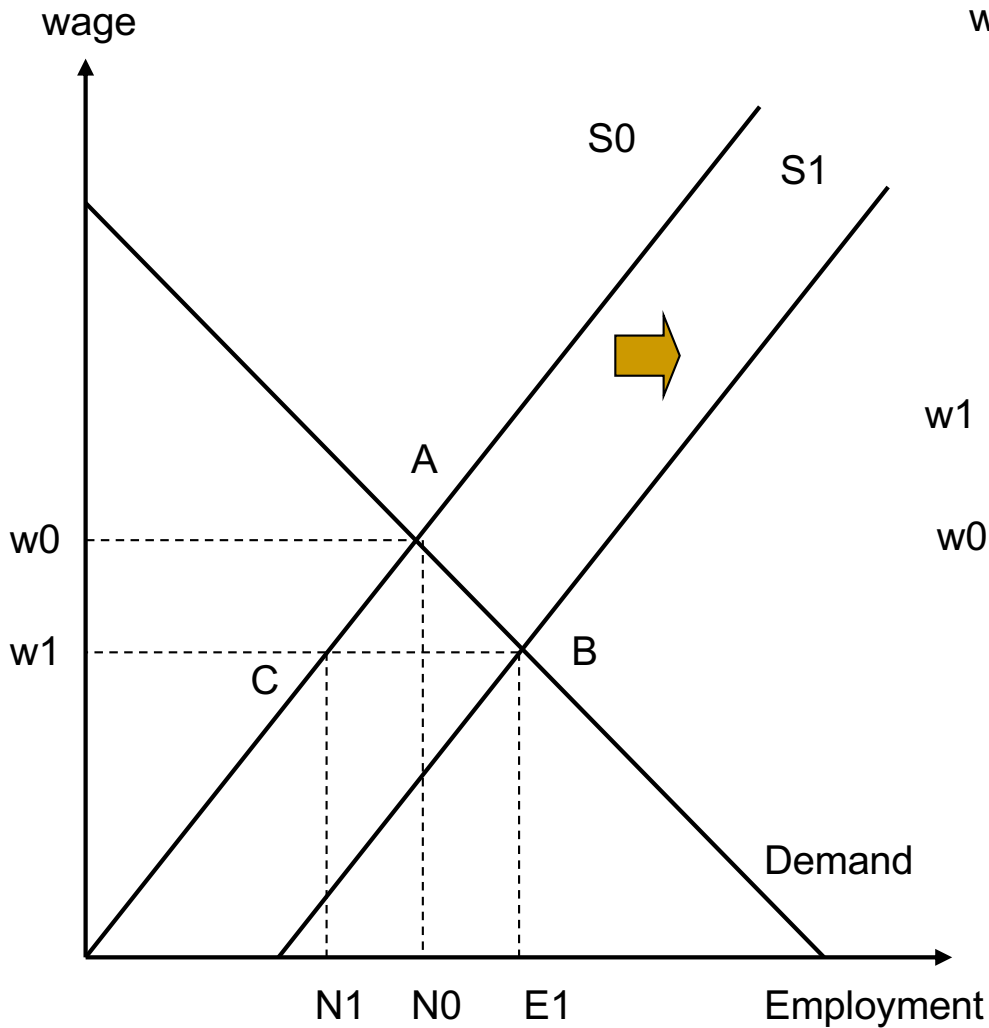


- Immigration makes natives more productive, shifting out the demand curve even though capital is fixed
- Leads a higher native wage
- An increase in native employment

