Economics of labour
S.G. Berlinski, M. Manacorda
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Undergraduate study in
Economics, Management,
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This is an extract from a subject guide for an undergraduate course offered as part of the University of London International Programmes in Economics, Management, Finance and the Social Sciences. Materials for these programmes are developed by academics at the London School of Economics and Political Science (LSE).

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Chapter 1: Introduction

Aims and objectives

The objective of this 300 course, 15 Economics of labour, is to introduce you to the economic analysis of the labour market. This involves understanding what are the determinants of the observed structure of wages and employment. A suitable framework to organise what you should learn in this paper is that of supply and demand.

If taken as part of a BSc degree, 28 Managerial economics or 66 Microeconomics must be passed before this course may be attempted.

Learning outcomes

• Explain, on the supply side, the factors that affect the decision of an individual:
  ○ to work
  ○ to choose a particular job or a career path
  ○ to acquire education and on-the-job training
  ○ to provide effort in a particular job.
• Explain also, how governments’ policies could affect the decisions of the individual.
• Explain, on the demand side, the factors that affect the decision of a firm:
  ○ to hire and fire workers
  ○ to offer jobs with different characteristics (amenities and training for example)
  ○ to discriminate among different workers
  ○ to choose particular compensation policies and to offer different career paths.
• Explain also how government policies (examples include employment subsidies, minimum wages and affirmative action) and institutions (such as the unions) can affect the decisions of the firm.

Economics and the labour market

What is labour economics?

Broadly speaking, labour economics is the economic analysis of how workers, firms and the government interact in shaping the outcomes in the labour market, primarily employment and earnings.

Although at this stage this definition will probably look a bit vague and not too appealing, we hope that by the end of this brief introduction you will be able to fill it with content and get excited over the topics we will cover in this subject guide.

Why are we interested in the study of the labour markets?

From an economist’s point of view, labour is primarily an input in the production of goods. In this sense, it is by no means different from potatoes in the production of French fries. But there is no paper in Potato
Economics. The reason for this is that labour is a special production input. Work has a direct impact on the lives of almost all of us. We spend a large part of our life working and we draw most of the support for our expenses from work. Work affects our socialisation patterns, our social identity and happiness. A variety of social norms play a prominent role in shaping our behaviour in the labour market. Governments often intervene in the labour market, not only by setting laws and regulations, but also as employers and by redistributing from those who work to those who are without work. One needs to develop a specific analysis to understand how these norms and institutions affect individuals’ and firms’ choices and determine the outcomes in the labour market.

**How do economists approach the study of the labour market?**

You will see how the standard tools of economics that you have learnt in your study of Microeconomics and Macroeconomics can be used to understand complex social phenomena and how even simple economic models can take us a long way in understanding these issues. As a first approximation, economists have in mind a simple model of the labour market which is characterised by the actions of rational agents who maximise their well-being. On the one side, utility-maximising workers decide whether and how much to work, based on the remuneration offered to them and the disutility that they draw from working, as opposed to spending time in leisure activities. This constitutes the bulk of the theory of labour supply. It simply states that workers will tend to provide more hours of work as their wage increases. But while workers supply their services, that is to say their labour, in the market for a price (the wage), firms need workers in order to produce final goods. Profit-maximising firms will demand more labour as it becomes cheaper, that is as the wage decreases. Indeed as labour becomes more costly, firms will tend to use other inputs of production (machines, for instance) to produce their output. This constitutes the other side of the labour market: labour demand. The interaction between labour demand and labour supply determines the labour market equilibrium. Government intervention in this market affects the set of options available to these actors and it can therefore affect the equilibrium that is attained.

It should be clear that the main advantage of having a model is that it constitutes a simplified representation of the reality that we are trying to describe. Its implications can be tested against data and one can draw predictions that can be used for policy discussion. However, you will have probably recognised that the model described above is excessively simplistic. Soon after having studied this basic model, we will proceed to relax some of the simplifying assumptions on which the model is based. While on the one hand this complicates the analysis, it also adds a greater degree of realism to it.

We usually have more than one theoretical model that can explain a given set of facts and predict the behaviour of different actors. Therefore, labour economists put a great amount of effort into using statistical data to estimate and test the relationships that economic theory suggests. One can learn a great deal by looking at the past or comparing the experience of different countries or different individuals (i.e. firms or workers) acting in different circumstances.

With this framework in mind, let us try to sketch the structure of this subject guide.
Structure of the guide

The first chapter of the paper is devoted to labour supply, that is to say to the relationship between market wages and individuals willing to work. The theory of labour supply (Chapter 2) helps us understand a number of interesting questions. Why do women work less than men (although increasingly less so)? Do unemployment benefits reduce the incentives of the jobless to work? What is the division of labour within a household and why do individuals work more hours around the middle of their lives than when they are younger or older? In Chapter 3 we introduce the other side of the market: labour demand. Here we study the demand for labour on the part of firms and we ask how this is affected by technology and market structure. We then move to the equilibrium (Chapter 4) in the labour market and we show how several kinds of government interventions can affect the equilibrium outcome.

The second part of this subject guide looks at some specific issues in detail. We start by questioning the view that there is a single (competitive) wage for everybody in the labour market, we recognise that different individuals earn different wages. One explanation for this is that some unpleasant features of jobs have to be remunerated to make these jobs attractive enough to workers. This is the theory of compensating differentials (Chapter 5). But workers can also earn different wages because their skills are different or because employers discriminate against them. In Chapter 6 we try to explain why workers decide to acquire different levels of education and training. In this area of research we can think about the choice of education and training as a productive investment on the part of workers. In Chapter 7 we then study the distribution of earnings. Chapter 8 gives a different motivation for wage differentials across workers: firms can use wages as a ‘carrot’ to motivate or retain workers. This leads to another area of labour economics which examines the interaction between incentives and the employment relation.

In Chapter 9 we look at the action of labour unions. We study why unions exist, what their objectives are and how their existence affects the outcomes in the labour market. Finally, Chapter 10 is devoted to unemployment. We use many of the theories that we have developed in the previous chapters to understand why not everybody is employed and why in particular some workers are unemployed despite wanting to provide their service on the labour market for pay.

The reading list

The reading list is divided into essential reading, taken from two main textbooks, and further reading. Although there are two main textbooks, it will be fine to closely follow only one of them. Occasionally, however, one of the textbooks treats an issue in a way that we like better than the other and in such cases we mention that in the text. So it is probably a good idea, if possible, for you to buy both of them.

Essential reading

The two main textbooks are:


A third textbook that you may find useful to consult is:


Further reading

Please note that as long as you read the Essential reading you are then free to read around the subject area in any text, paper or online resource. You will need to support your learning by reading as widely as possible and by thinking about how these principles apply in the real world. To help you read extensively, you have free access to the virtual learning environment (VLE) and University of London Online Library (see below).

