

Chapter 3

Measuring macroeconomic performance: wages, employment and the labour market

Overview

This chapter examines the labour market using the perfectly competitive labour market model. It describes and explains important trends in the labour markets of industrialised countries, including trends in real wages and employment. Unemployment is explained using the competitive market model (labour demand curve and labour supply curve) where the market fails to reach equilibrium because of (i) minimum wage laws, (ii) labour unions, (iii) unemployment benefits and (iv) other government regulations. It also discusses the two key factors responsible for recent trends in wages and unemployment: globalisation and technological change.

Core principles

Increasing opportunity cost—this is cited as the economic basis for the principle of diminishing returns to labour (and capital). Employers will assign workers to the most productive job, and so each successive worker is assigned to the next most productive job, and the marginal product of adding another worker decreases.

Cost–benefit principle—the cost–benefit principle is used to discuss workers’ decisions to work at any given wage. The concept of opportunity cost is used to describe the reservation price (the cost of working), which should be compared with the pay from a job.

Cost–benefit principle—this principle is applied to government regulations imposed on the labour market.

Important concepts covered

- Diminishing returns to labour
- Frictional/structural/cyclical unemployment
- Wage inequality
- Natural rate of unemployment

- Full employment
- Worker mobility
- Skill-biased technological change

Learning objectives

After completing this chapter, you want your students to be able to answer the following questions:

- 3.1** How can the perfectly competitive model be used to understand trends in the labour market?
- 3.2** What have been the five major trends in the labour market in the post-war era?
- 3.3** What factors influence firms' demand for labour?
- 3.4** What factors influence workers' supply of labour?
- 3.5** What are the three different types of unemployment?
- 3.6** For what reasons do some countries find it difficult to achieve full employment?

Teaching tips/Student stumbling blocks

- This chapter draws on the concepts of marginal product and value of marginal product, which were likely taught in a microeconomics course. Some of your students may be taking macroeconomics first, or may not recall these concepts, so it is probably a good idea to go over these concepts carefully.
- Students tend not to have the same intuition about diminishing marginal product as they do about diminishing marginal utility. Try an in-class demonstration. A simple demonstration for stuffing envelopes is described below, or you may like to create one of your own.
- As noted by the authors, the question of whether or not unions are good for the economy is highly controversial. This is a good subject for an assignment or in-class debate.

In-class and web activities

Experiments and simulations

Demonstrate diminishing marginal product using an envelope-stuffing example. Bring in a stack of blank paper and a box of business envelopes. Ask a student to volunteer to fold the

‘letters’ and then stuff them in envelopes. Give the student one minute and count how many envelopes the student is able to stuff. Then add a second student and give them a minute, and then add a third and again compare what happens. Likely results are that the two students will decide ‘You fold and I’ll stuff’; what happens when the third ‘worker’ is added can be more interesting.

Internet resources

The Fair Work Australia website is worth a look: www.fwa.gov.au. Some of the submissions posted to the website, particularly by individuals, would be good starting points for debates.

The website of the Australian Council of Trade Unions has a lot of good information about unions—see www.actu.asn.au.

The Brotherhood of Saint Laurence has a lot of information relating to the social cost of unemployment—see www.bsl.org.au/main.asp?PageId=1&iMenuPageId=1.

A simple introduction to some key issues related to unemployment is available at www.imf.org/external/pubs/ft/fandd/2010/09/pdf/basics.pdf.

Discussion questions

1. Why do graduates in some majors earn more than graduates in other majors? (Supply and demand in the relevant labour market, e.g. MP price of the output.)
2. Why might an individual choose to work less if the real wage rate is increased? (Backward-bending supply curve—fewer hours earns the same (acceptable) income.)
3. How have computers led to an increase in productivity on university campuses? (Teachers, students, staff and administrators can all produce more using computer technology.)
4. Why do economists consider three types of unemployment? (Each type has different causes and therefore different solutions.)

