Job performance and career prospects of auditors
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Chapter 2

A review of the literature

2.1 Introduction

There are three ways in which people can acquire skills which are necessary for successfully exercising a profession. They can learn it on-the-job, they can combine learning-on-the-job with formal theoretical learning at school or they can attend full-time (vocational) education. In the Netherlands part-time education combined with working and full-time education are most common. Pure on-the-job learning is rare, since youngsters are obliged to go to school until their 18th birthday\(^1\). In this section an overview is given of economic, psychologic and sociologic literature on learning, part-time versus full-time education and measuring labor market performance. Insights of these different scientific disciplines will be used because educational psychologists and economists who do research on learning and job performance may benefit from each other. The educationalist Walberg (p. 106, 1981) summarizes the strengths and weaknesses of the two disciplines quite clearly:

"... economics and psychology have a lot to gain in joining forces to improve educational productivity. Psychologists have contributed much to establishing the consistent, strong correlates of educational achievement, but they have tended to examine the relation to only one or two production factors at a time in isolation from the others. Economists provide comprehensive frameworks for the study and improvement of productivity; but in applying production models to education, they have accepted weak proxies such as student social class,

\(^1\)In the Netherlands full-time education is compulsory until the age of 16 and part-time education is compulsory until the school year in which someone becomes 18 years.
school racial composition, and teacher salaries for the more direct and potential determinants such as aptitude, quality of instruction, and home environment. Combining the best of both principles is likely to be most fruitful."

This chapter provides an introductory survey of the literature and is organized as follows. Section 2.2 pays attention to educational psychology. Basic concepts are introduced and attention is paid to learning styles, learning strategies and learning environments. Furthermore, Walberg's nine factor model is presented which shows which factors influence individual learning. This information is used to formulate hypotheses on the effects of different types of vocational education on job performance. In section 2.3 measurement and explanation of educational and labor market performance by economists is considered. The standard human capital of Mincer is introduced together with some of its refinements. Two types of job performance measurement are considered. In economic literature both static and dynamic ways of measuring job performance exist. The first one relates to short run job performance and the second one to long run job performance. Section 2.4 discusses some parts of Prais (1995) and Hoeben (1992). Prais has done research on measuring differences in labor productivity of workers in France, Germany, the Netherlands and the United Kingdom. He related the differences in productivity to differences in educational background of the workers. Hoeben did something similar for the Netherlands. Section 2.5 shows results of two recent Ph.D. theses on the effect of type of auditing training on expertise in auditing and on job mobility in the Netherlands. Section 2.6 formulates research questions and summarizes.

2.2 Educational psychology

2.2.1 Introduction

A brief overview is given on what educational psychology says about how people learn. First, some basic concepts are introduced from educational psychology on learning (Boekaerts and Simons, 1995). First of all a definition of learning is given: one says that someone has learned something if a relatively stable change is observed in one's behavior caused by learning activities. This new kind of behavior has a certain degree of flexibility.

In general learning of people can not be observed. One can only conclude that someone has learned something because one observes that (s)he can do something which (s)he could not do some time ago. Note that one can only speak of learning when there is a relatively stable change in someone's behavior
and that these changes are caused by learning activities (like learning at school, training at a sports club or learning from a textbook).

An important feature of learning is that a certain degree of transfer occurs. By transfer one means that one uses the knowledge and skills acquired in one learning situation in other (learning) situations as well. For example, an assistant accountant has attended a course (learning environment) on finance course and later on, he uses knowledge on finance when working on a financial audit, i.e. the assistant has transferred the knowledge on corporate finance to his work in auditing.

In order to be able to learn one needs a suitable learning environment. By learning environment is meant an environment in which the conditions are such that they stimulate pupils' learning. Teaching and instructing can in this sense be considered as creating a suitable learning environment for pupils. Learning environments can be divided in natural and artificial learning environments. In an artificial learning environment people learn something which they can not use immediately but they may need in future, like in working situations. One speaks of natural learning environments when someone learns something at a place where (s)he 'immediately' needs the skills/knowledge acquired there; schools are often artificial learning environments whereas companies which offer internships are (more) natural learning environments.

At school the desired learning outcomes are determined beforehand. Teachers, educational researchers and textbook writers have tried to create the optimal educational learning process which (hopefully) makes pupils attain these desired outcomes. By educational learning process is meant the learning process of pupils which gets going by education. Educational learning processes are complex interaction processes in which pupils interact with their learning environment. The quality and the outcomes of the educational learning process depend heavily on the quality of the instruction process and the learning capabilities of the pupils.

2.2.2 On learning styles, strategies and environments

People differ in the way they learn. It is useful to pay some attention to this because it may (partly) explain why some people choose for full-time and others for dual education. What is said in this section and much more can be found in Boekaerts and Simons (chapter 3, 1995).

In general, people can use different strategies to attain a goal. For learning, the same is true. The combination of cognitive and psycho-motor skills used to attain an educational goal is called a learning strategy. The choice for a certain combination of these skills out of all possible combinations depends on the situation, both internal (the mood/emotions of the person) and external
(circumstances outside the control of the person), and on someone's style. Not in all situations in which the same goal has to be attained the same strategy is chosen, but on the whole a lot of similarities exist across the strategies used in these different situations. This brings us to the definition of someone's *learning style*.

Learning style refers to the relatively stable way in which someone combines cognitive and psycho-motor skills in order to learn something. These 'standard' combinations or learning strategies are chosen because they are familiar, they have proven to be successful or they are in accordance with someone's character.

Some people have learning styles which are flexible and others have less flexible learning styles. People with flexible learning styles are able to choose a learning strategy which is well-suited for a certain educational goal. This is more difficult for people with a more or less rigid learning style. They face a bigger chance of having to deal with an educational goal with a relatively ineffective learning strategy. The 'bandwidth' of someone's learning style, or the degree of someone's learning style flexibility is of great influence on someone's capability of learning new things. The wider this bandwidth the more different kinds of educational goals can be dealt with.

