

CHAPTER 10

Private Returns to Education in the Netherlands: A Review of the Literature

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1 Introduction

Since Becker (1964) and Mincer (1958, 1974), many papers have been devoted to measuring the costs and benefits of education in terms of the internal rates of return of investments in education. By definition, the expected internal rate of return (IROR) is the rate of discount that equates the present value of the expected investment stream to the present value of the expected (additional) benefits stream. The *private* rate of return to education takes account only of privately borne costs and private gains in terms of higher post-tax earnings. The *social* rate of return includes both private and public costs and benefits. In this chapter only attention will be paid to the private returns to education.

In the Netherlands, calculation of the internal rate of return on investment in education has a long tradition (Oosterbeek and Odink, 1990). Several authors estimated 'precise' IRORs, taking into account indirect costs (foregone earnings) as well as direct costs (books, school fees) and grants, child allowances, etc. (De Wolff and Ruiter, 1968; De Wolff and Van Slijpe, 1974; De Boer and Van Ingen, 1981; Odink and Van Breemen, 1983; Odink, 1985; Koss-Fisher, 1988; OSA, 1994). Other authors took a more simple approach and estimated earnings equations with years of education as one of the explanatory variables. This chapter focuses mainly on this last group of studies.

We start with a description of the main features of the Dutch educational system. Next, we discuss the data sets that have been used for research on returns to education in the Netherlands. In Section 4, the empirical literature on returns to education in the Netherlands is reviewed. For each study, we briefly discuss the specification of the earnings equation, the data set(s) used, and the main results. Special attention will be paid to some recent studies using instrumental variable (IV) techniques, and to a comprehensive trend study, conducted by Hartog, Oosterbeek and Teulings (1993), in which coefficients of Mincerian earnings equations are estimated for the period 1962–1989. These coefficients are based on the same model specification and on rather well comparable data from the Dutch Structure of Earnings surveys and the OSA panel. We will also discuss some papers focussing on the human capital versus screening interpretation of the relationship between

education and income and on the issue of under- and overeducation. Finally, in Section 5, the main findings for the Netherlands are summarised and some general conclusions will be drawn.

2 The Dutch school system

A recent overview of the Dutch school system can be found in Odink and Kunnen (1998), on which this section heavily leans. Useful information on the Dutch educational system can also be found in Groot and Oosterbeek (1994) and on the website of the Dutch Ministry of Education, Culture and Science (<http://www.minocw.nl/english/kern/kern99gb/index.htm>).

One of the most striking features of the Dutch system is the combination of the almost complete centralisation of the administration by the state, along with the fact that the great majority of basic and secondary schools are private. This is due to the school struggle between Roman Catholics and Protestants in the nineteenth century, which resulted in the right for every (e.g. religious) group to have its own schools financed by the same system as the public schools. Hence, the private schools in the Netherlands are subsidised for just under 100 per cent. As a result, there are hardly any differences in school quality between different schools of the same type, nor between private and public schools.

In the Dutch educational system, *Primary education* consists of a uniform programme of eight years (age 4–11) of which the first two years are early childhood education and of which seven years are compulsory (age 5–11).

Secondary education consists of another six compulsory years of schooling; four years full-time (age 12–15) and another two years (age 16–17) full-time or part-time apprenticeship (LLW).

During the first three years of compulsory education, all the secondary schools now have to teach the same 15 subjects, although at different levels. These subjects are almost all non-vocational. After primary education the pupil may choose between two different levels of secondary education, which last four to six years before graduating: *Lower secondary*, consisting of four years of pre-vocational education (VBO) or four years of junior general

secondary education (MAVO), and *upper secondary*, consisting of five years of senior general secondary education (HAVO), or six years of pre-university education (VWO). Students with a VBO or MAVO certificate are entitled to enter senior secondary vocational education (MBO).

Tertiary education in the Netherlands implies in general four additional years of higher professional education (HBO) or at least four years of university education (WO).