5. Can the unemployment rate ever reach 0%? (No, because frictional and structural unemployment will always exist.)

Answers to review questions and problems

Answers to review questions

1. The five trends are the long-term increase in real wages in industrialised countries; the slowdown in real-wage growth since the 1970s; increasing inequality in real wages; rapid employment growth in recent decades; and high rates of unemployment in Europe. The link between rising labour productivity and standards of living is clearest in the case of average real wage growth: remarkable increases in labour productivity underlie the long-term increase in real wages (just as the slowdown in productivity growth since the 1970s is the primary reason for the slowdown in real wage growth during the same period). By increasing real wages, higher labour productivity improves living standards in the long term. Increased productivity (which raises labour demand) has also contributed to rising employment, which improves living standards by giving more people a chance to earn wages.

The other two trends show, however, that increases in average labour productivity by themselves do not necessarily guarantee improved living standards for everyone. Some workers have not shared in the general gains in real wages (rising wage inequality), while in Western Europe potential workers have been sidelined by persistently high rates of unemployment.

2. No, because virtually no one uses manual typewriters anymore and none are being produced. Hence the demand for Alice's repair services is low, implying that the relative price of the service she provides is low. Because the relative price of Alice's output is very low, the value of her marginal product (equal to the relative price of her output times her marginal product) is low, even though Alice's marginal product (in terms of number of typewriters repaired per hour) is high. A low value of marginal product implies a low wage.
3. Acme should determine how much extra output Jane will produce for the firm (her marginal product), as well as the value of that marginal product. For example, if Jane is a lawyer, the firm would calculate the extra revenues her billings would bring in (less costs

such as the cost of her secretary and her computer). If the value of Jane's marginal product is greater than or equal to \$40 000, Acme will find it profitable to hire her.

4. Strong productivity growth over the past century has raised labour demand and hence real wages. Since the early 1970s, a slowdown in productivity growth has slowed the rate of increase in the demand for labour while the supply of labour has grown more quickly, due to factors such as increased female participation in the labour market. Slower demand growth and more rapid supply growth have depressed real wages (but permitted strong employment growth) since the 1970s. In the past few years real wage growth has picked up again, reflecting a stronger pace of productivity growth.
5. Two factors contributing to wage inequality are globalisation and skill-biased technological change. Globalisation—which includes increased international trade—increases the demand for workers in export industries but lowers the demand for workers in industries that compete with imports. Wages rise in export industries but fall in industries that compete with imports, increasing wage inequality. Skill-biased technical change has increased the productivity of more skilled workers relative to that of unskilled workers. The relative increase in demand for skilled workers increases the difference in wages between the skilled and unskilled.

One type of policy response is to try to block the underlying processes generating increased wage inequality—for example, by reducing globalisation and international trade, or by refusing to adopt new technologies. Both strategies are highly detrimental to the overall growth and development of the economy. A better policy is to assist the natural process of worker mobility, helping workers acquire the skills they need to move from low-paying to high-paying jobs (while providing income assistance to those unable to retrain).

6. *Frictional unemployment* is the short-term unemployment associated with the process of matching workers with jobs in a dynamic, heterogeneous labour market. *Structural unemployment* is the long-term and chronic unemployment that exists even when the economy is producing at a normal rate. Structural unemployment results from factors such as language barriers, discrimination, structural features of the labour market, lack of skills, or long-term mismatches between the skills workers have and the available jobs.

Cyclical unemployment is the extra unemployment that occurs during periods of recession.

Frictional unemployment is probably the least costly type of unemployment, because it is both usually of short duration and often economically beneficial, being part of the process by which productive matches of workers and jobs are formed.

7. European labour markets suffer from a great degree of ‘structural rigidity’. Aspects of this rigidity include high levels of government regulation of the labour market (which impose extra costs on employers); high minimum wages (which exclude low-productivity workers from employment); generous unemployment benefits (which reduce workers’ incentives to find jobs); and powerful unions (which set wages at high levels and may impose other costs on employers). Presumably European governments do not eliminate these rigidities because of the political power of those who benefit from them (such as union members and other people with secure jobs).