Quite a lot of research has been done on learning styles, see e.g. Pask, 1977, Kolb, 1984, Vermunt and Rijswijk, 1988 (see also Vermunt, 1992). Vermunt and Rijswijk's learning style theorem is presented here as an example. This learning style theorem has been chosen because of two reasons. The first reason is that it refers to learning in higher education and is therefore related to the subject of this thesis. The second reason is that it is empirically validated which is not always the case with learning style theorems. Vermunt and Rijswijk distinguish different learning styles of students studying a subject. They distinguished three learning styles, namely the surface style, the depth style and the elaborative style. The main characteristics of these styles are given below

- **surface style**

  People with a surface style concentrate on facts, details and definitions. They try to learn them by heart and they read the text step-wise. They remain more or less on the surface of the text which is not the case with the students who have a depth style.

- **depth style**

  People with the depth style deal more critically with their subject; they select points of view, conclusions and ideas which can be found in the text. They try to find the main lines of the text and to form an opinion of their own about the text. They are mainly interested in conceptual and relational information.
2.2. EDUCATIONAL PSYCHOLOGY

- **elaborative style**

The elaborative style is characterized by the attention given to the applicability of the subject under study on relevant applications in practice. People with this learning style try to translate the theoretical text into more concrete images, like examples or own experiences. People with this learning style may have problems with having a good overview of the text.

Most teachers and educational researchers wish their students to have a depth style. They try to stimulate that by asking questions and giving tasks related to the subject. However, Vermunt (1992) concludes that their efforts are useless; they do not make people with a surface or elaborative style of their own work more depth stylish. People stick to their own learning style and trying to make them switch to other learning styles does not make them learn more.

Since students differ in learning styles the existence of different educational tracks in higher education may be sensible. Students can choose the educational track which is in accordance with their learning style (self-selection). The 'elaborators' of Vermunt and Rijswijk (1988) are people who, roughly speaking, want to do practical work, who want to work with people and who are not very much interested in theoretical backgrounds. For them an education in which they can combine going to school and working might be more in accordance with their learning style than a full-time (vocational) education where more general and theoretical subjects are given. For people who are more theoretically orientated, like the 'depth stylers' the opposite might be the case. Which type of education is most suitable for students with the surface style is not clear.

2.2.3 Learning environments

Schools are in general artificial learning environments and the workplace is a more natural learning environment. The question is which learning environment is best in which situation. Nieuwenhuis and Onstenk (1994) try to answer this question on the basis of a study of literature. Bolhuis and Simons (1999) wrote an interesting book related to this topic: their book is about learning in and of organizations.

Bolhuis and Simons distinguish three types of learning which can occur at work: spontaneous learning by the individual himself (not private study), learning on-the-job under some form of supervision and learning off-the-job/private study. Learning is valuable for the firm as long as the knowledge and skills acquired through these learning activities are transferable, i.e. can be applied at work. Transfer of knowledge/skills will hardly be a problem in case of spontaneous learning and learning on-the-job, although inadequate on-the-job training
will also result in transfer problems (Bolhuis and Simons, 1999, 192-195), but it may be a problem in case of off-the-job learning. Learning off-the-job used to be considered as an efficient method to learn people general knowledge. Yet, transfer problems may make this form of education less efficient. Learning off-the-job is often quite general and theoretical which may make it hard to transfer the general and abstract principles taught there to particular applications at work. However, if the organization supports the workers who have undertaken learning off-the-job activities well transfer does not have to be a problem. Sometimes learning off-the-job is the only way skills can be learned because of safety considerations or because of the complexity of the knowledge which has to be learned.

Nieuwenhuis and Onstenk say that much depends on how one has implemented the practical learning places in the full-time vocational education and in the dual education. On the basis of their literature study on powerful learning environments they conclude among others the following:

1. **technical instrumental skills can best be learned off-the-job**

A combination of theoretical education and practical education in the form of simulations is an effective way of developing the technical instrumental skills of students. Real work situations are suitable for getting experienced in using these instruments/tools.

2. **social-cognitive skills (complex job related problem-solving, working with clients, working in teams) can best be learned in on-the-job situations**

Acquiring social-cognitive skills can best be done on the work-floor. Creating simulations at school, where the acquisition of these skills should take place, is very difficult.

3. **flexibility, transfer potential and learning to learn can best be developed in a variation of different working places**

This means that students should not work at just one firm, like in the traditional dual system. Students should have traineeships at different companies during the first years of their education and become an apprentice in one particular firm during the last years of the education. Full-time vocational schools should provide simulated work places which vary enough in order to make the students flexible and develop good transfer potentials.

However, the authors remark that full-time students may have different characteristics (and therefore different learning styles) than students of the dual system and that one can not assume that a powerful learning environment for
some types of student is also powerful for other types of students. Or put in a more economic way, people with different learning styles prefer the learning environment which optimizes learning given their learning style. There may be selectivity in choice of learning environment.

Nieuwenhuis and Onstenk make some suggestions to improve learning in the dual system: apprentices must have a wide range of (complete) tasks to do, which become more and more complex during the training period. They should not stay at just one division of the firm, but they should work at different divisions during their training period. This will increase their flexibility and transfer potential. For learning certain jobs a full-time education may be preferable to a dual education. This is the case for learning jobs in which relatively much technical-instrumental knowledge and skills but relatively few social-cognitive skills are required. The dual system is best suited for learning jobs in which social-cognitive skills are important, but technical-instrumental skills are not very important. Full-time vocational education may also be superior when firms can not offer different working situations or when there are not enough companies who participate in the dual system. In these situations full-time vocational education, where theoretical subjects are combined with a wide range of simulations, is a good alternative.

