

10 Skills and Low Pay: Upgrading or Overeducation?

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A significant development in labour markets has been the trend towards people with higher levels of education, notably college graduates, holding jobs previously held by people with lower levels of education, such as school-leavers. This chapter examines the principal explanations of the processes giving rise to this. The 'overeducation' view sees it as evidence of the underutilization of skills, which is socially wasteful. The 'upgrading' view, on the other hand, emphasizes the higher skills now required within occupations; although the job is formally the same, it now involves greater complexity. Both views, however, have pessimistic implications for the position of low-skill workers. On the overeducation view the increased supply of more educated workers pushes the low skilled into the least-favoured jobs, or even crowds them out altogether from the working population. The upgrading view sees low-skill workers as increasingly marginalized as their skill levels no longer meet the minimum requirements of the labour market. In the literature it is often assumed that this bumping-down process results from rigid markets in which so-called job competition regulates allocation. We will show, however, that even in a perfect market, with wage competition, bumping-down might result. Crucial for these processes are the elasticities of demand for each skill level and elasticities of substitution between skill levels. Interpretation of these developments is crucial for public policies towards education and training. In the case of bumping-down, additional investment in education is not effective. Upgrading, on the other hand, requires an increase in educational investment. However, training that increases educational levels below those where upgrading tendencies occur only further stimulates the process of bumping-down.

One of the first studies to put forward the pessimistic view was Freeman's *Overeducated American* (Freeman 1976), in which he suggested that students were overinvesting in education. Acting on out-of-date information about the labour market, they expected good job prospects after graduation. In reality, however, the increasing supply of more highly educated people could not be absorbed by the market, forcing many college graduates to accept a job requiring fewer skills than they had actually obtained. The trend towards graduates taking jobs previously held by people with lower qualifications is, therefore, often associated with (i) overinvestment

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in education, (ii) a waste of acquired knowledge, (iii) a decrease in pay for the skilled. Furthermore, (iv) these underutilized workers who occupy jobs below their educational level take away jobs appropriate for lower-skilled workers. This leads to (v) a 'bumping-down' process in the labour market, ultimately pushing low-skilled workers into low-paid jobs, or crowding them out of work altogether.

In contrast to this rather negative picture, the importance of knowledge in our society is increasingly emphasized in both academic and policy debates. This discussion perhaps begins with Leontief (1953), who suggested that it was not physical capital endowment, but rather its endowments in terms of skills, that explained the apparently paradoxical trade pattern of the USA. Recently the European Commission (1996) has claimed that education and training should be a priority for European competitiveness, and suggested that material investment and investment in training should be treated on an equal basis. Similarly the OECD (1996*b*) notes that 'OECD governments are strongly committed to improving the skills of their citizens as one of the principal means for dealing with current economic uncertainty'. As with technological progress, productivity growth may be obtained by the input of more skills into the production process—that is, an upgrading of the skill level of the labour force. According to Porter (1990), human capital will become the decisive factor in international competitiveness. Recent economic literature focuses on the causes of this upgrading in the technology versus trade debate in particular (e.g. Wood 1994; Machin, Ryan, and Van Reenen 1996).¹

The overeducation versus upgrading debate is related to the debate on the development of the skilled-to-unskilled wage gap (e.g. Davis and Reeve 1997; Johnson 1997; Topel 1997). The upgrading of required skills is often cited as a major cause of the increased earnings differential between high- and low-skilled workers (e.g. Bound and Johnson 1992; Katz and Murphy 1992), whereas others explain the increase in wage inequality in countries such as Sweden and the Netherlands by an overeducation of the workforce (e.g. Muysken and ter Weel 2000). In a perfect market this link between the demand for educated labour and wages will hold, but, as will be shown in this chapter, where there is market failure an overeducated workforce does not necessarily lead to a narrowing of the earnings differential. Low wages for high-skilled workers who are overeducated for their job may occur alongside high wages for those with a level of education appropriate to it. Furthermore, formal qualifications may not represent a constant level and mix of skills over time. Screening theory (Lang 1994; Weiss 1995) suggests that increased enrolment may result in a reduction in the average ability of graduates, while Grogger and Eide (1995) explain part of the rise in the college premium by increased skills among graduates.

Although very different in character and policy implications, the overeducation and upgrading views share important empirical evidence about the role of skills in the

¹ This 'technology versus trade' debate also focuses on the explanation of the shift in demand towards the high skilled. This debate, however, deals particularly with the question of the extent to which this shift can be explained by changes in the industrial structure of the economy, while the 'upgrading versus overeducation' debate focuses on the explanation of the changed allocation of skills within occupations.

labour market. First, both views are consistent with the tendency for higher-educated people to obtain jobs previously held by lower-skilled workers. From the overeducation perspective, this illustrates the underutilization of skills, while from the upgrading view it illustrates the higher skills now required within occupations. Secondly, both views are pessimistic on prospects for low-skilled workers. From the overeducation perspective, low-skilled workers will be pushed into the least-favoured jobs, or even crowded out from the working population, irrespective of their real abilities or potential productivity, whereas the upgrading view predicts that low-skilled workers will become more and more marginalized, as their skill level no longer meets the minimum requirements of the labour market.

Knowledge about the allocation of skills across occupations will, therefore, not provide a direct answer to the questions on the role of skills in the labour market. To establish the significance of education and training for economic progress and for the position of low-skilled workers in the labour market, a better understanding is needed of the skills that people have and the way they utilize these skills in work. Unfortunately, much less is known about how workers' productivity is related to the way in which they use their skills than is known about the allocation of workers in the labour market. Because of the difficulty of measuring skills, the evidence available remains limited on the one hand to detailed case studies, and on the other hand to rough indicators of skills representative of the labour market as a whole.

The upgrading and overeducation views have opposite implications concerning the effectiveness of further investment in education and training, indicating that it is extremely important for policy purposes to gain a better understanding of the way in which an increase in the human capital investments of low-skilled workers is absorbed into the labour market. Whether additional investments in education and training are required because of upgrading within occupations or whether they lead only to overeducation of the workforce links naturally with debates about the way the labour market functions. Upgrading is associated with the neoclassical view in which additional skills are automatically rewarded by the market. Overeducation is associated with market failure, in which wages are insufficiently flexible and allocation is far from efficient.

We will show that the issue of the 'macro-efficiency' of further investment in education and training is not in the first instance related to the efficiency of the market. The effects of educational investments depend on specific characteristics of the segment of the labour market concerned, such as the elasticity of demand for each occupation and the substitutability between different skill levels within each occupation. We will show that even in a perfectly functioning market low elasticities of demand may lead to a bumping-down process, while, on the other hand, limited substitutability between skills might urge the need for an upgrading of the skill level of the labour force. Market failures bring a further level of complication, but only in addition to this.

Many advocates of the promotion of skills to combat the alleged increase in international competitiveness in a knowledge-intensive economy regard it as the role

of government to stimulate the acquisition of skills. This illustrates that even proponents of the upgrading view acknowledge market failures. Moreover, although the differing explanations for the shift of higher-educated people towards low-level jobs are analytically in competition, in practice both processes may simultaneously be changing the labour market.

Effective policy formulation requires assessment of the macro-efficiency of investment in education and training. The aim of this chapter is to discuss the effects of changes in supply and demand on the utilization of skills, and the way in which shifts in the skill structure of employment influence the effectiveness of policies on education and training. We first examine what determines the optimum level of education for a job and the different ways underutilization is measured in economic literature. We develop a typology of economic theories on the possible causes and consequences of the observed changes in the allocation of skilled labour, and their policy implications in regard to the (macro)-efficiency of training for the low skilled.