Answers to problems

1.
 - a. The table below shows marginal products and the value of marginal products for each worker added. Since skateboards sell for \$130, but non-labour costs are \$100 per skateboard, the value of a worker’s marginal product equals \$30 ($\$130 - \100) times the number of additional skateboards assembled.

b. Danny's demand for labour at each wage is:

Number of workers	Marginal product	Value of marginal product
1	10	\$300
2	8	240
3	6	180
4	4	120
5	2	60

Wage	Number of workers
\$300/day	1
240	2
180	3
120	4
60	5

c. If skateboards sell for \$140 each then the value of each worker's marginal product is \$40 times his or her marginal product. The table in part b becomes:

Number of workers	Marginal product	Value of marginal product
1	10	\$400
2	8	320
3	6	240
4	4	160
5	2	80

In this case Danny's demand for labour at each wage is:

Wage	Number of workers
\$400/day	1
320	2
240	3
160	4
80	5

- d. If labour productivity increases by 50%, marginal products are as given in the table below.

Number of workers	Total output	Marginal product	Value of marginal product
1	15	15	\$450
2	27	12	360
3	36	9	270
4	42	6	180
5	45	3	90

The value of the marginal product is found by multiplying the marginal product of each worker by \$30, the value of an extra-assembled skateboard net of materials costs. In this case Danny's demand for labour at each wage is:

Wage	Number of workers
\$450/day	1
360	2
270	3
180	4
90	5

2.

- a. The marginal product of a worker in a factory with N workers equals $30 - N$ flashlights per hour. Since flashlights sell for \$2 each, the value of the marginal product in a factory with N workers is $\$2(30 - N)$. The factory managers should

hire workers as long as the value of marginal product exceeds the wage. So if the wage is \$20 per hour, the manager will hire more workers as long as $\$2(30 - N) > \20 , and will stop hiring only when $\$2(30 - N) = \20 . To find the level of employment at which the manager does no further hiring, solve the equation $\$2(30 - N) = \20 for N to obtain $N = 20$. If the wage is \$30 per hour, the manager will hire workers until the value of marginal product equals \$30. Solving the equation $\$2(30 - N) = \30 yields $N = 15$. So the manager hires fewer workers when the wage is higher.

- b. For each wage, the factory manager will hire workers until the value of marginal product equals that wage. So for each wage it will be the case that:

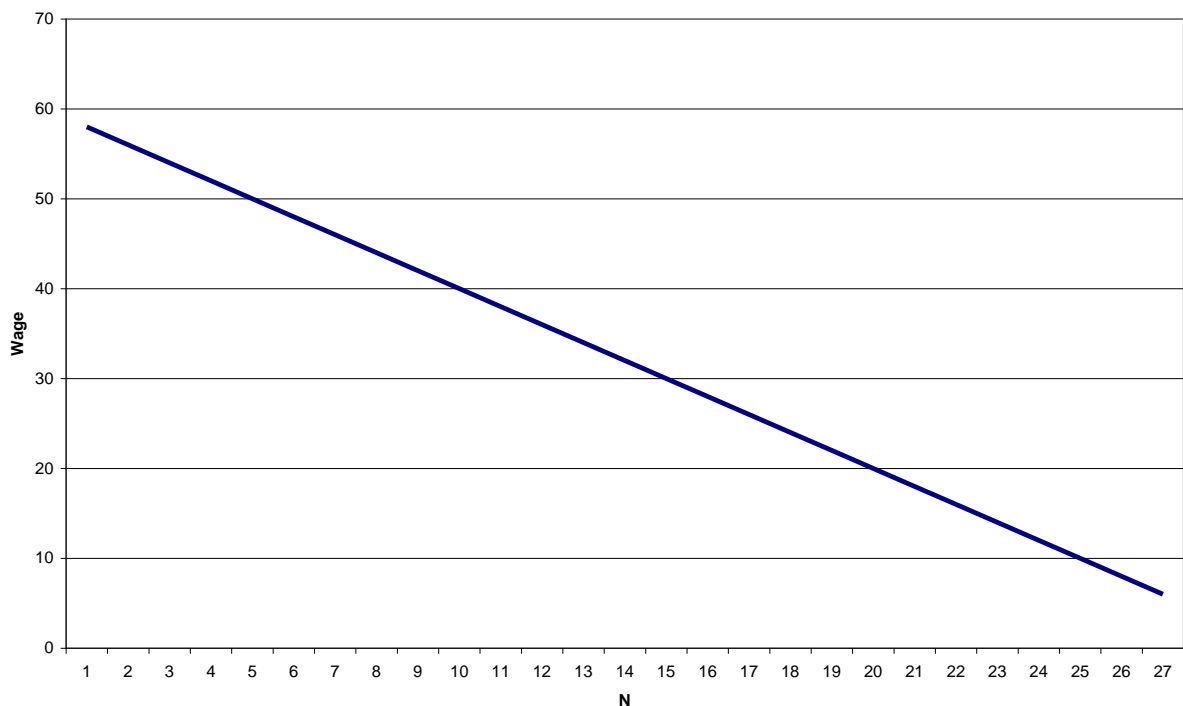
$$\text{Value of marginal product} = \text{Wage}$$