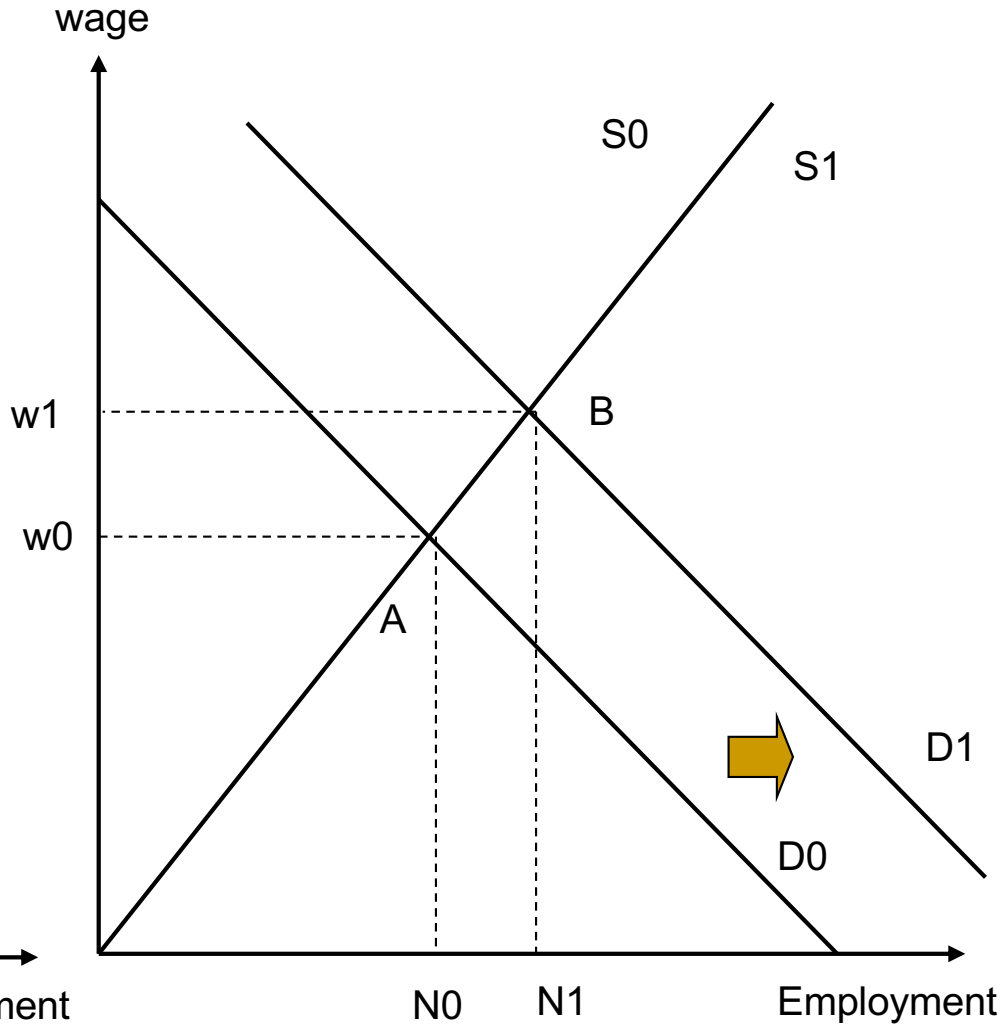
(b) Complements

If immigrants and natives are complements, they do not compete in the same labor market. The labor market here denotes the supply and demand for native workers. Immigration makes natives more productive, shifting out the labor demand curve. This leads to a higher native wage and to an increase in native employment.