Other useful texts for this course include:


The further reading offers an advanced treatment of the topics we cover here. It may help you to understand any issues that you find difficult or obscure in the textbook, and it can also enable you to find out more about topics in which you are interested.

Some of the readings in the further reading section are more accessible than others. In fact, some of the papers are technically very demanding. You should not feel discouraged by this. We have included these papers in the reading list hoping that even if you only read the introduction and conclusion it may provide a flavour of the issues at stake. Remember, you should use the exposition and questions in the textbooks to test your knowledge.

Many published papers are available as working papers (WP) online. Some are available on the National Bureau of Economic Research (NBER) website (www.nber.org). There is free access to these papers from many countries and universities. Also, a very good collection of working papers is available on Princeton University’s Industrial Relations website: (www.irs.princeton.edu/pubs/working_papers.html). There you can find most of the papers written by Card, Krueger, Ashenfelter, etc. in WP version.
A large number of journal articles are accessible via Jstor: (www.jstor.com or www.jstor.ac.uk) in case you have access to a library connected to such service.

In the links section of the European Association of Labour Economists (website: www.eale.nl) you will find The Labour Economists Gateway. On the gateway there are links to a variety of data sources, labour economists' websites (more papers), and other written material. For example, you can find a link to the web version of economics classics like Adam Smith's 'Wealth of Nations' (which you may want to read for the section on compensating wage differentials).

This subject guide follows closely the exposition you will find in the textbook. The main difference is that the textbook layout will give you some theory and a related policy application question.

Online study resources

In addition to the subject guide and the Essential reading, it is crucial that you take advantage of the study resources that are available online for this course, including the VLE and the Online Library.

You can access the VLE, the Online Library and your University of London email account via the Student Portal at: http://my.londoninternational.ac.uk

You should receive your login details in your study pack. If you have not, or you have forgotten your login details, please email uolia.support@london.ac.uk quoting your student number.

The VLE

The VLE, which complements this subject guide, has been designed to enhance your learning experience, providing additional support and a sense of community. It forms an important part of your study experience with the University of London and you should access it regularly.

The VLE provides a range of resources for EMFSS courses:

- Self-testing activities: Doing these allows you to test your own understanding of subject material.

- Electronic study materials: The printed materials that you receive from the University of London are available to download, including updated reading lists and references.

- Past examination papers and Examiners’ commentaries: These provide advice on how each examination question might best be answered.

- A student discussion forum: This is an open space for you to discuss interests and experiences, seek support from your peers, work collaboratively to solve problems and discuss subject material.

- Videos: There are recorded academic introductions to the subject, interviews and debates and, for some courses, audio-visual tutorials and conclusions.

- Recorded lectures: For some courses, where appropriate, the sessions from previous years’ Study Weekends have been recorded and made available.

- Study skills: Expert advice on preparing for examinations and developing your digital literacy skills.

- Feedback forms.
Some of these resources are available for certain courses only, but we are expanding our provision all the time and you should check the VLE regularly for updates.

**Making use of the Online Library**

The Online Library contains a huge array of journal articles and other resources to help you read widely and extensively.

To access the majority of resources via the Online Library you will either need to use your University of London Student Portal login details, or you will be required to register and use an Athens login: http://tinyurl.com/ollathens

The easiest way to locate relevant content and journal articles in the Online Library is to use the Summon search engine.

If you are having trouble finding an article listed in a reading list, try removing any punctuation from the title, such as single quotation marks, question marks and colons.

For further advice, please see the online help pages: www.external.shl.lon.ac.uk/summon/about.php

**Using the subject guide**

The subject guide is to a large extent self-contained. Of course, it assumes that you know your basic Micro, Macro, Maths and Statistics courses. However, in the first chapters, where the basic tools of supply and demand are introduced, we give you a review of some of the basic concepts. Once we leave the first three chapters there are fewer definitions of basic concepts so if you are not sure about the meaning of some terms or techniques you should probably go back to the literature you studied in earlier subjects.

Although the guide is self-contained it does not contain all the material you need to review for the subject. The essential readings are a must. We advise you first to read a chapter, then to do the essential readings, read another chapter, do the essential reading, etc. Occasionally when there is a topic that we have only referred to briefly, or we have not touched upon and we think is important, we point at some of the essential readings that you might want to read before going on with what follows in the guide. In fact, we occasionally include in the list of learning outcomes issues that we have not explained in the guide but that you should know for the exam.

The guide contains plenty of self-assessment activities and questions. It is important that you try them. The answers to most self-assessment activities are in the textbook. So, you should read the guide, do the self-assessment activities, read the relevant chapters and then go back to read the guide and do the self-assessment activities. You should remember always that the guide only provides the structure of the course and it is up to you to fill in the gaps. Occasionally the self-assessments are hard and/or there are no answers in the textbook. In such cases we include hints that should make it easier for you to come up with an answer. We provide sample questions at the end of each chapter. You should tackle these questions after doing your textbook reading. We finish the guide with a sample test and some guidance on how to structure your answers.
The examination

**Important**: the information and advice given in the following section are based on the examination structure used at the time this guide was written. Please note that subject guides may be used for several years. Because of this we strongly advise you to always check both the current Regulations for relevant information about the examination, and the VLE where you should be advised of any forthcoming changes. You should also carefully check the rubric/instructions on the paper you actually sit and follow those instructions.

You are expected to answer **all** the Section A questions and **any two** questions from Section B. The examination is three hours long.

Remember, it is important to check the VLE for:

- up-to-date information on examination and assessment arrangements for this course
- where available, past examination papers and Examiners’ commentaries for the course which give advice on how each question might best be answered.
Chapter 2: Labour supply

Essential reading

Further reading

Background and the static model:

Inter-temporal or life cycle labour supply:

Policy analysis: welfare programmes

Learning outcomes
By the end of this chapter, and having completed the essential readings and activities, you should be able to:
• explain the concepts of unemployment, employment and labour force participation
• define and explain the unemployment rate, the employment rate, the employment to population rate and the labour force participation rate
• define the worker's problem as to whether and how much to work
• analyse the effect of a rise in unemployment benefits on labour force participation
• derive and discuss the labour supply problem as an inter-temporal optimisation problem.
Introduction

In this first part of the subject guide we introduce you to the **theory of labour supply**. This part of labour economics helps us understand why some individuals decide to work and why different individuals choose to work different hours in the labour market.

We first concentrate on the theory of static labour supply, which examines the decisions of one individual at one point in time. Each individual in the market decides whether to work and – if he decides to work – how many hours to work, given the current market wage and any source of non-labour income. In order to derive this theory we use the standard tools of microeconomics that you have learnt in the first years of your degree. This model is extremely helpful in understanding a number of issues that are of policy concern. For example, the model helps us understand how unemployment benefits affect participation in the labour market.