$$\$2(30 - N) = \text{Wage}$$

The graph of this relationship, which we can rewrite conveniently as

$$\text{Wage} = \$(60 - 2N)$$

shows the demand for labour. For example, as we saw in part a, when the wage equals \$20, employment N equals 20. When the wage equals \$30, employment N equals 15. See the demand curve below.



- c. If flashlights sell for \$3 each, the value of marginal product is $\$3(30 - N)$. The demand for labour is determined by the equation

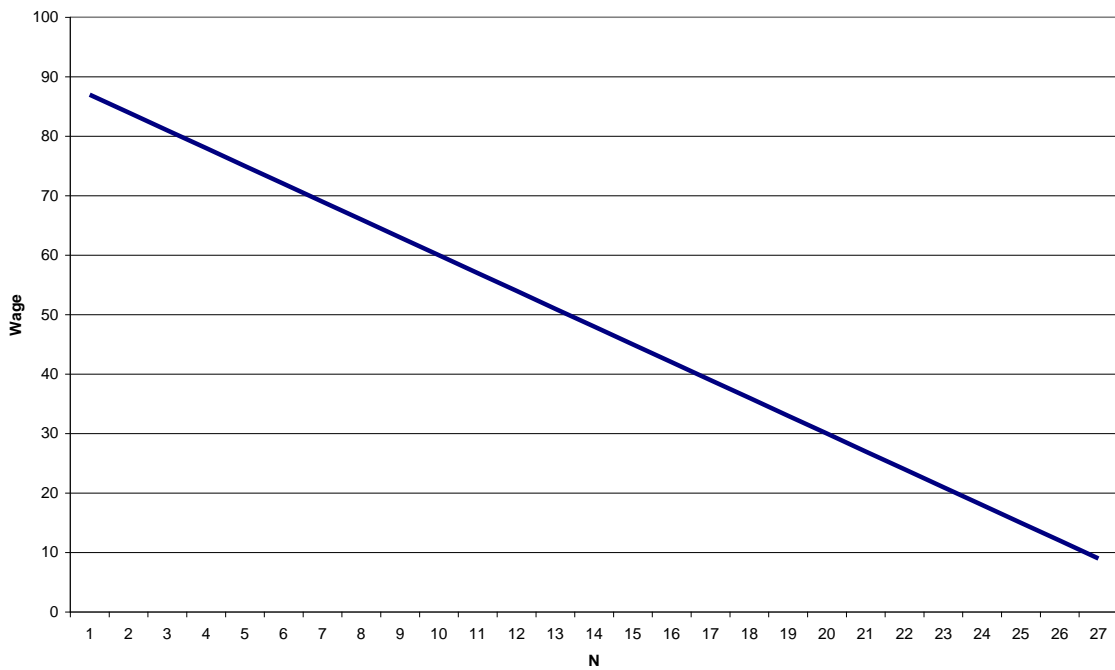
$$\text{Value of marginal product} = \text{Wage}$$