2.2.4 Factors influencing individual learning

Much research has been done by educational researchers, psychologists and sociologists on determining which factors influence learning. Unfortunately, in most research the influence of one particular variable on learning is studied in isolation of other variables, instead of studying the influence of several variables on learning simultaneously. Walberg (1981) and Fraser et al. (1987) have proposed an educational productivity model which incorporates a set of factors which have proven to be good predictors of student outcomes in past research. Walberg argues that nine factors are required to optimize learning, namely:

**Student aptitude variables**

1. Ability, or prior achievement, as measured by the usual standardized tests
2. Development, as indexed by age or stage of maturation
3. Motivation, or self-concept, as indicated by personality tests

**Instructional variables**

4 Quantity of instruction (amount of time students engage in learning)
5 Quality of instruction, including psychological and curricular aspects

*Educationally stimulating psychological environment variables*

6 Home environment

7 Classroom or school environment

8 Peer group environment outside the school

9 Mass media environment, especially amount of leisure-time television viewing

The student aptitude variables and instruction variables have occurred in many studies on learning. Each variable appears to be necessary for learning because without one of them the student is not likely to learn much. People who are e.g. very intelligent but who are not motivated at all, will not learn much at school. Ability can not compensate for a total absence of motivation. The last four variables reflect the psychological environment of the students. Three of them - home environment, classroom or school environment and peer group environment outside the school - influence learning both in a direct and in an indirect way; for example, students learn from home directly (parents who read books with their children, who help them to learn the multiplication tables by heart), but the home environment also influences learning indirectly by raising the motivation and the responsiveness to instruction of students. The last variable, the mass media environment of the students, is supposed to have a 'n-shaped' effect on learning. Watching television may be relaxing after a school day, by which students do their homework better. If on the other hand they spend too much time watching television, little time is left for doing homework or engaging in other educational and developmental activities outside school.

The educational productivity model of Walberg assumes that the factors interact by substituting for one another with diminishing returns. In his model it is not possible to take into account that different types of students perform differently under different learning environments (Boekaerts and Simons, chapter 3, 1995).

Fraser et al. (1987) investigate the validity of Walberg's model. This has been done on the basis of quantitative syntheses of past research and a multivariate study on study achievement with the nine factors of Walberg's model included as explanatory variables. Seven of the nine factors seemed to be important in influencing learning. The researchers did not find much evidence on the variables 'peer group environment' and 'mass media environment'.
2.3 Performance measured by economists

In the late seventies economists started doing research on the area of educational performance and educational production functions. They have developed several methods to explain the effect of school inputs on educational performance, see Hanushek (1986) and Krueger (1997). The results on the effect of school resources on student achievement are ambiguous; the results are conflicting or weak. Krueger (1997, p. 1) says the following about this:

"Much of the uncertainty in the literature derives from the fact that the appropriate specification - including functional form, level of aggregation, relevant control variables and identification - of the 'education production function' is uncertain."

Hanushek (1979, 1986, 1990) was one of the first economists who did research on educational performance. His 1979 article provides a detailed overview on what research on educational performance had been done until the late seventies. His paper especially paid much attention to measuring educational output, how to deal with multiple outputs, modelling the educational production process and how to deal with inputs in the production function and about efficiency in production. He pointed out, just as Walberg did, that the use of production functions to explain educational performance, instead of considering the relation between one particular factor and the performance outcome, enables researchers to measure the influence of various factors on the educational performance while controlling for other variables. He also found convincing evidence that schools are economically inefficient; schools do not use optimal mixes of inputs. Quality differences between schools and teachers can explain part of differences in students' achievement. Another finding is that there are significant differences in production functions by race and family background, which indicates that school resources interact with background characteristics of students. One of the gaps (in 1979) was the unclear relationship between school quality and subsequent performance, i.e. labor market performance, and how to measure school quality. Another issue which needed more attention according to Hanushek was the dynamics of the educational process and achievement patterns varying over time.

There are two ways to measure educational performance. There are economists who try to explain educational performance, measured as standardized test scores, by individual and school characteristics. However some economists doubt whether test scores are adequate measures of student performance; test scores are only weakly correlated with subsequent labor market outcomes (Griliches
and Mason, 1972) and selectivity bias and difficulties in standardizing tests also cause difficulties (Hanushek, 1990). Betts (1995) argues that it is more sensible to investigate the effect of school characteristics on students labor market outcomes, like wages, than on test scores. This point of view distinguishes educationalists from economists; the first group is mainly interested in school performance whereas the latter group focuses on the relation between educational attainment and subsequent labor market performance. It is not clear whether school quality, measured by e.g. expenditures per pupil, teachers’ salary or class size, affects post-school earnings. The research results are somewhat conflicting. Sometimes significant positive effects of school quality on earnings are found (Altonji and Dunn, 1996) In other research school quality has either a small positive significant effect or a statistically insignificant effect on earnings (Betts, 1995, Card and Krueger, 1992, Grogger, 1996, Heckman, Layne-Farrar and Todd, 1996). Not many attempts have been made yet to measure the effects of direct school quality measures on individual job performance of graduated students. Until now, economists have used school quality proxies like class size, text book spending per pupil or average teacher salary in their models but not more direct measures of school quality derived from educational research, like teaching methods, teacher-pupil contact, time spent on certain subjects, etc. However, it may be very hard to get these data together with data on subsequent labor market performance of graduated students. In case of comparing full-time and dual educational tracks in higher education it would require a longitudinal study starting when students enter higher education and following them during, say, the first ten years at the labor market.