The remainder of the chapter is organized as follows. Section 1 examines the meaning of the skill level of a job. By comparing the occupational productivity profile with the education-wage profile, it will be shown that the optimal skill level in an occupation can be viewed as an interaction between potential productivity in the occupation, on the one hand, and supply and demand developments in the labour market, on the other. The measurement of underutilization of skills is discussed in Section 2. Three different approaches to the measurement of underutilization can be distinguished in existing research. These are discussed in the light of the investigation of the optimal skill level, with empirical examples. Section 3 gives an overview of possible causes of shifts in the educational structure of occupations, presenting different theories that explain the movement within jobs towards the employment of higher educated, with their consequences for both higher- and lower-skilled workers. Finally, Section 4 concludes with a discussion of the implications of the various theoretical points of view for the macro-efficiency of training policies for low-skilled and low-paid workers.

1. What is the Right Level of Education for a Job?

In everyday language it is common to state that an occupation requires a certain level of education. In this simple picture of the relationship between education and work it is implicitly assumed that jobs at a given level cannot be performed by a worker with lower qualifications: the productivity of the latter is zero. On the other hand, people with higher qualifications than are required are thought to waste their excess qualifications: their productivity in a job below their educational level equals the productivity of workers with only a sufficient educational background for the job.

Many empirical studies, however, question this rigid interpretation and suggest a looser relationship between productivity and educational background. Hartog and Jonker (1998) provide an overview of many empirical studies that show a gradual, non-linear relationship between the education level of workers and

Table 10.1. Hourly wages by job level relative to 'adequate match' by education in the Netherlands

Relative job level	Level of education				
	Lower	Extended lower	Intermediate	Higher vocational	University
Below	—	0.063 (1.68)	0.288 (7.80)	0.508 (11.05)	0.536 (11.04)
Equal	—	0.170 (6.04)	0.440 (10.49)	0.607 (15.77)	0.860 (14.19)
Above	0.115 (2.65)	0.330 (8.30)	0.478 (10.35)	0.829 (10.52)	—

Note: *t*-values in parentheses.

Source: Hartog (1985).

productivity.² This is illustrated in Table 10.1, which shows for the Netherlands the wage effects of (mis)match between the job level and the level of education of workers. The productivity (wage) of a worker with a given level of education increases with the level of the occupation. In most cases the productivity of higher-educated people in lower-level jobs exceeds the productivity of the lower educated at the same job level. (Academics are an exception to this.) In general the extra earnings for a job above the worker's educational level are less than the lost earnings in jobs below it. Hartog tests whether the influences of education and occupational level on the wage are additive, but rejects this hypothesis. This suggests the existence of comparative advantage, with educational levels keying into appropriate job levels.

1.1. Occupational Productivity Profiles and the Education–wage Profile

In assignment or matching theory as introduced by Roy (1950, 1951) and Tinbergen (1956, 1975), the productivity associated with a given level of education becomes specific to each occupation, and therefore the relationship between productivity and level of education, which we denote the 'occupational productivity profile', varies

² All empirical results that demonstrate this gradual non-linear relationship between education and productivity are based on the assumption that wages reflect productivity. The neoclassical law that productivity equals wages assumes, however, an optimal allocation of workers over the jobs. Since these analyses try to catch the consequences on productivity when allocation is changed, and therefore compare people with the same qualifications in jobs at different levels, this assumption is violated. Although illustrative of the idea that productivity depends on allocation, the estimates are in fact based on an inconsistency. Neoclassical theory would state that either workers with the same educational background are indifferent between jobs at different levels—e.g. because the wages are equal in each job—or that there must be differences in skills between these people with a formally equal qualification. More insight is therefore needed about the way in which skills differences influence allocation and productivity.

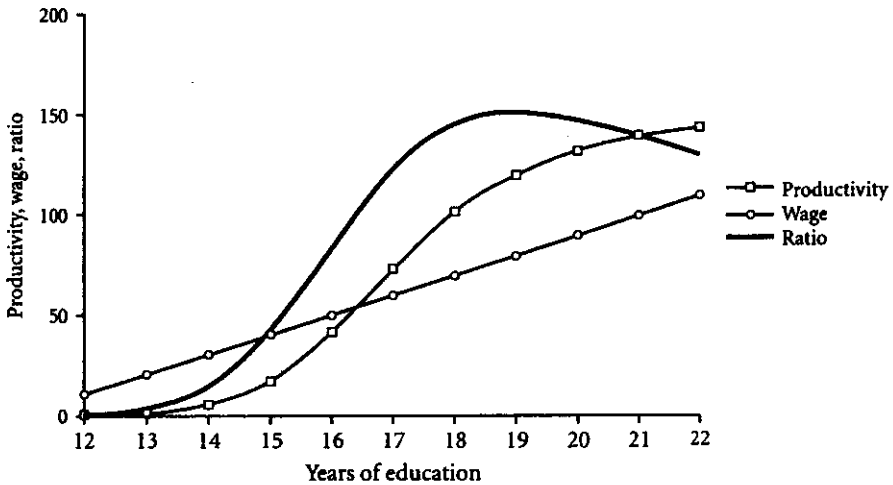


Fig. 10.1. An occupational productivity profile, and an education–wage profile, together determining the optimal skill level for a specific occupation

across jobs. In a perfect labour market, by contrast, the relationship between the wage and level of education, the ‘education–wage profile’, is equal for all occupations, and varies only with developments in the labour market as a whole.

Fig. 10.1 illustrates these relationships for an individual occupation, with occupational productivity profiles as introduced by Knight (1979). In this example the education–wage profile increases linearly with the level of education, while productivity rises sharply around fifteen–eighteen years of schooling. With low years of schooling, productivity is low and remains below the rising wage. At high levels of schooling again the additional productivity of one further year of schooling does not compensate for the increase in the wage. The ratio between productivity and the wage shows that workers with nineteen years of schooling provide the optimal combination of productivity and wages.

Fig. 10.1 also shows that, although the productivity/wage ratio reaches its maximum at nineteen years of schooling, it takes only modestly lower values at eighteen–twenty years of schooling. This might imply that employers are more or less indifferent between people with educational backgrounds within this interval. This is confirmed by the way the US Bureau of Labor Statistics indicates the educational requirements for an occupation, in terms of ‘at least this level, but some/may employers prefer . . .’ (BLS 1985).