Later in the chapter we allow for the circumstance that in deciding on how many hours to work in the labour market, individuals take into account not only their current wage but also the profile of their wages throughout their working lives. In order to distinguish this from the static theory of labour supply, we refer to this as the inter-temporal (or life cycle) theory of labour supply.

**Some basic concepts: measures and definitions**

Before illustrating the theory of labour supply, it is useful to introduce some fundamental concepts. You might have read many times in the newspapers that the unemployment rate is higher in Europe than in the USA. But what exactly is the unemployment rate? How do we measure it? And is this the only measure of the performance of the labour market?

According to the standards set by the International Labour Office, an individual is **employed** (denoted by $E$) if she works for pay for more than one hour per week. A person who is not employed is not necessarily unemployed. In order to be qualified as **unemployed** (denoted by $U$), she must have used at least one active method to look for a job in the last four weeks or she must be willing to start a job and able to take one up within two weeks if offered one. We refer to those who are either employed or unemployed as **active**, or **in the labour force** (denoted by $LF$):

$$P = LF + NLF$$

One index that labour economists use to measure how well a certain labour market is doing is the **unemployment rate**, which is defined as the ratio between the total number of unemployed and those in the labour force:

$$ur = U/LF$$

Sometimes we are not interested in the proportion of those without a job but in the proportion of those who have a job or would like to take one.
One typically used measures of labour market performance is the labour force participation rate:
\[ \text{lfpr} = \frac{LF}{P} \]
which is the ratio between the labour force and population. This is also called the activity rate. The employment to population rate is the ratio of total employment to total working-age population:
\[ \text{epr} = \frac{E}{P} \]
and the employment rate is
\[ \text{er} = \frac{E}{LF}. \]

**Static labour supply**

In order to derive the static theory of labour supply, we use the standard tools of consumer theory. Recall that consumer theory helps us understand how an individual (the consumer) allocates a certain amount of money (income) to her expenditure on different goods. Her utility-maximising bundle will depend on the level of income and the relative prices of the different goods. But, as we suggested in the introduction to this guide, most people derive their income from working. People sell their work in the market to buy consumption goods through labour earnings. If people want to consume more goods they will have to work more. However, people dislike working because this reduces their free time. Work in this sense is a 'bad'.

**Utility function**

An easy way to embody this concept into the standard consumer model is to assume that individuals' utility depends not only on consumption but also on leisure. Leisure is the amount of time that workers devote to non-productive activities and therefore it is a 'good'. If \( T \) is the individual's time endowment (for example 14 hours a day, once we have subtracted from the 24 hours the amount of time devoted to sleep and personal care) and \( H \) is hours of work (for example 8 hours), it must be that:
\[ L = T - H \]
where \( L \) denotes leisure (for example 6). A rise in hours of work is associated with a one-to-one fall in leisure. Equation (1) is called the time constraint.

A rational worker maximises her utility that depends on leisure and consumption:
\[ \text{Max}_{C,L} U = U(C, L) \]
In Figure 2.1 we have drawn a set of indifference curves (i.e. the loci of consumption and leisure combinations corresponding to a given level of utility). On the horizontal axis we measure leisure and on the vertical axis, consumption. Since, as leisure increases, hours of work decrease, one can travel from right to left on the horizontal axis to measure hours of work \( H \). At the origin, for example, \( L = 0 \), which implies that \( H = T \). But as we move to point A, leisure has increased, which suggests that hours of work have decreased.
Marginal rate of substitution

The slope of the indifference curve at a given point is called the marginal rate of substitution (MRS). The marginal rate of substitution measures the change in consumption that is required to keep utility unchanged as leisure changes by one unit. This is often expressed as $dC/dL\mid_U$, i.e., the derivative of consumption with respect to leisure along an indifference curve (that we represent by the subscript $U$ to signify at 'given' utility). The MRS is a negative number since consumption has to increase for utility to stay unchanged as leisure decreases by one unit. The increase in consumption which is required to keep utility unchanged as leisure decreases by one unit varies with the level of leisure. If the worker consumes very little leisure she will value her leisure highly. If she is required to reduce leisure by one unit she will need a high increase in consumption to keep her utility unchanged which suggests that the absolute value of the MRS is high. This is a situation corresponding to point $P$ in the figure where the indifference curve is steep. But if the consumer is already consuming plenty of leisure she will not value leisure very highly and she will only require a small increase in consumption for a one unit reduction in leisure to maintain her utility unchanged. This corresponds to a point like $P'$ in the figure where the indifference curve is relatively flat. The marginal rate of substitution is therefore decreasing in leisure.

Constraints

A rational consumer will want to maximise her utility in (2). But she cannot choose freely any bundle of consumption and leisure. She faces two constraints. The first constraint comes from the fact that extra consumption can only be afforded at the cost of extra work. This is called the budget constraint and it is written as follows:

\[ C = V + WH \]

where $V$ is unearned income that is to say any income level the worker receives which is independent of how much she works. For example, state benefits paid to the unemployed, or the money transfers children receive from their parents are all sources of unearned income. Implicitly we have assumed here that the price of consumption goods is equal to one. $W$ is the market wage rate, or the increase in income associated with one extra hour of work $H$. The budget constraint simply states that any expenditure on consumption ($C$) must be financed by either earned income ($WH$) or by unearned income ($V$). We assume in this case that one cannot borrow
and there are no savings. Adding to both sides of (3) the quantity $WL$ and exploiting (1), the budget constraint can be rewritten as:

\[(3') \quad C + WL = V + WT\]

The left-hand side is total expenditure on the two goods: consumption and leisure. The wage rate $W$ can be thought of the price of leisure. Why? It is the essentially the amount of money that the worker has to give up if she wants to consume one extra unit of this good. The right-hand side is the sum of unearned income ($V$) plus the income the worker would gain if she devoted all her available time to work ($WT$). The sum of these two components is called full income. This equation looks very much like the budget constraint in a classical consumer optimisation problem [if you do not remember this you should go back to your microeconomics textbook and revise it]. On the left-hand side we have expenditure and on the right ‘income’. A basic difference here is that income depends on $W$, that is on the price of one of the goods. This circumstance suggests that the worker's problem is somehow ‘special’. A rise in the wage rate $W$ has two effects in this model. Not only does it alter the relative price of the two goods by making leisure more expensive but it also affects the total amount of consumption goods a worker can afford at a fixed number of hours of work. It is important that you keep this in mind because this is one of the most important differences between classical consumption theory and the theory of labour supply.