In summary, economic research on educational performance has been reviewed. Some researchers have concentrated on the effect of school inputs on educational performance to assess the quality of different schools. Their research has indicated that it is still quite uncertain what the relation is between school quality and educational performance. Others have argued that it is more sensible to investigate the effect of education and school inputs on labor market performance. However, it is also quite unclear whether school quality affects labor market performance.
2.3. PERFORMANCE MEASURED BY ECONOMISTS

2.3.1 Labor market performance

Job performance and worker’s productivity are rather vague concepts, because how does one measure someone’s productivity or performance on the job? For some people it is quite easy to measure their productivity, like for people who do piecework, or salesmen, but the productivity of most people is hard to measure. This is the case for people who have jobs with many job responsibilities, people who supervise and people who hold jobs in which the quality of the work is important. There are various measures used as indicators of labor productivity. In the human capital literature, wages are assumed to reflect someone’s marginal productivity. The effect of education on wages has been extensively studied during the last three decades. The standard human capital model of Mincer will be introduced together with a refinement made by Rosen (1977).

Labor organizational psychologists have also done much research on the area of how to evaluate workers job performance. Economists (Medoff and Abraham 1980, 1981, Barron et al. 1989, Bishop, 1994 and Bartel, 1995) have used job performance ratings as productivity measure.

Another approach to measure job performance is by means of promotion probabilities, as Wise (1975) and Van der Velden and Lodder (1995) have done. This is a somewhat different but intuitively appealing way of looking at job performance; people who have a relatively high labor productivity (as compared with workers who hold a similar job) are more likely to be promoted than people with a relatively low labor productivity.

Human capital theory and wages

Mincerian wage equation  This section provides a short introduction in human capital theory and is by no means complete. It is included in order to provide the reader with some basic knowledge of human capital theory. There are several surveys on human capital theory which are good and cover both early work and more recent research on human capital theory, like the surveys of Rosen (1977), Willis (1986), Ashenfelter, Harmon and Oosterbeek (1999) and Hartog (2000).

Human capital theory focuses on the relation between education and training on earnings. Education is considered to be an investment which individuals undertake in order to get higher future earnings. It distinguishes two types of schooling: formal schooling and training-on-the-job.

Formal schooling entails costs like foregone earnings during the training period and tuition. An individual only undertakes additional schooling if he will be compensated sufficiently by higher lifetime earnings. According to human capital theory individuals maximize lifetime earnings with respect to the number of
years at school. The optimal schooling length $s$ is determined by equating the marginal costs of additional schooling with the marginal benefits of additional education (increased earnings in remaining working life).

After formal education workers may still increase their human capital stock. In that sense having a job does not only mean that someone earns money in exchange of working but it also provides opportunities to increase one's stock of human capital through training-on-the-job. Training at work may decrease present earnings but it increases future earnings capacity. The worker faces a choice problem; how much time should he invest on training and how much on working and when should he spend time on training? Beginning with Ben-Porath (1967) economists have developed theoretical models characterizing the life cycle earning paths of workers. In these models workers choose when and how much time they spend on training in order to maximize their present value of discounted lifetime earnings net of direct costs of investment on training. These models suggest that workers spend relatively much time on training early in life when their stock of human capital is relatively low and relatively little time at the end of working life. There are two reasons for this. Firstly, the opportunity costs of training are low early in life because of the relatively low stock of human capital. Secondly, there is a large amount of time left to reap the benefits of educational investments made early in life.

The standard human capital earnings equation was developed by Mincer (1974) and is also known as the Mincerian wage equation. Mincer's earnings model was the result of using economic theory on investment in education and investment in on-the-job training in order to find a functional form of the earnings function which could be used in empirical work. Unfortunately, the human capital models on life cycle earnings do not have a closed form solution and the precise functional form for life cycle earnings is usually not known. Furthermore, many variables in these models are unobserved, like the stock of human capital itself and the rate of discount. Mincer's earnings equation provides a nice approximation of the unknown functional form of life cycle earnings.

$$\ln y_i = \beta_0 + \beta_1 s_i + \beta_2 x_i + \beta_3 x_i^2 + u_i$$ (2.1)

where $y_i$ equals the wage, $s_i$ the number of years of schooling and $x_i$ the number of years of work experience of individual $i$. The factor $u_i$ is an error term with expectation zero. The parameters $\beta_j$, $j = 0, \ldots, 3$ are to be estimated. The coefficient $\beta_1$ provides an estimate of the rate of return to education. The coefficients $\beta_2$ and $\beta_3$ determine the curvature of the earnings profile.

**Ability bias and self-selection** In the Mincerian earnings function it is assumed that the amount of schooling $s$ is an exogenous variable. However, there
is a large literature in which this assumption is criticized. There, it is argued that the estimated rate of return to education is upwardly biased because no account is taken of the individual's ability. High ability people will tend to have, on average, a higher schooling level than low ability people. Consequently, the residual $u$ in equation 2.1 will be positively correlated with $s$ and the estimated rate of return to education $\beta_1$ will suffer from the so called omitted variable bias which is, in this specific context, also known as 'ability bias'. Because of the omission of ability in equation 2.1 the real rate of return of education will be overstated. This problem is known as the 'self-selection problem' (see Rosen, 1977).

Much research has been done to correct for self-selection. It is possible to correct for self-selection by including ability measures like test or IQ scores (Blackburn and Neumark 1995) in earnings equations. Another possibility is to use IV estimates of the number of years of education instead of the number of years of education itself in the earnings equation (Card, 1993, Harmon and Walker, 1995). The use of twin or sibling data (Ashenfelter and Rouse, 1998, Ashenfelter and Zimmermann, 1997) in earnings equations is also a way to correct for ability bias.

**General and specific human capital** In human capital theory, two types of training are distinguished: general training and specific training. General training increases an individual's productivity for many employers equally whereas specific training increases the individual's productivity only at the current firm. The distinction between these two types of training is primarily conceptual. In reality, training programs do not provide pure general or pure specific training. It provides a mixture, with training programs differing in the relative amount of general and specific training they provide to their students.