Fig. 10.2 gives an alternative representation, showing a job characterized by an occupational productivity profile that increases continuously with the level of education. The education–wage profile rises very similarly. As a consequence, employers will be almost indifferent to the exact amount of human capital which an employee brings, within the range of fifteen–twenty-two years of education. Empirical research

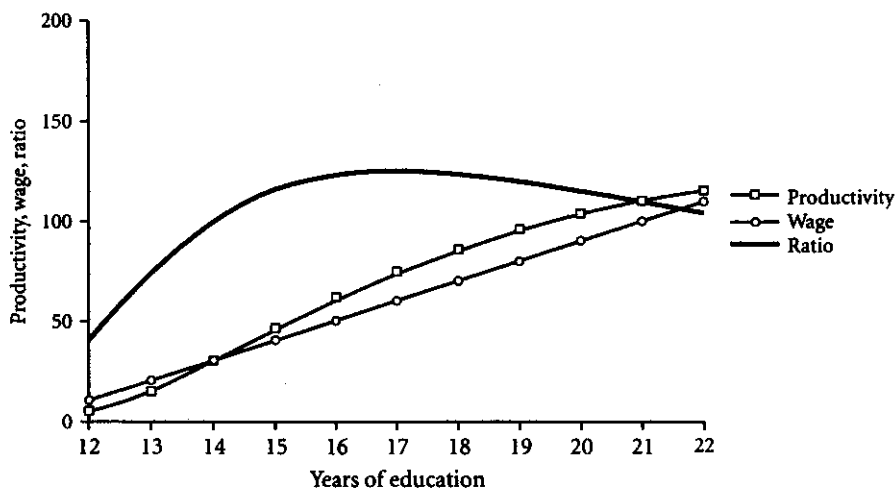


Fig. 10.2. An occupation in which productivity and wages increase proportionally with the skill level

shows that there are indeed occupations in which people of differing educational levels are employed. Borghans, De Grip, and Smits (1997) show that, while jobs such as the lower-level occupations in the printing and chemical industries are matched exclusively to one educational level (Intermediate Vocational Education), other occupations such as lower technical, industrial, and transport occupations seem to allow for a wide variety of educational levels. It is important to note that, although employers may be indifferent between workers with an educational background within this interval, productivity will not be equal for all workers in this group. Workers with more education are more productive, but also have higher wage costs. Within the indifference interval, however, productivity increases proportionally to the wage. Allocation theory suggests that the higher educated handle work differently, or perhaps carry out the more complicated tasks, and therefore are more productive than their colleagues with lower qualifications.

Although the education–wage profile has been introduced in Figs. 10.1 and 10.2 as exogenous, in neoclassical theory it has to be regarded as the outcome of an equilibrium process. Given the wage structure in the overall labour market, it is possible to determine the required educational level and the demand for workers in each occupation. Therefore the aggregate demand at each educational level can be determined. If supply is assumed to be given—that is, participation does not depend on the wage—this aggregate demand for workers at a particular educational level might differ from the supply. Educational levels with excess supply will face falling wages, while those for which demand exceeds supply will show wage increases. The adjustment of wages will ultimately lead to an equilibrium of supply and demand for each educational level. Teulings (1995) estimates such a model in which wages and allocation are investigated simultaneously.

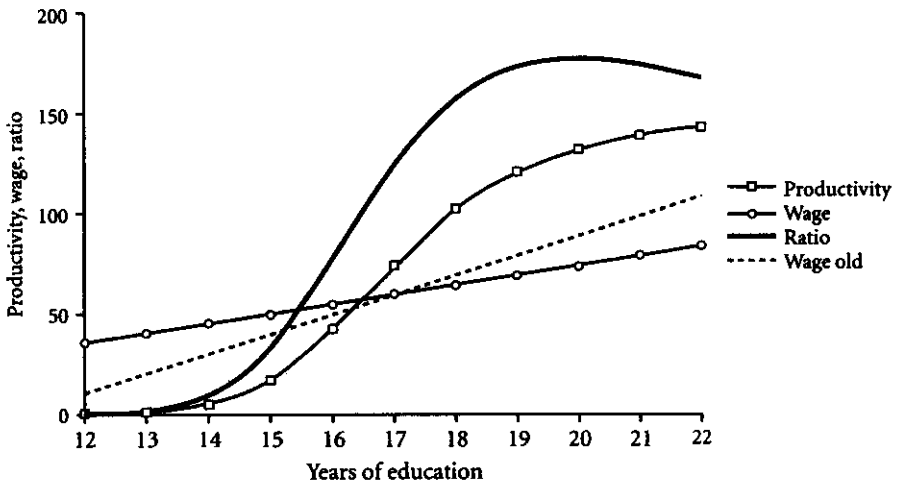


Fig. 10.3. A shift in the optimal skill level of an occupation owing to a shift in the education–wage profile, caused by changes in demand or supply

The education–wage profile in this equilibrium indicates the returns to education. For each additional year of schooling it provides the additional wage an employee can expect. If students anticipate these returns properly, their educational investment decisions will adjust to these returns to education. If some levels of schooling exhibit low returns, fewer students will invest in them, raising the returns again. Assuming a perfect market for education in which students perfectly foresee the returns on their human capital investments, the capital market is not restricted and the only benefits from education are the returns in the form of future wages, then the education–wage profile will become approximately linear with a slope that depends on the discount rate.³

1.2. Shifts in the Education–wage and Occupational Productivity Profiles

Allocation theory provides an explanation of a specific educational level being ‘required’ for an occupation. It refers to the match that is optimal given production possibilities and the supply of labour. This required level is not fixed but will be changed by shifts in the education–wage profile (owing to changes in occupational demand or in supply at that educational level) or to changes in the occupational production profile due to technological or organizational developments.

A change in the optimal skill level owing to a shift in the education–wage profile is illustrated in Fig. 10.3. Compared to Fig. 10.1 the optimal level of education increases

³ Since more education will also shorten the period in which returns are obtained, the slope will rise slightly with years of schooling. Borghans (1993) discusses the effects on educational decisions of imperfect information about the returns; Kodde (1986) analyses the impact of constraints in the capital market, and Oosterbeek and Webbink (1995) discuss the impact on educational decisions from a consumption effect of education.

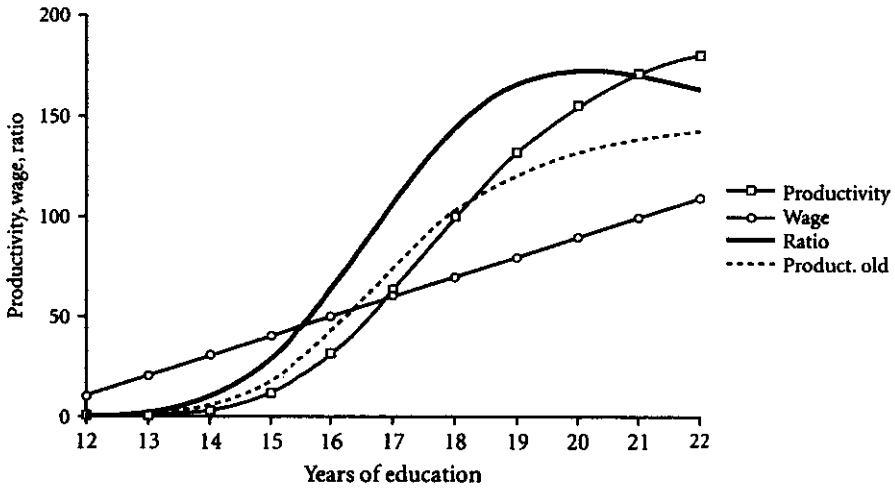


Fig. 10.4. A shift in the optimal skill level of an occupation owing to a change in the occupational productivity profile, caused by the introduction of new technology

from nineteen to twenty years of education. Fig. 10.4 shows the effect of a change in the occupational productivity profile on the optimal skill level. Compared to Fig. 10.1 the optimal level of education in this occupation again increases from nineteen towards twenty years of education.

Both the change in the supply of educated labour, which results in lower wages for the higher educated, as shown in Fig. 10.3, and the change in the occupational productivity profile, as shown in Fig. 10.4, result in a situation in which people employed in this occupation have a higher educational background than previously. Such a shift might easily be associated with overeducation or underutilization. However, in Fig. 10.3 the flattening of the education–wage profile (excess supply of higher skilled workers) has increased the optimal level of education in the occupation concerned. This figure therefore illustrates the overeducation view. However, the figure also shows that this does not mean that the more highly educated workers employed in this occupation do not utilize their extra skills; their productivity in this occupation is higher than the productivity of the workers with fewer years of education. Furthermore, given labour market conditions, it is not possible for them to reach a higher level of productivity.