Short Run

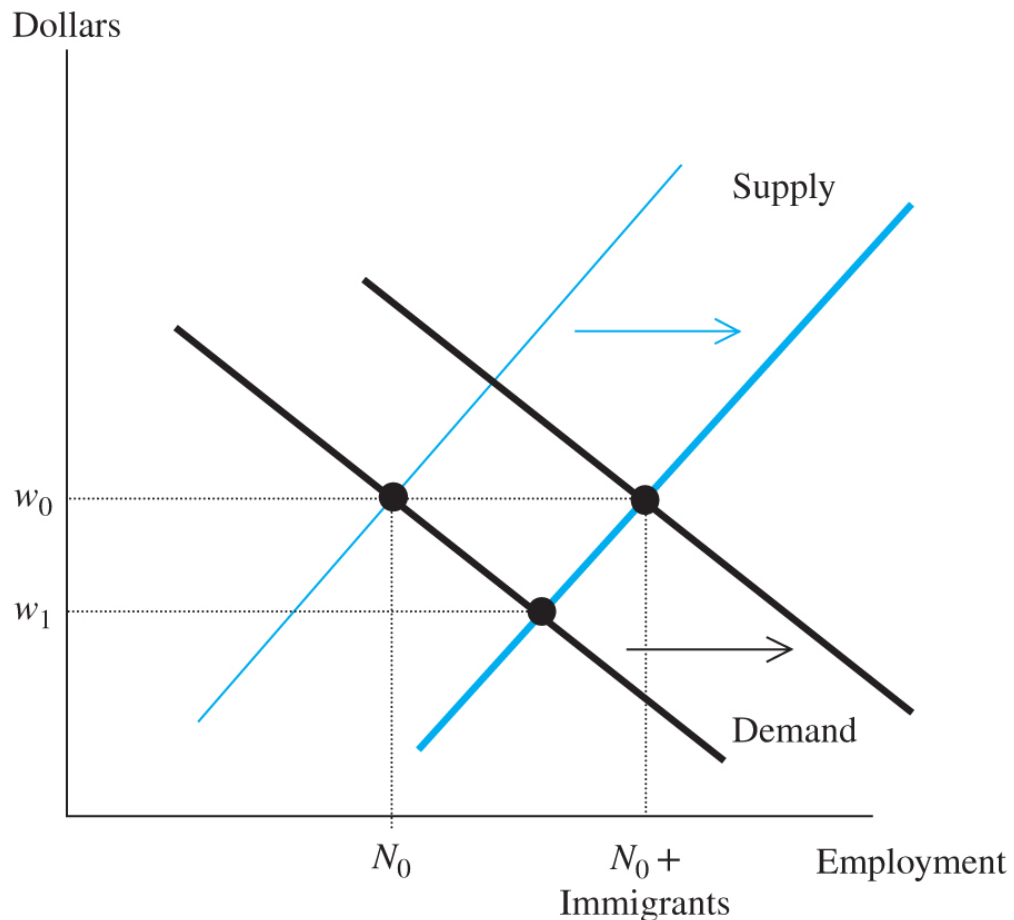


Substitution



Complement

The Long-Run Impact of Immigration when Immigrants and Natives are perfect substitutes