Suppose an employee has attended a general training program which increases his marginal productivity from $MP_0$ to $MP_g$. Since he has attended general training this implies that his marginal productivity equals $MP_g$ both inside and outside the current firm. In order to retain the employee for the firm the employer should pay him a wage $W_g$ which is equal to his marginal productivity $MP_g$. The firm can not pay less because otherwise the employee may quit and start working for another employer who is willing to pay him $W_g$. If an employee has attended a specific training program his marginal productivity increases from $MP_0$ to $MP_s$ in the current firm, but stays the same outside the education itself. When the ability measure itself is influenced by schooling the inclusion of it biases the estimated return to education downwards (Blackburn and Neumark, 1995)!
firm. In order to retain this employee the employer only has to pay him a wage $MP_0 < W_s < MP_s$. The difference between the $W_s$ and $MP_0$ depends on the likelihood of turnover and the costs involved with training a new employee. Employers are willing to share some of the returns of training with their employees in order to reduce turnover. The higher the difference between $W_s$ and $MP_0$ the lower the likelihood of turnover will be.

Whereas specific training should be financed by the employer, general training should be financed by the employee himself. This is because specific training increases productivity only inside the firm whereas general training increases productivity both inside and outside the firm. The employer's benefit from a training is the differential between actual marginal productivity of the employee and the wage he pays the employee. Since the employer should pay a generally trained employee his full marginal productivity in order to prevent him from quitting he has no incentive to pay for this training. This is already an important indication that full-time accountancy education has a more general character than the part-time accountancy education since the larger part of the full-time training is paid by the employee whereas the part-time training is paid by the employer.

According to the theory described above it is expected that, at least in the early stages of their career, full-time educated auditors have higher wages than part-time educated auditors (except if $MP_g$ is large for both types of accountancy training). Decompose marginal productivity $MP_i$ of individual $i$ into a component originating from general training $MP_g$ and a component originating from specific training $MP_s$ ($MP_i = MP_g + MP_s$). Full-time educated auditors have relatively more general human capital than part-time educated auditors, $MP_{fg} > MP_{pg}$. Marginal productivity of full-time educated auditors $MP_{fg}$ outside the firm is higher than marginal productivity outside the firm for the part-time educated auditors $MP_{pg}$. As a consequence, the employer has to pay his full-time educated auditors a wage $W_f >= MP_{fg}$ in order to keep the full-time educated auditors but only has to pay a wage $W_p > MP_{pg}$ to keep his part-time educated auditors. This suggests that employers have to pay higher wages to full-time educated auditors than to part-time educated auditors in order to retain them if the difference between their amount of general human capital is sufficiently high and in favor of the full-time accountancy training.

**Job performance rating**

Job performance rating can be done by using a ordering, like performance is unacceptable, almost satisfactory, ..., excellent or by giving numerical ratings e.g. between 1 and 10, where 1 stands for minimum performance rating and 10 for maximum performance rating. Job performance ratings have some drawbacks
which are pointed out by Bishop (1994) and Wise (1975). Because productivity is not measured objectively but subjectively measurement errors are likely to occur. They are listed and discussed below:

1. Supervisors may not know exactly what their subordinates are doing and how well it could have been done.

2. Different supervisors may have different beliefs about what constitutes good performance.

3. Supervisors are not very willing to give bad ratings to employees who perform badly.

4. Supervisors may tend to give subordinates they like systematically higher ratings than subordinates they do not like.

According to Wise reason 2 is not a serious problem; laboratory studies suggest that there is a high degree of interrater reliability. Reason 3 biases the ratings of the 'true' performance upwards but it is not very likely that it distorts the relative ratings of bad performers and good performers. About measurement errors resulting from reason 1 and 4: as long as these 'measurement errors' are uncorrelated with the 'true' productivity level, which is not unlikely, they will not give rise to estimation difficulties. The measurement error will, in a classical regression model, be absorbed by the error term and it will not result in biased coefficients.

Economists use human capital variables like schooling, indicators for various kinds of on- and off-the-job training, experience and job characteristics to explain job performance (Medoff and Abraham 1980, 1981, Bishop, 1994, Wise, 1975) or changes in job performance due to training activities (Barron et al., 1989, Bartel 1995). Differences in performance rating between graduates from full-time and part-time intermediate vocational training have been analyzed by Hoeben (1992) and will be discussed in section 2.4.

Measuring productivity by promotions

Wise (1975) sets out to relate job performance with the probability of promotion instead of relating it to wages or wage growth (that was the usual approach in those days to measure job performance). He argues that salaries are linked to the position someone holds in a firm and not to the individual who holds that particular position. Wages normally increase each year but this happens automatically and does not have to be related to someone's productivity growth, see e.g. Lazear (chapter 4, 1996) for a discussion about this subject. Therefore, Wise (1975, p. 914) suggested that
the rate of upward movement of an individual in the firm hierarchy may be a more direct measure of job performance than is his rate of salary increase, assuming, of course, that persons who are judged by the firm to be 'more capable' are promoted faster.

Wise presents a Markov model in which jobs are assigned to levels and employees can move up to higher levels in the firm, can stay at the current level or can leave the firm (demotion is not considered by Wise). Moving up in the firm is considered as an indication of high labor productivity relative to the productivity of other jobholders in the same level. In his sample there are only people younger than 30 years, with an academic degree and who have been hired by a particular manufacturing firm before 1965 (the data were from 1968). His estimation results show that the rate of promotion increases with college selectivity, college GPA and rank in graduate school. Furthermore, it is positively related to leadership ability, imaginative thinking, initiative and negatively related to the individuals desire for job security. Socio-economic background does not effect the rate of promotion.