Fig. 10.4 illustrates the upgrading view. Here a change in the production process owing to technological or organizational developments increases the demand for more highly educated workers. This means that more highly educated workers will be employed in this occupation, which used to be the domain of people with lower qualifications. The productivity of these higher-educated workers will, however, not be lower than the productivity they have, and used to have, in their traditional

occupational domain. The new technologies have opened up opportunities to utilize the education of these people productively in these new jobs as well. Therefore there is no underutilization of their level of qualification.

Thus, allocation theory can explain the tendency for more highly educated people to occupy jobs that used to be held by the lower educated, from both a supply side and a demand-side perspective. Within this neoclassical framework, skills are always utilized optimally, given labour market conditions. In fact three grades of underutilization of skills can be distinguished:

- First, a worker may be employed in a job where people of his educational background used to have lower productivity than in their original occupational domain, but where productivity is now at least equal to the productivity in this original domain. This is the case when upgrading occurs, and one can speak only of *alleged underutilization* of skills.
- Second, a worker may be employed in a job where he has lower productivity than people of his educational background used to have, but which equals their current productivity. This occurs in a situation of excess supply on a perfect labour market and might be called *inter-temporal underutilization* of skills.

Overeducation is, however, generally associated with underutilization of skills in a labour market that is far from perfect, and where part of the workforce with a given skill level is occupied in jobs where they are less productive than others; therefore

- Third, workers may be employed in a job where they have lower productivity than other people with the same educational background currently have. This is *genuine underutilization* of skills, and is not explained by allocation theory.

2. How should Underutilization be Measured?

As both the overeducation ('bumping-down') and upgrading views are consistent with the stylized fact that people with higher education levels are being appointed to jobs previously held by lower-skilled workers, these views are difficult to distinguish empirically. This problem is increased by the fact that, despite the large number of empirical studies, the measurement of underutilization of skills is far from straightforward. Moreover, various terms are used to describe essentially similar situations (Shockey 1989). Thus skill underutilization, overeducation, overqualification, underemployment, overtraining, and occupational mismatch are often used interchangeably.

Underutilization is most simply defined as a level of educational attainment greater than the requirement of the occupation in which the person is employed.⁴ However the previous section has shown that it makes no sense to speak about a 'required level'

⁴ Exceptions are the studies of Sloane, Battu, and Seaman (1996) and Borghans and Smits (1997), who distinguish different levels of underutilization.

of education for an occupation. Harvey, Moon, and Geall (1997) suggest that the distinction between graduate and non-graduate jobs is artificial, because graduates alter the nature of a job. Further, technological change and shifts in demand may also alter the relative demand for different levels of skills within an occupation. It has been argued that employers hire educated workers for jobs with lower educational requirements precisely because the more educated are more productive and reduce the cost of training (Sicherman 1991). This recognizes the fact that education is only one form of human capital and one that can be substituted for on-the-job training to the extent that more-educated workers take a shorter period of time to become fully proficient.

A study by Mason (1997) of engineering supervisors in the USA and Britain finds that only 20 per cent of production supervisors in British plants were graduates compared to 35 per cent in the USA. However, British managers recognized several advantages in employing graduate engineers alongside traditional supervisors trained on the shop floor. For example, graduates were better at utilizing computer systems and keeping up to date with technological developments. They played a key role in planning and implementing new work systems, and had the ability to combine the previously separate roles of manufacturing manager (usually office rather than shop-floor based) and production supervisor. This kind of evidence again suggests that more highly educated workers perform differently within an occupation, leaving open the question whether this can be viewed as underutilization.

Many empirical studies suggest, however, that a substantial proportion of workers do not fully utilize their skills, being employed in jobs for which lower skills would be sufficient. Their productivity is, therefore, lower than it would be in appropriate jobs. This is what we call underutilization of skills. Since it means that at least part of the potential productivity of the labour force is not utilized, it can be compared with unemployment. The International Labour Office (ILO 1996) therefore speaks about workers being 'underemployed' in a situation where similar people hold more productive jobs; underutilization is then treated on an equal basis with part-time unemployment.

To support the claim about the underutilization of skills, measurement is needed. However, direct measurement of the way in which people organize their work and thereby utilize their skills is rare. An interesting example of such research is provided by Stasz (1998). Using extensive observations of people at work, she draws conclusions about the role of competences such as problem solving, communications, and teamwork at the workplace. Mason, van Ark, and Wagner (1994) and Lam (1996) also provide interesting detailed studies of the utilization of skills. Studies such as these require large resources, however, and therefore can never provide a complete picture of developments across the labour market. To obtain a more general view on the developments in skill utilization indirect methods are needed.

There are three main alternative measures of underutilization. The *objective measure* involves systematic evaluation by professional job analysts, who attempt to specify the level and type of education required in particular occupations. The best-known source of data of this sort is the Dictionary of Occupational Titles

(DOT) established by the US Employment Service and used in a number of studies of overeducation. On this approach a job is analysed in two different establishments in one state and then in two different establishments in another state. Worker characteristics are assessed in terms of six components: training time, aptitude, interest, temperament, physical demands, and working conditions (see Rumberger 1981). The US Department of Labor's (1972) *Handbook for Analysing Jobs* shows that the training time requirements are derived from two questions. The first asks the level of general education necessary to give the worker the background knowledge required to perform the work. The second asks the duration of the vocational training required for a worker with a specified level of educational attainment to become fully qualified on the job. European equivalents to DOT are few and far between. One is the ARBI-code developed by the Dutch Department of Social Affairs (*Arbeidsvoorziening beroepsin-deling* (employment services occupational classification)); this involves a classification into seven levels of job complexity ranging from very simple work with a training time of a few days (level one) to work on a scientific basis at level seven (Hartog and Oosterbeek 1988). The classification takes into account both the job content and the employee's ability and knowledge in attaining the required level of proficiency.

The second approach is based on worker self-assessment and can therefore be referred to as *subjective assessment*. Examples include the question in the Michigan Panel Study of Income Dynamics that asks 'How much formal education is required to get a job like yours?', or the question in the British Social Change and Economic Life Initiative (SCELI) data set that asks 'If they were applying today, what qualifications if any would someone need to get the type of job you have now?' In similar vein, Green and his colleagues (2000) distinguish 'credentialism' from underutilization of skills. Credentialism occurs where an employer requires a certain level of skills although these are not utilized. Workers with an appropriate level of qualifications are simply not recruited. A slightly different variant is the Spanish Living and Working Conditions Survey of 1985 (*Encuesta de Condiciones de Vida Trabajo (ECVT)*), which has been analysed by Alba Ramirez (1993). This includes two separate questions. The first asks 'Considering the job you do, how long would it take someone with the required education, who begins the job, to do it correctly?' Such periods of time may be interpreted as on-the-job training requirements, but may be influenced not only by the complexity of the job, but also by the ability of the individual. The second question in the ECVT survey, asks 'What kind of education does a person need in order to perform the job?' This recognizes the possibility that there may be a distinction between the actual requirements of the job and the customary hiring requirement. This is consistent with the screening hypothesis that suggests that the labour market is characterized by imperfect information and education is used as a signal to identify to employers the more able, ambitious, or productive workers. Finally, some data sets may allow for the fact that there is no unique educational requirement—for example, asking for minimum entry requirements. As Hartog (1997) notes, the above definitions are clearly different from one another, but they may not necessarily be perceived as such by the respondents.