The second constraint the worker faces is that the total number of hours she can work in the market cannot be negative or greater than $T$:

\[(4) \quad 0 \leq H \leq T\]

Equations (3') and (4) define the worker’s opportunity set, which we have drawn in Figure 2.2. This is the set of consumption-leisure combinations that are achievable by the worker. Again we have reported leisure on the horizontal axis and consumption on the vertical axis. Equation (4) restricts the set of feasible bundles to the area between the vertical axis and the vertical line at $L=T$. The downward-sloping line is the budget constraint (3') whose slope is $-W$, the (negative of) the wage rate. This line intercepts the vertical axis at $V+WT$, which simply says that at zero hours of leisure the worker can devote her full income to consumption. At point $D$ a worker consumes $T$ hours of leisure (and works zero hours) and can afford $V$ of consumption goods. This is called the endowment point.

With a utility function and the two sets of constraints we now have all the elements to solve the worker's problem. To start with, we concentrate on the decision on whether to work or not, also called the participation decision. Later on we study the optimal number of hours of work for those who decide to participate.

![Figure 2.2](image-url)
The solution to the worker’s problem

Participation decision

We have said in the introduction that not everybody in the population qualifies as active. In order for people to participate they must be offered a high enough market wage $W$. If the worker were offered a wage that was unreasonably low, she would rather not work. We define the reservation wage as the minimum wage rate which makes a worker indifferent between working and not working. We denote this by $W^*$. The worker will participate in the labour market if the market wage is at least equal to the reservation wage:

$$W > W^*$$

Otherwise, if $W < W^*$, the worker will not participate. Graphically, the reservation wage is the (absolute value of the) slope of the indifference curve at the endowment point $D$, (i.e. at zero hours of work, as drawn in Figure 2.3 (dotted line)). We denote the indifference curve going through $D$ by $U$. To understand why this slope is the reservation wage, you can draw the budget line and observe that the (absolute value of the) slope of this line is the market wage $W$ (see equation 3'). In Figure 2.3 we have depicted the case in which the reservation wage $W^*$ is higher than the market wage $W$. You can check that if the worker locates somewhere to the left of the endowment point $D$ along the budget line she is going to attain a lower level of utility than at $U$ (for example $U'$). In this case the worker would rather not work: she will locate at $D$.

Notice that people differ in their reservation wage and that might explain why for some level of market wages some people decide to work while others decide to stay at home and enjoy their spare time. The reservation wage depends on preferences and the level of unearned income.

The worker in Figure 2.3 has a relatively steep indifference curve and therefore strongly dislikes working.

Activity

What happens when a worker does not have a strong dislike for work?

If unearned income increases, it becomes less likely that a worker decides to participate.
Activity

You should verify the statement above graphically. Suppose initially that the worker is indifferent as to whether to work or not. Check what happens to the reservation wage and to participation as unearned income increases. Observe that a change in unearned income can be represented by a vertical shift of the endowment point.

Hours of work decision

Suppose now that \( W > W^* \). We know that in this case the individual will work. But how much will she work? This is the hours of work decision. In order to derive the optimal hours of work decision, recall from the consumer theory that the optimum is achieved at the tangency point between the indifference curve and the budget line. However, we know from the previous discussion that (negative of the) slope of the indifference curve is the marginal rate of substitution while the (negative of the) slope of the budget line is the wage rate. The optimal condition is therefore:

\[
|MRS| = W
\]

This says that the worker’s subjective evaluation of the trade-off between consumption and leisure (the MRS) must be equal to the market evaluation, which is the market price of leisure, that is the wage rate \( W \).

What happens to the optimal hours of work if the level of unearned income increases? Again the graphical analysis is going to be of great help. This situation is depicted in Figure 2.4. A rise in unearned income from \( V \) to \( V' \) shifts the budget line up in a parallel fashion [be sure to check this]. In the rest of this guide we assume that leisure is a normal good. A normal good is one such that its consumption increases as income increases. If leisure is a normal good, the new optimal allocation is at \( A' \). An increase in income raises leisure and therefore reduces hours of work. This makes sense: if a worker becomes richer, she will decide to work less.

Figure 2.4

A change in the wage rate in this setting is more complicated. To understand this complication, recall from our previous discussion that a rise in \( W \) has two separate effects. On the one hand, at fixed labour supply, a rise in \( W \) makes a worker better off. If leisure is a normal good, a rise in \( W \) therefore tends to increase leisure and the optimal number of hours of work tends to fall. This is the income effect associated to a rise in market wage. However, if the wage rate increases, the price of leisure increases relative to the price of consumption (recall that this last price is set arbitrarily equal to one) and therefore workers will tend to substitute away from leisure (which has become more expensive) towards consumption. This is the substitution effect. Through this channel an increase in the wage rate tends to decrease the optimal hours
of leisure and therefore to increase hours of work. Overall, the net effect of a rise in the wage rate on the total number of hours is ambiguous, since this is the combined effect of two forces acting in opposite directions. Essentially, if \( W \) goes up the worker has to decide whether to work more to take advantage of the fact that working now pays more, or to work less to take advantage of the fact that by doing so she can still afford the same amount of consumption goods as before the wage rise.

In formulas, the net effect of an increase in \( W \) when \( V \) is given can be expressed in terms of the Slutsky equation:

\[
dH/dW|_V = (dH/dV) H + dH/dW|_U
\]

The left-hand side is the net effect of a rise in hours of work as wages increase by one unit and assuming that \( V \) is given. The first term on the right-hand side is the income effect. This is equal to the change in hours associated with a rise in income, times the change in income associated with a rise in wages. This last term is the number of hours worked \( H \). The second effect is the move along the indifference curve induced by the substitution effect.

**Activity**

What happens if wages decrease? What is the sign of the substitution and income effects?

The same equation can be rewritten in terms of elasticities by multiplying both sides of the Slutsky equation by \( W/H \). You can check that this leads to:

\[
e = e^* + e_k
\]

where \( e^* (dH/dW) W/H \) is the compensated (i.e. at fixed utility) elasticity of hours of work with respect to wages, \( e_k (dH/dV) V/H \) is the elasticity of hours of work with respect to unearned income and \( k WH/V \) is the ratio of labour to non-labour income. The left-hand side \( e (dH/dW) W/H \) is called the uncompensated elasticity.\(^1\)

To give a graphical illustration of the effect of a rise in \( W \) on total number of hours of work, in Figure 2.5 we have depicted the case in which the substitution effect outweighs the income effect. Suppose we start from point \( P \) which is determined by the tangency point between the original budget line \( AD \) and the indifference curve \( U \). Suppose that the wage rate increases from \( W \) to \( W' \). This is equivalent to an upward rotation of the budget line around \( D \). [Be sure you check that this is true.]