Van der Velden and Lodder (1995) look at labor market careers of graduates from full-time intermediate vocational education and graduates from dual vocational education in the Netherlands. The sample they use contains information about people graduated in the early 80s in either full-time intermediate vocational education or dual vocational education and who have been interviewed about 5 years later. The individual labor market careers are broken down into different spells. A spell is ended in case of a rise in the level of the function (exit 1), a change of job but not of function level (exit 2), a decline in the level of the function (exit 3) or getting unemployed (exit 4). With the help of a standard duration model the labor market history of the young graduates is analyzed. For each type of exit and for each type of vocational education a separate model is estimated. The estimation results indicate that the start at the labor market of full-time graduates is quite unstable; these people are relatively mobile at the labor market (mobility includes promotion, horizontal mobility, demotion, and unemployment) compared to the mobility of the dual graduates, who often stay with the employer where they have received their dual education. However, Van Imhoff and Ritzen (1989) show that the employment probabilities of the dual and full-time students converge to each other. The start of full-time graduates may be more troublesome than that of the dual graduates but on the long run they seem to be better off; full-time graduates face much higher promotion probabilities than their dual educated counterparts. However, graduates from dual education do not face higher demotion or unemployment probabilities than full-time graduates. So it seems that graduates from full-time education get jobs with good career opportunities whereas graduates from the dual system
end up in 'dead-end' jobs. In terms of productivity this indicates that graduates from the full-time vocational education are more productive than their dual counterparts.

Summarizing, in this section three measures of job performance are discussed, namely wages, performance ratings by the supervisor and career mobility. The two former measures reflect labor productivity at a particular point in time whereas the latter more or less reflects the development of labor productivity in time. This dynamic measure of labor productivity is used to compare career mobility of full-time students and apprentices.

2.4 Different vocational educational systems

Countries differ in their types of vocational education. The educational systems of several western countries are described and evaluated in e.g. Booth and Snower (1996), Gordon, Jallade and Parkes (1994), Prais (1995) and OECD (1996). Gordon et al. (1994) offers the most extensive description of the vocational educational systems in France, Germany and the Netherlands and also pays attention to current improvements, the role of social partners, the financing of vocational education and policy with regard to weak students. Differences in labor productivity of blue collar workers (see Prais 1995) in these countries are shown using an objective productivity measure. With this in hand differences in labor productivity of blue collar workers are related to differences in vocational education. Another report is by Hoeben (1992) who compared productivity of graduates from different types of intermediate vocational education (IVE) in the Netherlands. The results of these two reports are summarized in this section. These results may indicate what the effects might be on labor productivity when introducing dual tracks in Dutch higher education.

2.4.1 Prais' cross-country productivity analysis

Prais (1995) compared the productivity of blue collar workers in four countries (Germany, France, the Netherlands and the United Kingdom) in order to get more insight into the links between training and productivity using an objective productivity measure.

In Germany, France and the Netherlands full-time secondary education is compulsory until the age of 16. At the age of 16 youngsters may continue full-time education or enter a dual educational system in which working and studying are combined. However, in the United Kingdom youngsters do not have to attend any education after the age of 16 which explains the relatively high number of blue collar workers without any vocational qualifications. The
British vocational educational system is not very transparent. There are no specific educational tracks for particular professional fields. Youngsters who do not continue in higher education can continue studying full-time at Further Education colleges. There, they can attend broad based vocational courses where they can get General National Vocational Qualifications (GNVQ’s) or more job-specific courses where National Vocational Qualifications (NVQ’s) can be obtained. Students may study for one or a combination of the qualifications. Apprenticeship training is also possible. In Germany the vocational educational system is dominated by apprenticeship training. In France and the Netherlands, where both full-time and dual vocational education are offered, full-time vocational education is the dominant education.

Matched samples of 165 manufacturing plants in England, France, Germany and the Netherlands are compared on their productivity. Five types of plants were distinguished in which different average skill levels were required, namely (in descending average skills level) engineering, wood furniture, clothing, food manufacturing and hotels. In order to increase the cross-country comparability the plants included in the sample had to be of about the same size (50-300 employees) and had to produce similar products (within a particular branch of industry). Productivity was defined as the number of products produced per employee-hour. The products chosen were relatively simple so that the productivity could be more readily compared. However, even for some products, like cookies in the food industry and clothes in clothing it was necessary to correct for quality differences in produced goods.

Table 2.1 presents the productivity differentials. The quality adjusted figures are given in italics. The productivity figures in Britain were taken as benchmarks; they show the relative difference in productivity compared with Britain. Table 2.1 shows that productivity is lowest in Great Britain and highest in Germany for every investigated type of manufacturing. The productivity differential between the British and German productivity ranges from about 50% in the wood and food industry to about 100% in the clothing and hotel industry. More generally, the results in the table above suggest that both the

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3 The quality adjusted productivity in the food industry equals the product of the physical output per employee-hour times the quality index per unit of output. For the food industry the quality index is based on the average value of sales per ton less cost of raw materials i.e the quality index is a sort of average value added measure with the level of the UK as its benchmark. The quality adjusted productivity in the clothing industry is calculated by comparing the productivity between the two countries (UK as benchmark) in plants which produce an even more similar type of clothing than in the original sample. This 'new' sample contains about 50% of the plants from the original sample. This was done because there were big quality differences in clothing in the original sample.
quantity and the quality of produced goods/services in Britain are lower than in Germany and the Netherlands. The Dutch productivity is somewhat lower than the German productivity.

If the productivity differentials are linked with the differences in vocational education of the laborers in these branches of industry it may be concluded (very cautiously) that there is (some mild) evidence that Prais' productivity differentials seem to favor the apprenticeship training in Germany. The Dutch and French primarily full-time vocational education seem to turn out workers who are slightly less productive than the German workers. The British rather chaotic (vocational) educational system seems to perform worst.

| Table 2.1 |
|------------------|------------------|------------------|------------------|------------------|
| **Productivity differentials per country (Great Britain as reference country)** |
| **Country** | **Branch of industry** | **Engineering (Engin.)** | **Furniture (Furn.)** | **Clothing** | **Food** | **Hotel** |
| France | - | - | - | - | 5 | (25) | na |
| Great Britain | 0 | 0 | 0 | (0) | 0 | (0) | 0 |
| Germany | 63 | 60 | 0 | (100) | -20 | (45) | 200 |
| Netherlands | 36 | - | - | - | 20 | (35) | 100 |


Note: quality adjusted productivity figures are given in italics

Productivity differentials do not seem to depend on the average skills level needed in order to perform well; the differential is highest in the food plants (intermediate skills level needed) and the hotels (lowest skills level needed), intermediate at the two type of plants where the highest average skills level is needed and lowest at the food industry (low average skills level needed).