The third approach focuses on the distribution of educational qualifications within an occupation. Most commonly underutilization is defined as a level of education more than one standard deviation above the mean, and undereducation as a level of education more than one standard deviation below the mean (see e.g. Verdugo and Verdugo 1989). This so-called *empirical method* clearly differs from the measures above in defining underutilization as being substantially underutilized. Borghans, de Grip, Smits, and Zuurbier (1997) formulate criteria that allow the identification on an empirical basis of a range of skill levels as appropriate.

It is clear that the above approaches to the measurement of underutilization of skills can lead to divergent estimates. All three have been criticized on various grounds. As Hartog (1997) notes, conceptually the job analysis approach has the advantages of being objective, and having clear definitions and a detailed measurement methodology. Yet there are a number of sources of potential bias. First, estimates of mean years of required schooling in an occupation are constructed by aggregating various jobs within that occupation, ignoring the fact that there is likely to be a distribution of required education across those jobs. Some workers may, therefore, be misclassified as overeducated as a result of variation within the occupation in job-specific schooling requirements (Halaby 1994). Second, required schooling levels may vary for each occupation according to the abilities of incumbents. As Rumberger (1987) and others have pointed out, workers with higher levels of ability may require fewer educational qualifications to perform tasks effectively. Education and ability are substitutes. Third, converting job scores, as in the DOT approach in the USA, into years of schooling is far from uncontentious, though in European studies that use educational dummies this sort of problem may be avoided. Fourth, levels of education ignore the type of education received and some workers who are mismatched may be misclassified. As Halaby (1994) puts it, 'if plumbing requires a high school diploma then plumbers who work in any occupation requiring a high school diploma would be classified as matched even if plumbing skills are not used in the work'.

Most important, however, is that, fifth, such studies make the assumption that the educational requirements of occupations are fixed, whilst in practice both tasks and the required level of knowledge alter over time (Smith 1986). Since the objective method is very expensive and time-consuming, occupational classifications become available long after they have been measured, and are typically used for a very long time period, assuming no changes in the required level. However, as explained in Section 1, the optimal level of skills for an occupation depends on market forces, and is changed by technological and organizational developments. Measurement of changes in underutilization based on the objective method therefore includes shifts in the optimal level. In practice, the objective method picks up all three forms of skills underutilization distinguished in Section 1 and is not able to separate real from alleged underutilization of skills. It is, therefore, not surprising that it tends to produce high levels of underutilization of skills and also strong increases in these levels. Indeed, a study by Van der Velden and van Smoorenburg (1997), comparing the results of the objective and the subjective methods on a Dutch data set,

finds that the job analysis method systematically overestimates the actual level of underutilization.

Worker self-assessment has been criticized as subjective, and it is claimed that workers may not have a clear insight into the actual level of education required. For example, they may be inclined to overstate the requirements of their job in order to enhance their perceived status. Stasz (1998), however, found that employees report the actual skill requirements much more accurately than employers. By contrast with the job analysis method, workers will be able to identify their own job rather than the occupation in general. Furthermore, workers may report changes in job requirements as soon as they show up. The method therefore might have clear advantages for measuring pure developments in underutilization, without incorporating biases due to changes in the optimal levels of skills within an occupation. Given a suitably worded question, correctly understood and accurately reported by the worker, the subjective measure reflects genuine underutilization of skills. There is, however, a severe risk that workers relate their situation to productivity standards from the past. In that case the subjective measure would adjust only gradually to new allocation equilibria and tend towards a measure of inter-temporal underutilization of skills. Employees might furthermore simply state current hiring standards. Any tendency to credentialism may be underestimated by the subjective method.

The empirical approach has the advantage that it takes the theoretical foundation of allocation theory as its point of departure. When the labour market functions reasonably well, it might be expected that the majority of workers within an occupation will have an appropriate educational background. Moreover, this approach will be very sensitive to labour market conditions and technological developments, picking up changes in skill requirements quickly. Ideally, the method therefore reflects genuine underutilization of skills. Measurement based on the labour force as a whole might be hampered by stickiness of existing work contracts, leading to some elements of inter-temporal underutilization being included. However, based on information about school-leavers or other new matches on the labour market, the information might be very responsive to new allocation equilibria. Another advantage of this method is that it incorporates the possibility that a range of educational levels is appropriate for a given occupation, as in Fig. 10.2. The empirical method will therefore do a good job in identifying the appropriate level of education for a particular occupation and changes in it. The demarcation line between adequate levels and levels at which underutilization occurs will, however, be largely arbitrary, since the method is based on criteria of frequency. If underutilization occurs more than only incidentally the method might therefore fail, while furthermore it will not provide very precise measures of the degree of underutilization.

It can be concluded that, although it seems to be clear that occupations that used to be occupied by lower skilled workers tend now to be occupied by people with higher levels of education, it is not evident to what degree this really indicates underutilization of the acquired skill level. Therefore, empirical information about such trends has to be treated with care.

3. The Shifting Allocation of Skilled Labour: Causes and Consequences

To assess the likely consequences of a policy of education for the low skilled, we need to know the reasons for the shift in employment towards the higher skilled. This section will therefore discuss theories explaining this observed tendency and their implications for the labour market position of both higher- and lower-skilled workers.

In Section 1 the concept of the optimum level of education for a job was analysed in order to provide a benchmark for the measurement of skill utilization. It was shown that even in a perfect labour market, where workers with different skill levels are allocated optimally, changes in the matching of workers with jobs might occur. Theories that explain the shift of higher-educated workers towards jobs that used to be held by less-educated workers can therefore be distinguished in two groups: theories within the framework of allocation theory and theories that claim that the actual allocation deviates from the optimum of allocation theory. In the first group three explanations for shifts in the employment structure are possible. First, they may be caused by changes in supply and demand for different levels of education or, second, by technological progress, expressed in a changing occupational productivity profile. Section 3.1 will focus on changes in supply and demand, while in Section 3.2 the process of upgrading will be discussed. A third explanation that does not violate the essence of allocation theory can be found in the heterogeneity of workers with the same formal educational level. This will be discussed in Section 3.3.

Although the allocation model seems able to explain both processes of bumping-down and upgrading, there is empirical evidence of deviations from the optimal allocation of labour. These deviations have serious implications for the interpretation of developments in the educational structure in the labour market. In Section 3.4 the consequences of screening in the labour market are discussed. Section 3.5 continues with efficiency wage theories. In Section 3.6 inflexible wages will be discussed. The theoretical positions elaborated in these sections will be illustrated by some stylized facts from the UK and the Netherlands. Finally, in Section 3.7 a typology of the various theories on the causes and consequences of the shift of the occupational domain of high-skilled workers will be given.