---

1 The elasticity of \( y \) with respect to \( x \) is defined as the percentage change in \( y \) for a 1 per cent change in \( x \). This is equal to \((dx/x)/(dy/y))/(dlog(x)/dlog(y))\).
The new optimum is at $P'$ which is to the left of $P$. This is determined by the tangency point between the new budget line $AD$ and the new indifference curve $U'$. The overall effect of a rise in wages in this case is a reduction in leisure from $L$ to $L'$ (i.e. a rise in the number of hours of work from $H = T - L$ to $H' = T - L'$). In order to decompose the move from $P$ to $P'$ into an income and a substitution effect, you can draw a line parallel to original budget line $AD$ that is tangent to the new indifference curve $U'$. This tangency point is denoted by $P''$. You can see that point $P''$ is to the right of $P$ and the associated number of hours of work is given by $H'' = T - L''$. The move from $H$ to $H''$ is called the income effect and you can see that it is associated with a fall in the number of hours of work. You can think of this move as the change in the optimal level of leisure induced by a change in $W$, assuming that the relative prices of the two goods have remained unchanged and the only effect of a rise in $W$ is to make the worker better off. However, since prices have changed, this induces an extra move from $P''$ to $P'$, which tends to increase hours of work from $H''$ to $H$. This movement is the substitution effect which goes in the opposite direction. Since we have assumed that the substitution effect is greater, $H'' - H > H'' - H'$. Total number of hours of work increase ($H' > H$).

**Activity**

Draw the case in which the income effect outweighs the substitution effect. What is the total effect of a rise in $W$ on $H$? Be sure to decompose the movement from $P$ to $P'$ into the movement from $P$ to $P''$ and the movement from $P''$ to $P'$. Now experiment with a fall in the wage rate $W$. Distinguish the case in which the substitution effect prevails from the case in which the income effect prevails.

The relationship between hours of work $H$ and the wage rate $W$ (assuming that unearned income $V$ is fixed) is called labour supply. We have seen that the theory gives us no unambiguous prediction on the sign of this relationship. However, there are reasons to believe that when wages are very low a rise in $W$ will ultimately tend to increase hours of work $H$. It is easy to understand why. If wages are very low, workers do not participate and their hours of work are zero. But for a sufficiently high wage the marginal worker will be induced to spend some time in the labour market. So, around zero hours of work, the substitution effect must prevail and the labour supply is upward sloping. However, as wages increase further, this worker is likely to realise that providing even a few hours of work in the market makes her extremely well off and she will want to take some time off. For very high wages an increase in wages should tend to reduce labour supply. Therefore, there are reasons to believe that the labour supply curve is upward sloping but then it tends to bend backwards for very high levels of wages. We have depicted this situation in Figure 2.6.
Fixed costs of going to work

In the rest of this chapter we relax some of the simplifying assumptions we have used throughout the presentation of the standard labour supply model. You will see how we can add different degrees of realism to our analysis at the cost of only an extra bit of complexity. One interesting extension of the model of labour supply that we have discussed above consists in allowing for fixed costs of going to work. These are the costs a worker incurs as she decides to provide her first hour of work in the labour market and they do not depend on the total number of hours of work.

We start from fixed money costs. Under these headings we include, for example, commuting costs or childcare costs. Suppose a worker has unearned income $V$ corresponding to the endowment point $D$ in Figure 2.7. At point $D$ she can achieve utility $U$. Her initial reservation wage is given by the slope of the indifference curve at $D$. Suppose now that this worker incurs a fixed money cost of going to work. As soon as she enters the labour market, she has to make this money disbursement which reduces her unearned income to $V'$. The endowment point conditional on working is $D'$. This worker will decide to work only if work allows her to afford a level of utility at least equal to $U$. This suggests that in order for this worker to enter the labour market she must be offered a market wage at least equal to the slope of the line departing from $D'$ and tangent to the indifference line $U$.

![Figure 2.7](image)

The slope of this line is the new reservation wage: it is the minimum level of market wages that makes this worker just indifferent between working and not working. It is not hard to see that an increase in money costs (from 0 to a positive quantity) has increased the reservation wage. We know from the discussion above that this is going to reduce participation. It follows that fixed money costs of going to work tend to reduce participation. This should not come as a surprise to you. Effectively, if going to work is expensive, it becomes less likely that individuals will decide to work, especially if they are on very low wages.

A similar conclusion is reached when we allow for fixed time costs of going to work. Suppose that going to work takes two hours by train. Even if the employer paid for the worker’s train ticket, the worker would rather employ these two hours in some pleasant or productive way rather than sitting on a train. Time has an opportunity cost. A rise in the fixed costs of going to work tends to increase the reservation wage. To see this, suppose that a worker has to spend $H$ hours commuting. This implies that she has fewer hours to allocate to either work or leisure. Graphically, this implies that as soon as she enters the labour market, she loses $H$ hours. Her endowment point conditional on working is now $D'$ in the right panel of Figure 2.7.
Activity
Derive the reservation wage in this case and show that it has increased. To see this draw the indifference curve going through $D'$ and then draw the line tangent to this indifference curve starting from point $D'$. What happens to participation in this case? Give an intuitive explanation.

The effect of a rise in fixed costs of work (whether money costs or time costs) on the number of hours of work for those who decide to remain in work is less clear cut. In general, if a worker decides to stay in work she will find it optimal to reduce her number of hours of leisure. With fixed money costs of going to work this implies that hours of work increase. However, when the worker faces an increase in the time costs of going to work, this reduction in leisure is likely to be absorbed by the rise in commuting time and she might end up working less in the labour market.

Unemployment benefits
One argument that you might have read in the newspapers or heard in conversations with friends is that unemployment benefits discourage labour force participation. In many countries those who are unemployed are entitled to some form of compensation. While the need for unemployment benefits is clearly to guarantee some income to those who happen to be in a bad economic condition, it is often argued that these benefits are inefficient, since they tend to discourage those who are unemployed to look for a job. To see this in our simple model of labour supply, assume a worker is jobless and to keep things simple assume that she has no unearned income. Clearly, if the market wage is sufficiently high this person will be induced to work. In Figure 2.8 we have depicted this situation.

![Figure 2.8](image)

The worker’s endowment point is at $D$ and her optimal consumption-leisure bundle is $A$. Suppose now that this person receives some benefits when she is out of work. This introduces a spike at zero hours of work in the budget line. Conditional on not working, the endowment point is at $D'$. This person will lose her unemployment benefits as soon as she decides to provide the first hour in the labour market. The individual depicted in the left-hand panel will be better off not working. You can see that at point $D'$ she can achieve a level of utility ($U'$) higher than the one attainable at $A$ ($U$). In this case unemployment benefits tend to reduce participation.
Activity

It is important to notice however, that this is not a necessary result. Draw the corresponding graphs for:

• a worker who is indifferent between working and receiving benefits
• a worker who will continue to work anyway.

For any given type of worker experiment with different levels of unemployment benefits. You can do so by varying the height of the spike and the shape of the indifference curve.