$$\$3(30 - N) = \text{Wage}$$

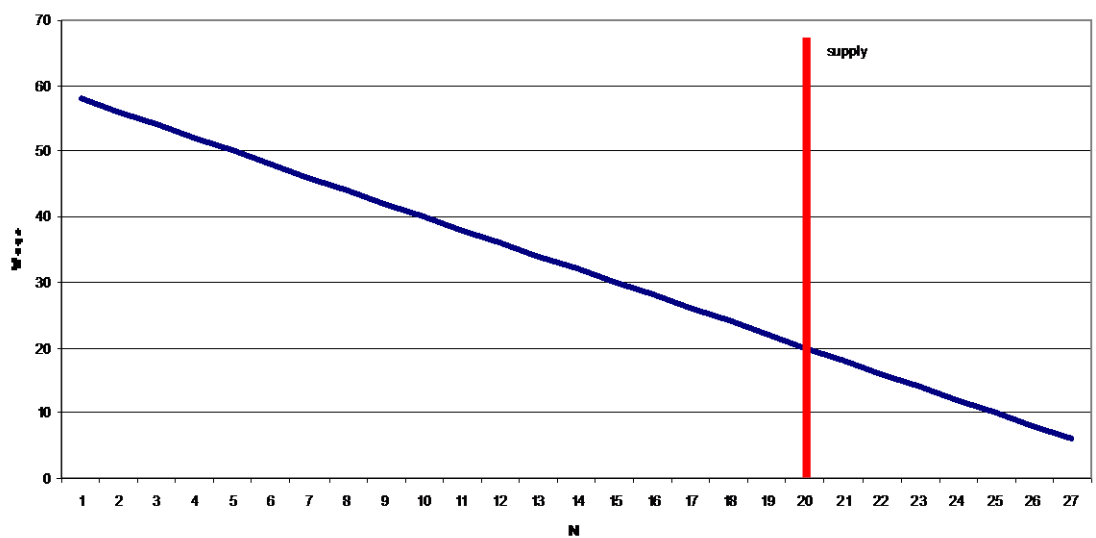
Writing the wage on the left-hand side yields

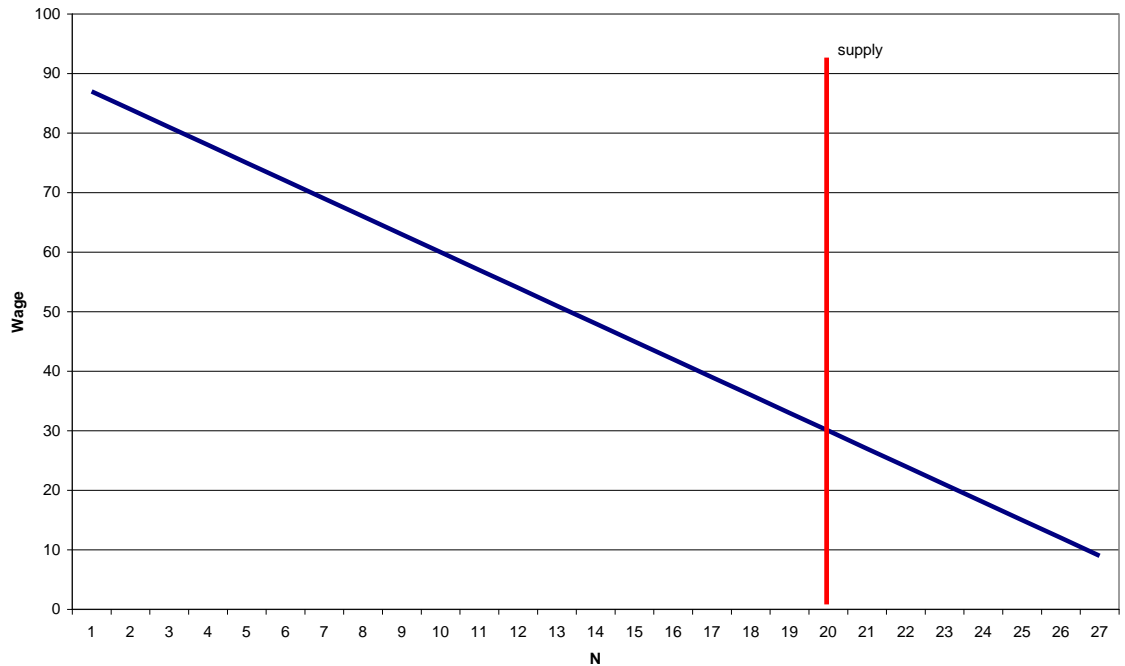
$$\text{Wage} = \$(90 - 3N)$$

For any given wage, solving this equation for N tells us how many workers the manager will employ. The graph of this relationship, the factory's demand curve for labour, is shown below. Because the relative price of flashlights has risen (we assume that the prices of other goods and services haven't changed) the demand for labour in the flashlight factory has increased relative to part b.