3.1. *Increasing Supply or Decreasing Demand for the Higher Educated*

In allocation theory, described in Section 1, the allocation of people with different levels of education is regulated by the balance between the higher wages and the increased productivity of the higher educated. The relative wages of the various levels of education reflect their scarcity. Changes in the supply of skills or demand for occupations will therefore influence wages and the allocation of workers over the occupations. If supply of the highest educational level goes up, or demand for the jobs they are initially matched to goes down, the optimal match of these people will shift towards the lower level occupations. As they become relatively cheaper,

employers with jobs that 'require' lower levels of education will consider the higher educated as a serious alternative, as soon as their wages are low enough to be compensated by the higher productivity that their education will bring. Also employment opportunities within their traditional occupational domain will increase as costs fall. The extent of the increase in employment in their own occupational domain depends on the elasticity of demand in the relevant product market. Assuming that this elasticity is low, the wage of the higher educated will decrease until there is sufficient demand from the lower-qualified jobs for which they become attractive. Workers with higher education levels will therefore occupy part of the market in jobs at one level below their own skill level. As a consequence, demand for workers with this lower skill level will fall. This effect is likely to be amplified owing to the higher productivity of the more educated workers. The decrease in demand at the lower educational level will also push down wages there. This will lead to a chain of shifts in the occupational domains, that can be typified as a process of bumping-down.

If the wage elasticity of demand is low in all markets for educated labour, this wave will be transmitted to the lowest part of the labour market. The lower the wage elasticities of demand for the various levels of educated labour, the more severely this tidal wave will ravage the lowest part of the market, resulting in either very low wages or high unemployment for low-skilled workers. If the demand for unskilled labour is elastic, an increase in this unskilled work, with very low wages, will result. If demand is inelastic or if a minimum wage hampers wage adjustment, unemployment will result. Note that productivity does not go down because these workers have lower skills, but because the market value of their skills has gone down owing to competition with more educated workers. The above shows that even within allocation theory it is possible to explain a process of bumping-down, leading to increased low-paid jobs or unemployment for the least skilled.

In the case of an inelastic labour demand any exogenous decrease in demand, for high- or low-skilled jobs, will be transmitted to the lower part of the labour market. Empirical research has indeed shown that the unemployment rate among lower-skilled workers is very sensitive to the business cycle. Teulings (1990) provides unemployment figures by skill level for the Netherlands in 1979 and 1985, shown in Table 10.2.⁵ In 1979 total unemployment was relatively low, while in 1985 the economy was in a deep recession. The table shows that the low skilled are indeed hurt much more by this recession than those with higher levels of education. Teulings (1990: 200) states that these results show that actual labour market dynamics deviate from those of neoclassical theory: 'in a standard neo-classical model of the labour market there is no room for unemployment. Wage flexibility guarantees supply to be equal to demand in every market segment.' The main difference between Teulings's 'standard neoclassical model' and the matching theory presented here is the endogeneity

⁵ A more recent overview of unemployment rates by level of education indicates that in various OECD countries the unemployment rate for low-skilled workers is still much higher than the unemployment rate for high-skilled workers (see Glyn and Salverda, this volume).

Table 10.2. Unemployment by level of education in the Netherlands, 1979 and 1985 (%)

Education level	Unemployment	
	1979	1985
Lower	6	24
Extended lower	3.2	14
Intermediate	2.2	7.6
Higher vocational		6.3
University		6.2
Total	3.2	12.7
In persons × 1,000	167	751

Source: Teulings (1990).

of the optimal match between the different levels of education and occupations. Teulings assumes that every level of education has its own occupational domain and thus supply and demand always have to equilibriate within this domain.

3.2. Upgrading

The alternative explanation that allocation theory offers for the movement of people with a given level of education towards lower-level jobs in the employment structure is the upgrading of the skills required in these jobs. Suppose that the occupational productivity profile changes in one specific occupation: productivity goes up, owing to the introduction of new technologies. Spenner (1985: 126) describes this as 'the logic of industrialisation [that] involves a division of labour that evolves along the lines of greater differentiation and efficiency. Technological change raises productivity, requiring a broader variety of skills and higher average skills from the work force.' As a consequence, within an occupation that faces an increase in complexity, the optimal level of education will go up, even if wages for this group rise owing to their increased scarcity. Murnane, Willett, and Levy (1995) indeed find that the market value of cognitive skills has been rising. Empirically this will lead to an increase of employment of these higher-educated people in jobs that were formerly occupied by lower educated. Since the new technologies imply increased productivity, employment may, furthermore, be reduced within the occupation if product demand is inelastic.

Wages will increase for the level of education concerned. For workers in the educational level that has lost this occupational domain, demand will fall, *ceteris paribus*. Again assuming a low elasticity of demand, their wages will go down. These lower

Table 10.3. Qualifications required in Britain, 1986 and 1997 (%)

Educational level	1986	1997
High level	20.2	23.8
Level 3	15.3	13.3
Level 2	18.5	21.4
Level 1	7.7	8.9
None	38.3	31.4

Source: Green *et al.* (2000).

wages might make them competitive again with the higher educated who took over their jobs, or might lead to a changed match of these skill levels with jobs at a further lower level of qualifications. Therefore these groups will also be observed occupying jobs previously occupied by lower-qualified workers. While upgrading means an improvement in labour market position for the skill levels directly affected by the changed occupational productivity profiles, for lower-educated workers the effects are equivalent to the situation of decreasing demand described in the previous subsection. So upgrading will again induce a chain of shifts in the occupational domain accompanied by wage decreases for the lower educational levels. Which might again finally push low-skilled workers into low-wage jobs or unemployment. For the lower parts of the labour market, the consequences of upgrading are not completely opposite to those of excess supply of higher-educated people, as is often suggested. Only if the trend to upgrading occurs at all job levels does increasing the education of the low skilled seem a fruitful response.

Table 10.3 provides information about the changes in required qualifications in Britain between 1986 and 1997 from Green and his colleagues (2000). Except for level 3, all educational levels experienced an increase in demand. If these figures are interpreted as a measure of inter-temporal skills utilization, this would clearly indicate a trend to upgrading in Britain for this period. Robinson (1997) estimates, however, that the shift of higher-educated workers to lower occupations exceeds this increase in demand for higher skills, suggesting that the upgrading process is only a part of the explanation. According to Table 10.3, workers with no qualifications experienced a severe decline in demand between 1986 and 1997. The labour market position of approximately 25 per cent of this group could have been improved by additional education, up to level 1. This might have improved the labour market position both of those who received this additional education, and also of those who did not, since the decreasing number of low-skilled jobs would be available for a smaller group of workers. Assuming low elasticities of demand, this would lead to an oversupply at level 1, possibly inducing a bumping-down process that again would hurt the people without qualifications. In addition to the training for the non-qualified, additional

Table 10.4. Underutilization of education in the Netherlands, based on workers' self-assessment (%)

Utilization level	1974	1982	1995
Underutilized	17	16	24
Adequately matched	53	62	63
Overutilized	30	22	12

Source: Hartog and Jonker (1998).

education would also be necessary to increase the skills of some of the workers with levels 1, 2, and 3.

3.3. *Heterogeneity of Labour within an Educational Category*

Although allocation theory is able to explain the shifts in the occupational domain of skill groups adequately from both a bumping-down and an upgrading perspective, there is empirical evidence that its main assumptions do not hold. This derives from the observation that some of those at a given educational level are always found to be 'under-utilized', whatever measure is used. Table 10.4 provides an example from Hartog and Jonker (1998), showing a subjective measure of underutilization in the Netherlands rising from 17 to 24 per cent between 1974 and 1995. In addition to the increase, the figures show that only a fraction of the workers with a given skill level work below their educational level. Since allocation theory predicts that people with the same skills will end up in the same position in the labour market, this finding contradicts the theory. In allocation theory this outcome can occur only when people are equally well off in both types of job. But the data show that workers working below their educational level systematically earn less than those suitably matched.