Inter-temporal labour supply

Upto this point we have assumed that workers make their decisions on whether and how much to work at each point in time. A more realistic description of labour supply decisions is that workers take decisions based not only on the information they have about their current wages but also about future wages. Suppose a worker knows that the wage next period is going to be higher than her current wage. Based on this information, she can decide to work more tomorrow and less today. This is the essence of the inter-temporal substitution hypothesis: workers will work more when the wage rate is higher.

To keep things simple, let us assume a worker works only two periods (periods 1 and 2) and she knows in advance the wage at both times. This worker is only interested in maximising the present value of her utility over the whole span of her life. Her problem can be written as:

\[
\text{Max } U(C_1, L_1) + U(C_2, L_2)/(1+r)
\]

s.t. \( C_1 + C_2/(1+r) + W_1 L_1 + W_2 L_2/(1+r) = W_1 T + W_2 T/(1+r) + V_1 + V_2/(1+r) \)

where the subscripts 1 and 2 refer to the first and second period respectively and \( r \) is the interest rate. The budget constraint simply says that the present value of total money receipt either unearned (\( V \)) or earned (\( W \)) must be sufficient to cover the present value of the expenditure on consumption (\( C \)) and leisure (\( L \)) over both periods. Notice however, that there is no constraint for the worker to match receipts and expenditures at each point in time. She can borrow or lend to smooth her consumption over time. At the optimum:

\[
|MRS_{12}| = \frac{W_2}{W_1}
\]

The left-hand side of this equation is the marginal rate of inter-temporal substitution of leisure: the increase in leisure today required to keep utility constant as leisure tomorrow is reduced by one unit. The equilibrium condition states simply that this rate is equal to the ratio of wages tomorrow relative to wages today.

To get a grasp of this condition, assume that \( W_2 > W_1 \) (i.e. that wages grow as the worker ages). In this case, the increase in leisure today that is required to keep utility constant as hours of work in the future increase by one unit is greater than one. Therefore it makes sense for the worker to trade some leisure tomorrow for some extra consumption today. The model therefore suggests that as the worker's wages grow, her hours of work will increase. This might explain why middle-aged men tend to earn more and work more than younger men. Notice that the implication of the life cycle model of labour supply is that a rise in wages at a given point in time unambiguously raises hours of work. This suggests that along the life cycle the substitution effect of a rise in wages dominates the income effect. The reason for this is that while a rise in wages at a given point time, say a rise in \( W_2 \), tends to induce the worker to consume more leisure throughout
their life cycle (income effect), the worker will tend to consume more leisure (work more) when wages are higher (at time 2 in this case).

### Key terms
- Unemployment rate
- Employment rate
- Participation
- Marginal rate of substitution
- Reservation wage
- Slutsky equation
- Income effect
- Substitution effect
- Inter-temporal substitution hypothesis.

### A reminder of your learning outcomes
Having completed this chapter, and the essential readings and activities, you should be able to:

- explain the concepts of unemployment, employment and labour force participation
- define and explain the unemployment rate, the employment rate, the employment to population rate and the labour force participation rate
- define the worker’s problem as to whether and how much to work
- analyse the effect of a rise in unemployment benefits on labour force participation
- derive and discuss the labour supply problem as an inter-temporal optimisation problem.

### Sample examination questions

1. Suppose workers in country X pay proportional income taxes. What is the effect of a rise in the tax rate on hours of work and the participation decision of these workers? Suppose now that the government replaces the existing flat rate tax system with a progressive system. Discuss the labour supply effects of this reform.

2. Discuss the labour supply effect of an overtime premium equal to 1.2 the standard wage for any hours of worked in excess of 30 hours. What happens if the overtime premium is 1.5?
Chapter 3: Labour demand

Essential reading


Further reading

Background and static model


Learning outcomes

By the end of this chapter, and having completed the essential readings and activities, you should be able to:

• describe how the demand for labour is determined both in the short and the long run
• describe the effects of an increase in the wage at the firm level and at the industry level
• explain the factors that affect an industry's elasticity of demand
• explain how non-wage labour costs affect different aspects of the demand for labour.

Introduction

In Chapter 2 we analysed the motivations behind the individual decision to supply labour services to a firm. We turn now to the other side of the coin and we study the demand for labour. This is to say, we analyse how many workers a firm will decide to put on its payroll, when it will be profitable for a firm to hire new workers and when it will be more likely that workers will be fired. Although we will discuss policy issues in the next chapter, where we analyse the market equilibrium, it is worth pointing-out at this stage that many of the central questions in economic policy involve the number of workers that firms employ and the wage that these workers get paid. Such diverse policies as the minimum wage, employment subsidies, and restrictions in firing or laying off workers are attempts to regulate various aspects of the firms' labour demands.

We start this chapter by analysing the objective of the firm and what it does to achieve its objective. This allows us to set up the essential features required to analyse the demand for labour. Next, we study the determination of the demand for labour (at the firm and the industry level) when labour is the only variable input of production. The so-called short-run analysis is followed by the long-run analysis where the firm can vary all inputs, not only labour, at will. We finish this chapter by pointing out the potential importance of non-wage labour costs to the demand for labour.
The objective of the firm

Consider a company that produces some good or service, which sells at the market price. The revenue of that firm is the price of each unit of output, $P$, times the number of units produced, $Y$

\[ \text{Revenue} = P \times Y. \]

This firm produces output by using factories, machines, office space, etc. (i.e. capital) and by hiring a given number of employee hours (i.e. labour) to operate the machines and sell the good. We will summarise the production capabilities of the firm by using the following production function:

\[ Y = F(L, K). \]

Where $L$ is the total number of hours the firm hires and $K$ is the stock of capital. We will assume that no output can be produced without using some labour and some capital and that an extra unit of labour or capital increases output (i.e. $\frac{\partial F}{\partial L} > 0$ and $\frac{\partial F}{\partial K} > 0$).

The total cost of producing a given level of output for the firm is the number of hours of work it hires times its price, the wage rate $W$, plus the amount of capital times its rental price, $R$:

\[ \text{Cost} = W \times L + R \times K. \]

The objective of the firm is to choose the level of output that maximises its profits (the difference between revenue and cost). The demand for production inputs (such as capital and labour) is a derived demand, in the sense that inputs are bought and rented for the contribution that they make towards the production of the good or service that the firm sells.

The demand for labour in the short run

At the level of the firm:

We will start by considering the case where capital is in place and cannot be expanded in the short run (i.e. $K = k$). The analysis of the short run is of interest as the assumption that office space, machines and other things cannot be expanded immediately to accommodate changes in output is quite realistic. When the stock of capital is fixed, the only way to increase output in the short run is to hire more hours of work. However, it is usual to assume that the increase in output generated by an extra hour of work decreases as more hours of work are hired (i.e. $\frac{\partial^2 F}{\partial L^2} = F_{LL} < 0$). This property is called the law of diminishing returns.