- d. If we were to add a vertical supply curve at $N = 20$ to the graph of the demand curve in part b, we would find that the equilibrium wage is \$20 per hour, when flashlights sell for \$2. Algebraically, if flashlights sell for \$3, then the demand curve is as given in part c. Adding a vertical supply curve at $N = 20$, we find in that case that the wage is \$30 per hour.





3.

- a. An increase in demand for the type of car made by the plant raises the car's relative price, which raises the value of the marginal product of the plant's workers. The increase in the VMP raises the demand for plant workers and hence should increase their real wage and employment.
- b. The increase in gas prices lowers the demand for cars. The relative price of cars falls and hence the value of the workers' marginal product. Demand for workers falls, and with it their real wage and employment.
- c. A decline in the supply of factory workers raises their real wage but reduces their employment.
- d. Increased worker productivity increases the demand for workers, raising the real wage and employment.
- e. Presumably the robots represent a form of skill-biased technical change, which increases the marginal product of skilled workers but reduces the marginal product of unskilled workers. Introducing the robots reduces the demand for unskilled workers, lowering their real wage and employment.
- f. Unionisation probably increases the workers' real wage, because of the threat of a strike. If the firm retains the ability to set employment levels, the higher real wage will lead the firm to demand fewer workers.

4.

- a. As additional older people are now available to work, the supply of labour is increased.
- b. An increase in productivity shifts up the demand for labour. The supply of labour is unaffected.
- c. The draft removes people from the labour force, reducing the supply of labour. This effect may be offset if patriotism drives more civilians to enter the labour force, as appears to have been the case in the past.
- d. In the short run the withdrawal of parents and caregivers from the labour force reduces labour supply. In the long run, however, more children means a larger population and thus more workers, all other things being equal.
- e. The effect on labour supply depends on how the generosity of Social Security benefits affects people's retirement decisions. Assuming that people are induced by better benefits to retire earlier, labour supply falls.

5.

- a. If all skilled workers are employed ($N^s = 100$), from the formula marginal product = $(200 - N^s)$, the marginal product of a skilled worker equals 100 toys per day, and (at \$3 per toy) their value of marginal product equals \$300 per day. Similarly, if there are 50 employed unskilled workers ($N^u = 50$), their marginal product is 50 toys and the value of their marginal product is \$150 per day. Since in equilibrium the wage equals marginal product, skilled workers will earn \$300 per day and unskilled workers will earn \$150 per day.
- b. Assuming that the number of skilled workers remains equal to 100, the marginal product of a skilled worker rises to $(300 - 100)$, or 200 toys per day. At \$3 per toy, the value of the marginal product rises to \$600 per day, as does their wage. The value of the marginal product of unskilled workers and hence their wage is unchanged at \$150 per day.
- c. Initially there are 100 skilled workers and 50 unskilled workers. If S unskilled workers acquire skills, then there will be $100 + S$ skilled workers and $50 - S$ unskilled workers. The value of the marginal product of skilled workers (assuming that $N^s = 100 + S$) will be $\$3[300 - (100 + S)]$, and the value of the marginal product of unskilled workers will be $\$3[100 - (50 - S)]$. Remember

that the wage will equal the value of marginal product in equilibrium. Thus S will be determined by the condition that

$$\text{Skilled wage} - \text{Unskilled wage} = \$300$$

$$\$3[300 - (100 + S)] - \$3[100 - (50 - S)] = \$300$$

Solving this equation for S yields $S = 25$; that is, 25 unskilled workers will become skilled. If 125 workers are skilled, the value of their marginal product and hence their wage will be $\$3(300 - 125) = \525 . The 25 remaining unskilled workers will earn $\$3(100 - 25) = \225 . Note that there is a \$300 differential, as required; note also that labour mobility has reduced the gap in wages somewhat.

6.