A straightforward explanation for this is worker heterogeneity within the given level of education. If qualifications do not adequately reflect skills (OECD 1998*b*; Steedman 1999), then a given qualification in fact represents a distribution of skills. Different levels of skills within this distribution may be allocated differently (Borghans and Smits 1997). Underutilization based on formal qualifications rather than actual measurement of skills does not therefore indicate at a non-optimal allocation. Heterogeneity might, however, go together with other explanations for the underutilization of skills. Pryor and Schaffer (1999) show that in the USA the growth of low-skilled jobs has been greater than the growth of high-skilled jobs. As a consequence, higher-educated workers have been forced to accept lower-level jobs. Pryor and Schaffer also show that cognitive abilities vary among the higher educated. Their analysis, based on the US National Adult Literacy Survey, shows that those among the higher educated who have lower cognitive abilities are employed in lower-level jobs. This sheds another light on the interpretation of 'overeducation' of these workers.

3.4. Screening

An important issue in the economics of education is whether the education process delivers a constant output when the throughflow increases. By contrast with human capital theory (Becker 1962), which treats education as a production process producing skills, screening theory (Spence 1973) stresses the selectivity role of education. People differ in initial abilities, but employers lack information about these abilities. If it is assumed that children with greater ability can go through education more easily, education can become a screening device, enabling pupils to signal their abilities to employers. In a so-called separating equilibrium, youngsters who stay longer in school are associated with higher abilities and therefore earn higher wages. For the youngsters with lower ability, a longer spell in education is not worthwhile. Although they would be able to indicate high ability, the costs to them in completing the course would be too high.

There is extensive evidence that screening at least partially explains the income effects of education (Blaug 1976; Weiss 1995). Furthermore, the importance of screening may have increased⁶ (Lang 1994; Borghans 1998). As a consequence, people with the same abilities will now stay longer in education. This implies that, as a scale to measure skills, years of schooling not only contain measurement error, as in the case of heterogeneity, but also shift over time. This process of increased screening might therefore explain the changing occupational domains of certain skill groups. A given qualification will after some time lead to lower-level jobs and a lower wage. In reality, however, people with the same level of skills, correctly measured by their initial abilities, remain allocated to the same jobs at the same wage. Only the time they spend in education increases. From a social point of view, this implies overinvestment in education. However, this does not mean that the initial abilities of workers are underutilized.

3.5. Efficiency Wages and Search Equilibria

As mentioned above, it is an important stylized fact that workers with the same educational background are not equally well off. An alternative explanation to heterogeneity is that the labour market position achieved is to some degree random. People might have the same probability of achieving a job appropriate to their level of education, but the *ex post* outcome might differ. The reason for this lottery might be that only a limited number of adequate jobs are available. Because of wage rigidity, supply might structurally exceed demand. Excess supply then leads to unemployment or to employment at lower job levels.

⁶ There is, however, also evidence that the return to 'educational signals' declines as additional work experience allows more direct estimates of production to be made by employers (Belman and Heywood 1997; Battu, Belfield, and Sloane 1999). This has the implication that the proportion of workers who are 'properly matched' according to their formal qualifications may decline with age, which is referred to by Belman and Heywood (1997) as a 'sheepskin effect'.

It is generally regarded as a weakness of fixed wage theories that no explanation is offered for employers not adjusting wages when supply and demand are not in equilibrium. Efficiency wage theory has been developed as a foundation for wage inflexibility (Weiss 1990 provides an overview). Also the equilibrium unemployment theories (Mortensen and Neumann 1988; Mortensen 1990) typically depend on the assumption of an efficiency wage. An efficiency wage model introduces a relationship between productivity and the costs of losing one's job. Assuming that employers will not be able to monitor effort perfectly, higher costs of job loss will motivate employees to be productive in order to avoid the firing that would follow the employer's discovery of their low level of effort. Employers will therefore pay more than the competitive wage in order to increase productivity. Since this argument holds for all employers, all will pay the same wage. With full employment there would be no costs of being fired. Efficiency wages therefore lead to unemployment—that is, an equilibrium in which the average duration of unemployment times the reduction in income in that situation equals a level that optimally increases the worker's productivity. However, without loss of argument, this equilibrium might refer to underutilization of labour instead of unemployment (Gautier 2000).

Although efficiency wage models explain wages that deviate from competitive equilibrium, wages are not fixed. Although a substantial number of the workers at a given skill level are employed below their educational level, there is no reason to expect that an increase in supply will lead only to an increase of the number employed below their skill level. The underutilization of a fraction of the workers with this skill level indicates only the existence of a natural rate of underutilization. Additional supply will also face this natural rate, but the fraction of workers whose skills are underutilized will remain unchanged.

3.6. *Fixed Wages: The Job Competition Model*

So far it has been assumed that wages reflect the marginal productivity of the people at each educational level. In the explanations of shifts in the occupational domain and bumping-down, workers' skills are utilized optimally in some sense. It is often claimed, however, that the labour market does not clear in the way assumed by neoclassical theory. The absence of wage adjustments—that is, fixed wages for each occupation—leads to job competition rather than wage competition. In this subsection we will discuss the consequences of such fixed occupational wages.

In the bumping-down model above, a decrease in demand for higher-educated workers ultimately pushes low-skilled workers into badly paid work or unemployment, and additional education will not improve their situation on the labour market. An important characteristic of this model is, however, that higher-educated labour will receive lower wages. Since in a neoclassical framework wages will be equal for all labour with the same personal characteristics, the wage will fall not only for those who have to accept a lower job, but also for the workers employed in their 'traditional' occupational domain. Although productivity might be higher within the higher-level jobs, wage competition among workers with equal characteristics for these scarce jobs

'at their own level' will push wages down until they are equal to productivity in the lower-skill jobs that have to be accepted by part of this group.

Although wage competition might therefore lead to a bumping-down process, it will also diminish the returns to education. If students adequately anticipate these returns and base their educational investments on its expected benefits, educational investments will diminish. This leads to an adjustment of labour supply to the demand shock. However, although many countries faced the shifts of higher-educated workers to lower-level jobs, a reduction of average investment in education has never been observed.

These observations might suggest that the labour market is regulated not by wage competition but by job competition. In the job competition model of Thurow (1975)⁷ it is assumed that wages do not directly reflect marginal productivity. Rather, it is assumed that every type of job is characterized by a constant wage. In more recent literature, these non-clearing wages are often explained by mark-ups owing to monopolistic competition (Snower 1983; Nishimura 1989; Matsuyama 1995; Zwick 2000). Knight (1979) shows that, if the productivity of workers increases with their educational level, then all employers will prefer to recruit the most highly qualified, even if the additional productivity is very slight. This creates a queue of workers. The workers with the highest skill levels are in the front of the queue, with plenty of choice between different jobs, and will therefore choose the best-paid occupations. For people with lower qualifications, the best-paid jobs will not be available. Therefore, a job queue will arise similar to the queue of workers. The outcome of this allocation process will be that the worker at the top of the queue will be matched with job number one, and so on. If demand decreases in the best-paid jobs, everyone will shift some places downwards in the queue. Reduced demand or excess supply for the high-level jobs will therefore again result in a bumping-down process, bringing unemployment or low-paid jobs for the people at the end of the queue.

Although the wage competition and job competition models are often considered as opposing theories, both seem able to explain the process of bumping-down. However, there are three important differences between them. In the first place a bumping-down process is not an inevitable consequence of the neoclassical matching model. Only in combination with the assumption of low elasticities of demand is a decrease in demand for higher-level jobs transmitted to the lower part of the labour market. In the job competition model the bumping-down process will always take place. The reason is that with constant wages *de facto* no demand elasticity exists. Wage competition therefore seems to be able to predict a wider range of market mechanisms among which the extreme bumping-down case is one.