In the short run, when capital is fixed, the only part of the firm’s costs that is variable is the wage bill (there is a fixed outlay equal to the cost of capital, $R \times k$). The choice of $L$, and therefore of output, that maximises the firm’s profit in the short run is obtained by setting the value of the marginal revenue of labour equal to the marginal cost of labour. If the firm takes the product price and the wage rate as given this condition can be written as

\[ \text{Activity} \]

Assume that the firm takes $W$ and $P$ as given. Obtain condition (4) by maximising firm’s profit with respect to $L$. Intuitively, the firm should hire hours of employment until the revenue of the last hour hired equals its cost. This condition is presented graphically in Figure 3.1. Why is the value of marginal productivity locus negatively sloped?
Chapter 3: Labour demand

Figure 3.1

The demand for labour is determined by solving equation (4) in terms of $L$.

(5) \[ L = L_{SR}(W, P, k). \]

As can be seen from Figure 3.2 an increase of the wage rate from $W_0$ to $W_1$ in this firm only (i.e. leaving $P$ constant) will decrease the demand for labour from $L_0$ to $L_1$ in that firm. In general, the demand for labour is downward sloping.

Activity

What happens to the demand for labour when $P$ increases?

Moreover, notice that by replacing the demand for labour in the production function,

(6) \[ Y = F(L_{SR}(W, P, k), k), \]

we obtain the supply of output in the short run.

Figure 3.2

The supply of output is decreasing in the wage rate. This can be seen in Figure 3.3. When the real wage rate is $W_0/P$ the equilibrium level of employment is $L_0$ and the equilibrium level of output is $Y_0$.

Activity

Why is the real wage rate (i.e. $W/P$) equalised to the marginal product to obtain the optimal employment level?

When the wage rate increases to $W_1$ the employment level falls (as we have seen in Figure 3.2). Therefore, the tangency of the real wage rate and the production function occurs at a lower level of employment and output, $L_1$ and $Y_1$. 
Activity
Obtain the demand for labour when the production function is \( Y = k^a L^{1-a} \). What is the effect of a wage increase on the demand for labour? Obtain the supply function for this technology. What is the effect of a wage increase on the supply of \( Y \)?

The demand for labour at the level of the industry:
What happens with demand for labour when the wage rate increases from \( W_0 \) to \( W_1 \) for the whole industry? Individually, as we have seen, all firms will be willing to reduce employment and output. The increase in the wage rate at the industry level will shift the output supply function of the industry, \( S \), to the left (which would not happen if only one firm would face a wage rate increase). If the demand for output is a negatively sloped function, \( D \), the shift in supply will increase the equilibrium price of output. We draw this process in Figure 3.4. The increase in the price of output will shift out the value of marginal product function counterbalancing some of the fall in employment. It can be proved, however, that \( P \) will rise proportionally less than \( W \) so that the effect on employment and output will not disappear completely. Therefore, the short-run demand for labour at the industry level is also negatively sloped.

Activity
Is the (absolute) slope of the industry demand for labour steeper or flatter than the firm demand for labour?
The demand for labour in the long run

At level of the firm:

Let’s consider now the demand for labour when the firm can adjust both capital and employment. The firm now wants to determine what is the combination of inputs, and therefore the level of output, that maximises profits. A graphical analysis of the equilibrium requires the definition of two terms: isoquants and isocosts. We explain these concepts and pursue the graphical analysis of the equilibrium in what follows.

The production function, equation (3), defines the minimal amount of capital and labour that are required to produce a given level of output. An isoquant is the minimal combination of capital and labour that allows the firm to produce a given level of output. We present a set of isoquants in Figure 3.5.

Activity

Do isoquants further from the origin represent lower or higher levels of output?

The slope of an isoquant, the marginal rate of technical substitution, is negative (i.e. \( \frac{MRT_{SKL}}{MRS_{LK}} = -\frac{FL}{FK} \)). If the firm reduces employee hours in one unit it must increase the capital level by some amount in order to maintain the output level constant, as both inputs are productive. The isoquants are convex to the origin (i.e. \( \frac{dMRT_{SKL}}{dL} < 0 \)) because the higher the level of employee hours the smaller is the increase in capital level required to compensate for a reduction in labour while keeping the level of output constant.

The elasticity of substitution

\[
S_{KL} = \frac{d \log (K/L)}{d \log (MRS_{KL})}
\]

characterises the degree of substitution between production inputs. The elasticity of substitution gives the percentage change in the capital-labour ratio when the marginal rate of substitution increases. When inputs are perfect substitutes \( S_{KL} = -\infty \) (L-shaped isoquant) and when they are perfect complements \( S_{KL} = 0 \) (straight-line isoquant).

Figure 3.5

The cost of using a given combination of inputs is given in equation (2). The combinations of capital and employee hours that keep costs constant, the isocost, is presented in Figure 3.6. The closer to the origin is the isocost the lower is the cost of production. The slope of the isocost, the marginal rate of transformation, is the rate at which it is possible, in the market, to trade one unit of work for one unit of capital (\( MRT_{LK} = -\frac{W}{R} \)).
Activity
What happens to the slope of the isocosts when the wage rate increases? Hint: Suppose that $R$ is equal to £1. Draw a £10 isocost when $W$ is equal to £2 and another one for $W$ equal to £3.

Figure 3.6
Which is the level of employee hours and capital that correspond to a given profit-maximising level of output $Y_0$? The combination of capital and labour that is chosen in this case is the one that minimises production costs. This occurs when the isocost is tangent to the isoquant $Y_0$. At a higher isocost the firm can increase profits by reducing costs and at a lower isocost it cannot produce the desired level of output. Of course, given a set of input prices every point of tangency between an isocost and an isoquant (that is to say, every point where $W/R = F_L/F_K$), constitutes a cost-minimising point but not every production level is profit maximising.

Formally, the choices of $K$ and $L$ that maximise profits are obtained when the value of the marginal product of both inputs equal their market prices:

\[ (8) \quad P^*F_L (L, K) = W \]
\[ (9) \quad P^*F_K (L, K) = R \]

Activity
Obtain equations (8) and (9) by maximising profits with respect to $L$ and $K$.

Of course dividing (8) and (9) gives the condition for cost minimisation and solving the system of two equations in two unknowns gives the input demands:

\[ (10) \quad L = L_{LR} (W, R, P) \]
\[ (11) \quad K = K_{LR} (W, R, P). \]

Furthermore, replacing (10) and (11) in the production function we obtain the supply function.