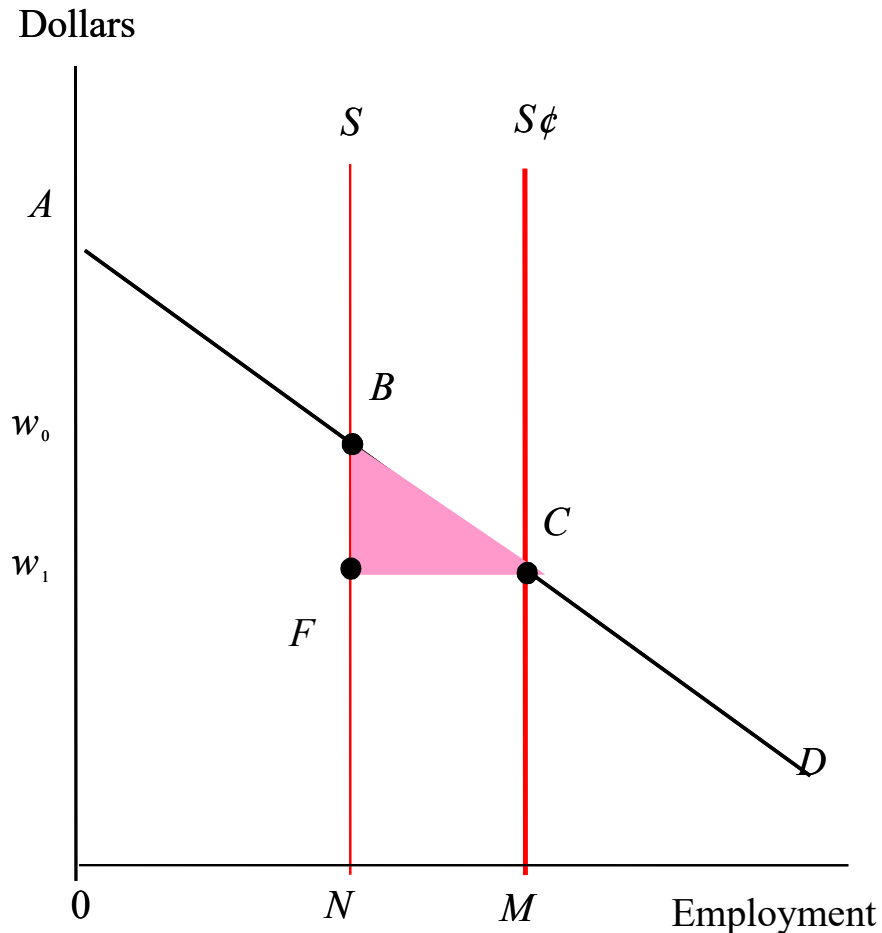


- Immigration initially shifts out the supply curve
- The wage falls
- Overtime, capital expands as firms take advantage of the cheaper workforce, shifting out the labor demand curve
- If the aggregate production function has CRTS, the wage is back at its initial level
- The LR level of native employment is exactly what it was prior to the immigrant influx

The Economic Benefits from Immigration

- Immigration surplus gives the increase in national income
 - The larger the adverse wage effects, the greater their economic benefits
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The Immigration Surplus



Prior to immigration, there are N native workers in the economy and national income is given by the trapezoid $ABN0$.

Immigration increases the labor supply to M workers and national income is given by the trapezoid $ACM0$. Immigrants are paid a total of $FCMN$ dollars as salary. The immigration surplus gives the increase in national income that accrues to natives and is given by the area in the triangle BCF .

Policy Application: Environmental Disasters and the Labor Market

Hurricanes generate exogenous economic shocks that affect labor market conditions.

Can use data to estimate difference-in-difference models that examine the economic impact on affected Florida counties relative to unaffected counties.

Next slide data: 19 hurricanes that hit Florida between 1988 and 2005.

Changes in Employment and Wages in Florida Counties Hit by Hurricanes

	Percent change in employment	Percent change in earnings
1. Effect of category 1-3 hurricane on county directly hit	-1.5	+1.3
2. Effect of category 4-5 hurricane on county directly hit	-4.5	+4.4
3. Effect of category 1-3 hurricane on neighboring county	+0.2	-4.5
4. Effect of Category 4-5 hurricane in neighboring county	+0.8	-3.3

Source: Ariel R. Belasen and Solomon W. Polachek, "How Disasters Affect Local Labor Markets: The Effects of Hurricanes in Florida," *Journal of Human Resources*, forthcoming 2009, Table 4.

Policy Application: Environmental Disasters and the Labor Market

How does the theory of labor market equilibrium gain support from this data?

- Labor supply decreases in counties directly hit, and more so in the more-affected counties. This increases wages and lowers employment.
- Labor supply increases in neighboring counties. This decreases wages and increases employment.

The Cobweb Model

Two assumptions of the cobweb model:

- Time is needed to produce skilled workers.
- Persons decide to become skilled workers by looking at conditions in the labor market at the time they enter school.