### 2.4.2 Hoeben's cross-education productivity analysis

Hoeben's (1992) research is on labor market differences between young graduates of four types of intermediate vocational education in the Netherlands of four different sectors (construction, metal, administrative and nursing). An interesting topic in this research is the employer satisfaction with four types of intermediate vocational educational types. Employer satisfaction is a sort of subjective measure of labor productivity and therefore it is interesting which type of education corresponds with the best workers according to the employers.

There are two types of full-time intermediate vocational education differing in length (duration two or four years) and there are two types of apprenticeship
training also differing in length (duration two or four years). Hoeben distin-
guished three job levels (job level 1 refers to simple work, job level 2 to skilled
work and job level 3 to specialized work and/or supervision). Employers were
asked to rate these four types of education between 1 and 4 twice; they were
asked to rate the general level of the education given the job level and to rate the
fit between the education and specific job requirements. These two ratings have
been added up and has resulted in a rating ranging from 2 (job performance is
very bad) to 8 (job performance is very good).

In all sectors and for all job levels the two-year types of training scored much
lower than the four-year types of training. Graduates from two-year dual types
of training scored better at all the three job levels than graduates from two-year
full-time vocational education. In the sectors constructing and metal four-year
apprenticeships were slightly higher valued in the first two job levels than the
full-time four-year vocational training. The latter scored better at the highest
job level in these sectors. In the administrative and in the medical sector the
four-year full-time vocational education graduates scored better at all job levels
than their counterparts from the four-year dual training. However, it should be
noted that these comparisons are based on average ratings of employers and that
the averages between school types of the same length did not always differ very
much. No statistical tests on differences of employer ratings have been reported.
Furthermore, it is unclear whether these differences are a result of the type of
training offered and/or can be explained by student characteristics, i.e. some
sort of selectivity.

The picture emerging is that in the Netherlands four year types of vocational
training turn out more productive workers than two-year types of training at
all job levels, that graduates from short dual training are better workers than
those from short full-time vocational education and that graduates from full-
time four-year vocational education are the best performers at the highest job
level.

The results from Prais and Hoeben indicate that the amount and possibly
also the type of vocational education may influence the labor productivity of
workers. The German dual system seems to turn out the most productive blue
collar workers. Dutch workers (most of them have finished full-time vocational
education) are slightly less productive. The British workers perform worst, which
is possibly due to their intransparent vocational educational system and the fact
that many of them have no vocational qualifications at all. In the Netherlands,
workers from a dual training do well in comparison with people from short
intermediate full-time vocational education. At the higher job levels people
from the long intermediate full-time vocational education seem to perform best.
2.5. **THE EFFECT OF EDUCATIONAL TYPE IN AUDITING**

2.5 The effect of educational type in auditing

In Anglo-Saxon countries some research has been done on job performance and career advancement in audit firms. Type of accountancy training has been taken into account (Lane and Parkin, 1998), but is not applicable to this thesis; in Anglo-Saxon countries there is only an academic educational track in auditing and not a part-time track which combines studying and working. In the Netherlands the effect of having an academic or a part-time training in auditing on auditing expertise type has recently been investigated by Vaatstra (1996). Meuwissen (1999) has also paid attention to type of auditing training in his research on the determinants of career advancement in firms and mobility across firms.

Vaatstra has done three empirical studies using research methods as recall, thinking aloud and knowledge assessment. These studies have been conducted in order to see whether practical experience influences the development of a conceptual knowledge network, whether expert auditors have more domain knowledge than less experienced auditors, whether expert auditors apply their domain knowledge better than less experienced auditors, whether there is a relationship between auditing expertise and type of knowledge and finally whether expertise speeds up the information process.

In her research she distinguished four groups, namely fourth year university students, post graduate university students (2.5 years of experience), post graduate Nivra students (7 years experience) and expert auditors with different levels of knowledge. These people were given case studies on auditing issues. In the first study she examined the relationship between the level of expertise and the application of knowledge. There she found that the different groups did not differ in the use of knowledge on internal control procedures but that they differed considerably in their use of financial knowledge. University students did not apply financial knowledge whereas Nivra students in the same stage of their education did. The Nivra students tried to integrate knowledge about internal control procedures with financial knowledge. Nivra students also made significantly more correct conclusions and interpretations when doing the case. Just like the postgraduate Nivra students the expert auditors integrated knowledge on internal control processes with financial knowledge, but on top of that they also used knowledge on the characteristics of the specific type of company. The second study has been done in order to find out whether the observed relationship in the first study between the level of expertise and the use of financial knowledge could also be confirmed by another research method which it did. In her final study she examined whether the results obtained in
her other studies were caused by a lack of financial knowledge or by a difficulty in using financial knowledge in a specific context. There she found again that the Nivra students were better than the university students. Post graduate university students performed better than the fourth year university students. The experts scored worse than the Nivra students which was explained by the fact that they used less time to finish the case and would have performed better if they had rushed less.

Vaatstra concludes that fourth year university students have a rather extensive and complex knowledge of internal control processes but that their financial knowledge is much less extensive and complex. Knowledge of post graduate university students is higher than that of the fourth year university students. However, post graduate Nivra students outperform the postgraduate university students on both internal control processes and financial knowledge. Furthermore, they seem to have more links between these two types of types of knowledge. Expert auditors appeared to have the largest number of links between these two types of types of knowledge and on top of that they also have links to another type of knowledge namely that of the characteristics of different types of businesses.