What are the consequences of an increase in the wage rate in one firm only\(^1\) (i.e. leaving $P$ constant) on the demand for labour and capital in that firm? The effect can be decomposed into two parts: a substitution effect and a scale effect. The substitution effect captures how the demand for the inputs changes when we leave output constant. The scale effect captures how the demand for the input changes when the scale of production changes. Note that inputs are defined as normal (inferior) when an increase in output increases (decreases) the amount used of the input. For a given output level, an increase in the wage rate will cause the

\(^1\) In the long-run equilibrium with constant returns to scale in production and perfect competition in input and output markets, firms make zero profits. Thus, an increase in the wage rate for a single firm will drive this firm out of the market and a decrease in wage for a single firm will allow it to serve the whole market. Therefore, the long-run analysis of a change in the wage rate in a single firm is of little practical interest. However, we present it here because it ties up well with the long-run equilibrium analysis at the industry level that we treat next.
slope of the isocost to increase, inducing a cost-minimising firm to replace capital with labour as shown in the movement from A to B in Figure 3.7. Notice that when the elasticity of substitution is higher (i.e. the isoquant is flatter), the substitution effect is more pronounced. (Try to draw this.)

As happens in the short run, and provided that labour is a normal input, the increase in the price of the input will reduce the level of output that maximises profits. If both inputs are normal, the scale effect will reduce the demand for both inputs (the movement from B to C in Figure 3.7). In sum, an increase in the wage rate will always decrease the demand for labour.²

**Activity**

Explain why the increase in wage rate will have an ambiguous effect on the demand for capital.

![Figure 3.7: The demand for labour in the long run at the level of the industry](image)

Now we want to study the effect on labour demand of an increase in the wage rate for the whole industry and single out the factors that determine the elasticity of demand at the industry level in the long run. As it should be clear from the problem of demand at the firm level analysed above, substitution and scale effects play an important role. However, two new factors enter the scene now. First, as we have seen in the short-run analysis, an increase in the wage rate reduces output in each firm. This will shift the output supply function. For any given supply shift, the extent of the price increase will depend on the elasticity of demand for output. In particular, if when the wage rate increases in the industry and the industry supply of output shifts to the left, the elasticity of output demand is large (in absolute value), the increase in price is relatively small and the counterbalancing effect on employment of the price increase is small.

In the second place, as the whole industry tries to substitute labour for capital the increase in the demand for capital will raise the price of capital unless the supply of capital is perfectly elastic. Thus, the smaller is capital’s supply elasticity the higher is going to be the increase in the price of capital for any shift in the demand for capital and therefore the smaller is going to be the substitution from labour to capital.

The factors that determine the elasticity of an industry’s labour demand in the long run have been summarised by Alfred Marshall in the following rules:

² If labour is an inferior input the increase in the wage rate increases the level of output that maximises profits and the scale effect reduces the use of labour as well.
The (absolute) value of the elasticity of industry labour demand increases when:

- the (absolute) value of the elasticity of output demand increases
- the share of labour in the cost of output increases
- the elasticity of substitution between labour and capital increases
- the capital's supply elasticity increases.

The rules 1, 3, and 4 should follow from the discussion above. Further, explanation of these rules is provided in the recommended readings (Borjas (2000) pp.131–34 and Ehrenberg and Smith (2000) pp.108–13). We also find them useful for the chapter on Unions.

As in the analysis of labour supply, the effect on employment of a 1 per cent change in wage is measured by the elasticity of the demand curve,

\[ \frac{d \log E}{d \log W} = \frac{W}{E} \cdot \frac{d E}{d W} \]

Is the demand for labour more elastic in the long run than in the short run? Yes. Why is that the case? There are two main explanations. First, in the long run the firm can substitute away from labour by using capital when the wage rate rises. Second, in the short run the demand for output is less elastic. Therefore, any change in the wage rate (and thus on output price) has a larger effect on employment in the long run.

### Non-wage costs of employment

The costs of an employment relationship for the firm are not limited to wages. When the firm hires a worker it must spend resources on the recruitment process (for instance on newspaper advertisements, interviews, and contracts) and in training those workers. Once there is an established ongoing relationship there are costs of keeping the payroll (e.g. producing payslips), evaluating workers and covering any non-wage benefit such as social insurance, vacations, sick days, etc. If the firm decides to terminate a relationship with a worker it can do it in two ways: it can dismiss the worker or it can lay off the worker hoping that it can recall this worker later. Either of these two alternatives may involve severance payments and advance notice of some predetermined length (e.g. 30 days). In addition, workers may decide to terminate the employment relationship themselves, this is to say to quit.

The above account of some of the costs involved in an employment relationship should highlight the fact that the decision to hire or fire workers will take into account a variety of other factors beside the wage rate. Some of the implications of these costs are the following:

- the separation between the number of hours and employees that the firm hires becomes important
- the elasticity of demand for labour is likely to be affected by the costs of recruiting and training the workforce
- the decision to expand or contract the employment level of the firm as the price of output changes is likely to be affected by employment security legislation.

You should seek further explanation of these effects by reading in the relevant sections of your suggested readings. Particularly, there is a nice treatment of these issues in Ehrenberg and Smith (2000) pp.144–63 and in Hamermesh (1993) pp.44–49.
**Key terms**

- Production function
- Revenue
- Costs
- Profits
- Short-run demand for labour
- Long-run demand for labour
- Firm-level analysis
- Industry-level analysis
- Substitution effect
- Scale effect
- Marshall’s rules
- Non-wage labour costs.

**A reminder of your learning outcomes**

Having completed this chapter, and the essential readings and activities, you should be able to:

- describe how the demand for labour is determined both in the short and the long run
- describe the effects of an increase in the wage at the firm level and at the industry level
- explain the factors that affect an industry’s elasticity of demand
- explain how non-wage labour costs affect different aspects of the demand for labour.

**Sample examination questions**

1. Suppose that a firm hires only labour, $L$, to produce output $Y$ with a production function $F(L)$. The demand for labour in a competitive labour market is given by the equality of the wage $W$ to the value of marginal product. For a firm in a competitive product market the value of marginal product is the price of the product, $P$, times the marginal productivity of labour, $F_L$. Suppose instead that a firm operates as a monopoly in the product market and define the generic demand function for the product as $P=D(Y)$.

Derive the value of marginal product in this case. Is labour demand going to be higher or lower in this case than for a firm facing perfect competition in the product market? Explain why.

2. Suppose a firm’s production function is given by $Y=4*L^{0.5}$ and its (inverse) product demand curve is $P=20-0.5*Y$. The firm can hire labour at a wage rate of £12. How many workers will the firm hire? What level of output does the firm produce? What price will it charge?

3. One reason behind deregulation in many markets like air travel, telephones and utilities was that regulation was not really effective, so that regulated firms would basically act like monopolies and deregulation would make markets more competitive. Suppose the market in which the firm in (2.) sells its product is deregulated so that
the product price falls to £15. Also suppose that deregulation does not affect the labour market in which this firm hires workers. How many workers are hired now and how much output does the firm produce? Discuss the effect that deregulation would have in the long run when the firm can also adjust its capital stock. Is the labour demand response of the firm going to be larger or smaller than in the short run?