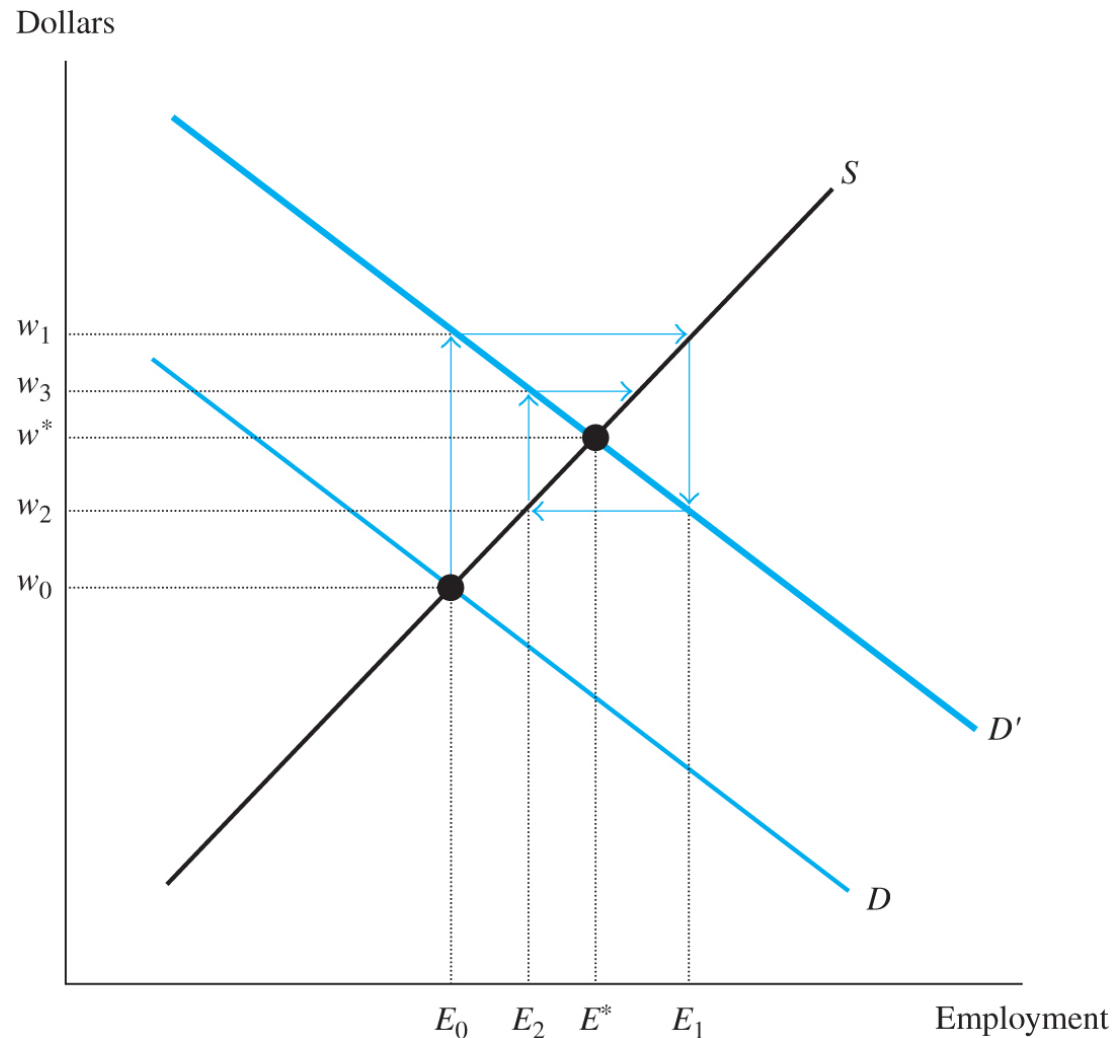
A “cobweb” pattern forms around the equilibrium.

The cobweb pattern arises when people are misinformed.

The model assumes naïve workers who do not form rational expectations.

Rational expectations are formed if workers correctly perceive the future and understand the economic forces at work.

The Cobweb Model in the Market for New Engineers



The initial equilibrium wage in the engineering market is w_0 . The demand for engineers shifts to D' , and the wage will eventually increase to w^* . Because new engineers are not produced instantaneously and because students might misjudge future opportunities in the market, a cobweb is created as the market adjusts to the increase in demand.