- a. The marginal product of a worker in the jacket industry is $20 - NS = 20 - 14 = 6$. Jackets sell for \$40 apiece, so the value of the marginal product of jacket workers (ignoring other costs) is \$240. In equilibrium \$240 will be the wage of jacket workers. Similarly, the marginal product of pants workers is $30 - ND = 30 - 26 = 4$. Since pants sell for \$60 each, the value of the marginal product (and hence the wage) of pants workers is \$240. So the two types of workers happen to be paid the same.
- b. The marginal product of jacket workers is still 6, but as jackets now sell for \$50, their value of marginal product and wage have risen to \$300. The wage of pants workers is the price of a pair of pants (\$50) times their marginal product (4), or \$200. Jacket workers have benefited but pants workers have lost from the opening to international trade.
- c. In the long run, workers move between industries. Let NS be the number of jacket workers in the long run, so that $40 - NS$ is the number of pants workers in the long run. The marginal product of jacket workers is $20 - NS$, and the value of their marginal product is $\$50(20 - NS)$. The marginal product of pants workers is $30 - (40 - NS)$, and the value of their marginal product is $\$50[30 - (40 - NS)]$. As workers always move to the industry with the higher wage, employment will not stabilise in the two industries until wages in each are the same. The condition that wages in the jacket industry equal wages in the pants industry is

$$\$50(20 - NS) = \$50[30 - (40 - NS)]$$

Solving this equation for the number of jacket workers in the long run, we get $NS = 15$. So in the long run, 15 workers (instead of the initial 14) will work in the jacket industry, and $40 - 15 = 25$ workers will remain in the pants industry. Wages in each industry will be \$250, as can be confirmed by the expressions for the value of marginal product in the equation above. As they initially earned \$240, in the long run the opening to trade helps domestic workers in both industries.

7.

- a. Structural. Ted's skills are mismatched with existing employment opportunities.
- b. Cyclical. Alice's unemployment is temporary and associated with a recession.
- c. Structural. Lance lacks the skills to land a long-term, stable job.
- d. Frictional. Gwen's change of location forced her to look for a new 'match' with an employer. After a short time searching she found a new job.
- e. Frictional. Tao's unemployment results from the process of searching for the best match between a job and his skills.
- f. Frictional. Again, the delay in taking a new job arises because Karen is trying to find the best opportunity, not because work is unavailable.

8.

- a. In equilibrium the quantity of labour demanded equals the quantity of labour supplied:

$$400 - 2w = 240 + 2w$$

Solving for the equilibrium wage w , we find $w = 40$. Plugging $w = 40$ into either the labour demand equation or the labour supply equation, we find employment $N = 320$.

- b. If the minimum wage is \$50, firms will employ $400 - 2(50) = 300$ workers, but $240 + 2(50) = 340$ workers will want jobs. Actual employment cannot be more than firms are willing to hire, so employment equals 300, and $340 - 300 = 40$ workers will be unemployed. Employed workers are better off than before (they earn a wage of \$50 rather than \$40). Unemployed workers are worse off. Taxpayers are worse off, if they must pay for unemployment

insurance or other support for the unemployed. Consumers are worse off too, as less output will be produced (fewer workers are employed). A reduced supply of output also implies that consumers will pay higher prices. (Note that a specific individual may be helped in her capacity as an employed worker but hurt in her capacity as a consumer and taxpayer.)

- c. If the required wage is \$60 per day, employment will be $400 - 2(60) = 280$. $240 + 2(60) = 360$ workers would like to have jobs at \$60 per day, so 80 people are involuntarily unemployed. As in part b, people with jobs are better off; the unemployed, taxpayers and consumers are worse off.
- d. If there is an unemployment benefit of \$50 per day, no one will work for less than \$50 per day. At a wage of \$50, employment is $400 - 2(50) = 300$ workers. All workers are better off (each has an income of \$50 rather than \$40) but taxpayers (who must foot the bill) and consumers (who pay higher prices for less output) are worse off.
- e. At \$50 per day, employment is $360 - 2(50) = 260$, whereas the number of people who want to work is $240 + 2(50) = 340$. So $340 - 260 = 80$ people are unemployed. Comparing with part b, we see that the reduced demand for labour coupled with a high minimum wage leads to increased unemployment. Employed workers still do the best, while the unemployed, consumers and taxpayers are hurt by the combination of the minimum wage and reduced labour demand due to government regulations.