The assumption of job-dependent constant wages,⁸ however, creates two further differences between wage and job competition, which obstruct efficiency in the job

⁷ Reder (1955) introduced the idea of occupational wage differentials two decades before Thurow.

⁸ In contrast with occupation-specific fixed wages, wages might also be fixed by level of education. Except for the influence of minimum wages on unemployment, not much attention is paid in literature to this situation, although many other institutional arrangements like wage bargaining agreements could explain

Table 10.5. The average wage of school-leavers from higher vocational education in the Netherlands relative to the fraction of school-leavers with a job below their educational level

Required education level for job	Constant	% below educational level
Lower plus extended lower	14.76 (9.75)	6.44 (1.09)
Intermediate	18.84 (26.91)	-2.70 (0.98)
Higher vocational	21.45 (26.34)	-5.25 (1.63)
University	21.45 (24.16)	-2.34 (0.67)
Total group	21.31 (30.66)	-6.13 (2.24)

Note: *t*-values in parentheses.

Source: Borghans and Smits (1997).

competition model. The marginal benefits of educational investments in the job competition model do not equal the wage in the marginal job. If one more worker is schooled for the highest educational level, this will push one of the workers with the highest education into a less-favourable job. In contrast to the wage competition model, the marginal benefits are larger than the wage in this marginal job. Decreasing demand will therefore not provide a signal to reduce educational investments.

Second, the allocation between workers and jobs might be obscured in the job competition model. Since wages are constant for each occupation, workers will not be allocated to the jobs where their productivity is optimal; instead, everyone will try to obtain the best-paid jobs. If the jobs with the highest wages do not provide the highest comparative advantage for the most skilled people, talent will be wasted in less productive jobs. Murphy, Schleifer, and Vishny (1991) provide the example of highly rewarded lawyer jobs reducing national growth rates by preventing people becoming engineers.

The wage competition model is less pessimistic than the job competition model regarding the effectiveness of additional training for low-skilled workers. Crucial in the job competition model is the difference in wage between those who are lucky enough to find a job that matches their educational level, and those who have to accept a job below their skill level. The burden of excess supply is borne by the losers in the competition for the favourable jobs (Borghans and Smits 1997; Borghans, Bruinshoofd, and de Grip 2000). Table 10.5 shows that school-leavers from Dutch higher vocational education receive higher wages if they are employed in jobs for

the absence of wage flexibility within an educational level. Teulings (1990) provides a short description of the consequences. Changes in demand and supply will have no effect on the match between level of education and jobs. Assuming an education-wage profile that is less steep than in equilibrium would lead to high levels of unemployment in the lower part of the labour market. Underutilization would not, however, occur, while shocks in supply and demand will not be transmitted to the market segments for other levels of education.

which higher educational levels are required. This confirms the findings of Hartog (1985) shown in Table 10.1. This wage is, however, found to be responsive to labour market conditions. The larger the percentage of school-leavers finding a job below the educational level within a labour market segment, the lower the average wage they receive. However, a deterioration of the labour market affects the wages of those with a job matching their educational level substantially more than the wages of the underutilized workers. This suggests that increased competition in the labour market leads to wage competition within the traditional occupational domain. The smaller wage effects for those in a job below or above the higher vocational education level can be explained by heterogeneity. These arguments also predict a positive relationship between the average wage and the percentage of workers below the educational level at the lowest level (lower vocational education).

Van Ours and Ridder (1995) reject the job competition model. They estimate that, where the higher educated face a low number of vacancies within their own occupational domain in the job-matching process, they do not substantially reduce the matching probabilities of lower-qualified people within other segments of the labour market. Higher unemployment rates among low-skilled people are, according to Van Ours and Ridder (1995), explained by higher quit rates. Although their findings provide interesting insights into the functioning of the labour market, it is not clear why the job competition model requires the reallocation induced by shifts in demand and supply to be realized through changing matching behaviour rather than changes in the quit ratio.

3.7. *A Typology of the Theories on the Shifts in the Allocation of Labour*

Table 10.6 recaps with a typology of the theories that could explain a shift in the occupational domain of higher-skilled workers towards lower job levels.

4. Policy Conclusions

The aim of this chapter was to discuss the effects of changes in supply and demand on the utilization of skills, and the way in which shifts in the skill structure of the workers within occupational groups affect the effectiveness of education and training policies for the low skilled. For this purpose we developed a typology of the theories that explain the possible causes and consequences of the observed changes. The over-education and upgrading views provide the two extreme positions. Analyses of the relationship between the acquisition of skills and labour market dynamics show that aspects of both may be involved.

For the policy issue of whether labour market developments make additional investments in schooling worthwhile, the opposing positions of the wage competition and job competition models are not crucial. The crucial point is whether increased employment of the higher educated in jobs at lower levels indicates a bumping-down

Table 10.6. Typology of theories that explain a shift in the occupational domain and their consequences

Consequences	Within allocation theory			Outside allocation theory		
	Upgrading	Increase in supply	Heterogeneity	Screening	Efficiency wages	Job competition
Overinvestment	No	No	No	Yes	No	Yes
Wastage of skills	No	No	No	No	No	Yes
Lower wages	No, higher wages	Yes	No	Yes, people end up with the same wage regardless of their qualifications	No	Yes, people end up with the same wage regardless of their qualifications
Take away jobs of lower educated	No, create job opportunities for lower educated	Yes, especially when elasticity of demand is low	Yes	No, but forces people to increase their educational investments to keep the same job	Yes	Yes
Bumping-down process	Upgrading in high-level jobs might result in bumping-down on the lower end of the labour market	Yes, especially when elasticity of demand is low	No	No	No	Yes

process initiated by excess supply of the more educated, or whether it points to a process of upgrading. Bumping-down can result in both the job competition model and the neoclassical matching model, suggesting that additional investment in education is not very effective. Upgrading, on the other hand, requires an increase in educational investment. Upgrading versus bumping-down therefore seems to be the most fundamental conflict for the macro-efficiency of training policies for the low skilled.

Two differences between the job competition and the wage competition models remain important, however. First, from the point of view of the wage competition

model, bumping-down is only an extreme case. The model does not exclude additional demand absorbing part of the extra supply of skills that results from training policies. The effects of training therefore need not to be totally cancelled out by a bumping-down process, but might lead to new employment opportunities at higher wages, depending on the elasticity of demand at the higher job levels. In the job competition model, however, the elasticity of demand equals zero, since wages do not react to changes in supply and demand. Second, although in a world of job competition and in a world of wage competition upgrading might occur, in the sense that jobs become more complex, in the job competition case the labour market will provide no signals for this. In the case of wage competition it might be very difficult to distinguish upgrading from bumping-down, since both processes will lead to a shift in the employment structure, with higher-educated people taking jobs that used to be occupied by the lower educated. Upgrading does, however, manifest itself in a changing employment structure. In the case of job competition, neither the allocation of workers nor their wages will be changed owing to upgrading. The increased productivity of the higher educated, which might make more educational investments fruitful, will therefore remain unobserved.

Finally, it is interesting to note that not every form of training will be a useful instrument to cope with upgrading. It has been shown that upgrading in a specific group of occupations might induce bumping at lower levels of education. Training is fruitful only if it increases the supply at a level of education for which the upgrading process creates new demand. Training that increases educational levels below those where the upgrading tendencies occur only further stimulates the process of bumping-down.