Meuwissen (1999) collected data from the membership list of the Royal Nivra. His research topic is related to the topic of this Ph.D. thesis and can be used to compare the results of this Ph.D. thesis with his research results. He investigated inter-organizational mobility and the chances of becoming partner of an audit firms. He used annual data covering the period 1970-1998. This data set does not only contain information on the personal characteristics of the auditor but it also contains information about current and former employers. He found that university educated auditors have a higher probability of becoming partner than auditors with the Nivra education. Other interesting findings were that firm size and changing firms was negatively related to becoming partner.

With respect to mobility across firms Meuwissen found that tenure of auditors is affected by education. University educated auditors have shorter tenures than auditors with the Nivra education. He relates this finding to the relatively general character of the university education. Furthermore, he found that tenure is lower in the small and medium-sized audit firms than in the largest audit firms. In the big audit firms the probability of leaving the firm decreases gradually but in the small and medium sized audit the probability of leaving increases sharply during the first three years and then decreases. He gives as a possible explanation that in these large audit firms auditors are more specialized and have more client specific human capital than auditors working in smaller audit firms which reduces mobility opportunities.
In this chapter a short overview of psychological and economic literature on learning, educational performance and job performance has been given.

According to psychological literature on learning people differ in the way they learn; they have different learning styles. Therefore, the existence of the two types of vocational education may be sensible, because they may serve students who differ in learning style. Student can choose the vocational educational system which develops his occupational skills best. In the economic literature this phenomenon is known as self-selection.

Sociological literature on learning states that the type of vocational educational system which delivers the best prepared students depends on the type of occupation. Occupations in which technical instrumental skills are most important, can best be learned off-the-job (full-time education) whereas occupations in which social-cognitive skills play an important role can best be learned in on-the-job situations (dual system).

Some economists argue that it is more important to investigate the effect of school characteristics on subsequent labor market performance than on school performance, because the primary goal of education is preparing people for the labor market. Several ways have been used to measure someone's job performance, namely by wages, performance ratings by his/her supervisor or by looking at upward career mobility. The former two have a static character and the latter a dynamic one.

Little attention has been paid yet to measure the effect of type of vocational education on job performance. In the Netherlands some research has been done on intermediate vocational education where both educational tracks are common. The results of this research indicate that full-time graduates of intermediate vocational education need more time to find a job than dual graduates. Dual graduates' start at the labor market is better but they face lower promotion probabilities than full-time educated graduates. In the long run, full-time graduates seem to be more productive and have better chances at the labor market. However, it is not clear whether this is caused by the education or by ability differences between the two types of workers. It is also not clear whether these results can be extrapolated to higher education.

From international comparisons it seems that the apprenticeship training as in Germany gives the most productive blue collar workers. Dutch research also indicates that type of vocational education and duration of the education may influence labor productivity of workers. In the Netherlands graduates from short intermediate vocational training are far less productive than their counterparts.
from a three-four year vocational training. People from the 4-year full-time training are more productive in high level jobs than their counterparts from dual training. At lower job levels graduates from the two different long educational types differ hardly in job performance. If these results also hold for higher education the benefits of introducing dual tracks in higher education may not be very large or even negative.

Recently, some research has been done on the effect of type of auditing training on expertise in auditing and on job mobility in auditing. Students from the part-time and full-time auditing training do not differ much in their knowledge on auditing, but there are differences in financial knowledge and links between financial knowledge and expertise in auditing favoring the part-time students in auditing. It is unknown whether these differences are still present a few years after completing the training.

Auditors with a university training have shorter tenures than auditors with a part-time training. This may be caused be the relatively general character of the university training. Part-time educated auditors have relatively much firm-specific human capital and probably less general human capital. This may lower their job mobility.

Based on the study of literature some research questions have been formulated for this thesis:

**Which of the two educational types turns out the most productive employees?**

If one compares two differently educated auditors holding the same job, who will turn out to be the most productive? It is expected that job level plays an important role in answering this question. Auditors of Nivra who have just graduated have more work experience than university educated auditors who have just graduated. Therefore, the Nivra educated auditors are expected to perform better at work during the first years after graduating. However, graduates of the full-time study may become more productive later on in working life because of their more developed theoretical and general skills. A related research question is:

**Do people choose the training system which makes them most productive; i.e. does educational self-selection occur?**

It is possible that each type of accountancy education attracts certain kinds of students. Nivra might e.g. attract students who want to do practical work and who are not interested in theoretical knowledge. For full-time students the opposite might be the case. Each type of student may choose the educational type which suits best with his/her learning style. Another feature which causes selectivity is that the Nivra students must be employed in order to be allowed to
2.6. CONCLUDING REMARKS AND RESEARCH QUESTIONS

It is possible that the employers pick out the most promising students of the pool of applicants for a job as assistant. So it is very well possible that the students are selected somehow to the training types.

In labor economics it is argued that not only measures like wages indicate productivity of workers but that comparing workers’ career paths may also indicate who is most productive. Following this branch of literature results in the following research questions:

**Do auditors of full-time education have different career paths than auditors of the Nivra education?**

Auditors of Nivra are likely to have a better start at the labor market than auditors of full-time educations. This is because they often stay employed with the employer. Auditors of the full-time education on the other hand probably have to search for a job and they might in fact be overqualified for their first job(s). However, they may outperform the former students of Nivra in later years. Because they are more theoretically and generally skilled, they will be more suited for middle and higher management jobs and in times of increasing unemployment they will be less vulnerable; it will be easier for them to switch to other kinds of jobs with better labor market prospects. This paves the way to a related sub-research question:

**Do auditors of full-time education work in a wider range of jobs than auditors of the Nivra education?**

It is very likely that this will indeed be the case. Full-time accountancy training provides relatively more theoretical and general subjects than the Nivra education combined with working as junior auditor. The general skills and theoretical knowledge of full-time educated auditors make it possible for them to learn new skills necessary for successfully performing a somewhat different job relatively easy. Full-time students are expected to be less concentrated at one particular job in one particular sector than Nivra educated auditors.