Standard and alternative paths

Within the Dutch educational system, there are many (re)switching opportunities for the pupil. Many schools combining more than one type of secondary education start with a transition period of one or two years before the children have to choose between the types. At the end of each school year, pupils generally are allowed to choose for one level lower without losing a year, even if they failed to pass. After the first year, they may choose for one level higher if they have good marks. After graduating from secondary school, they have the right to choose for another secondary school, one level higher, which will cost them one year. And there are many other alternative paths from which Dutch students may choose (see for example Groot and Oosterbeek, 1994).

Standard (short) paths are the paths where the highest possible level is chosen that is allowed according to the secondary school exam. These standard paths are:

VBO -> MBO
 MAVO -> MBO
 HAVO -> HBO
 VWO -> WO

Within the system longer paths than the standard paths are allowed: *stacking paths*, *long educational paths*, and *roundabout paths*. Stacking means that after completing a certain path, the student may take a second course. For example, after MBO the students may go to HBO, after HBO they may go to university, and even the path MBO -> HBO -> university is possible. Long paths start at a level that is lower than necessary for the final level attained. The first type of general education is followed by a higher type of

general education. For example, MAVO → HAVO → HBO or HAVO → VWO → university. Both paths cost an additional year of schooling compared to the standard path. Roundabout paths are paths which include an unnecessary intermediate stage. For example, HAVO → VWO → HBO costs two additional years.

Finally, it should be mentioned that graduating gives formal rights. A VWO exam, for example, entitles the student to choose, among other things, for a study of law at any of the nine Dutch universities with a law department and for a study of economics at any of the six universities with a department of economics. The university departments have not the right to select students. Selection takes place at the end of the first year. As a result, the dropping out rates are high at Dutch universities.

3 Data sets

Several studies of the rate of return to education in the Netherlands use data from the *Structure of Earnings Survey* (SOE) of the Dutch Central Bureau of Statistics (CBS). In 1962, 1965, 1972 and 1979, large cross-sectional employer surveys were held in which information on gross earnings, educational level, sex, age, and industry of employees was gathered. In 1985 and 1989, the same information was obtained by gathering additional educational information for a sub-sample of the yearly *Wage Survey*, which is an employer survey normally including no information on education. In 1995, the Structure of Earnings Survey was created by combining information at the individual level of three different data sources: the 1995 Employment and Wages Survey, the 1995 Insured Persons Register, and the 1994–1996 Labour Force Surveys. The number of respondents in the SOE was very large (more than 100,000) in the period 1962–1979, about 10,000 in 1985, about 30,000 in 1989, and about 125,000 in 1995.

Another important data source for the estimation of returns to education is the *OSA panel*, a panel survey conducted by the Organisation for Strategic Labour Market Research (Organisatie voor Strategisch Arbeidsmarkt Onderzoek), or OSA. The first wave of this OSA panel was held in 1985 and subsequent waves were held in 1986, 1988, 1990, 1992, 1994, and 1996. This survey pertains to

individuals aged 16 to 64, and contains detailed information on (changes in) labour market situation and education. The number of respondents is about 4,500.

Other data sets that have been used for this kind of research are the *NPAO labour market survey*, the *Brabant cohort*, and the *Socio-Economic Panel*. The NPAO survey is a cross-sectional data set with information on occupational mobility, earnings and schooling of 2,677 respondents. It was conducted in 1983 by the National Program for Labour Market Research (NPAO). The Brabant data contain information on schooling, family background, and intelligence for a one-year cohort of pupils who in 1952 were in the sixth grade. In 1983 1,613 of the 1,879 original male respondents were re-interviewed and information on their education, labour market situation and earnings was gathered. In 1993, these respondents were approached again, to collect new information about their labour market experiences in their 40s and to collect information on the educational attainment of their children. The Socio-Economic Panel (SEP) of the Dutch Central Bureau of Statistics started in 1984 and was held twice a year until 1989. From 1990 until now, the survey among 5,000 households (13,000 individuals) has been held once a year. It contains a broad set of variables on personal and household characteristics including education, wage and income.

4 Review of the empirical literature

4.1 Cross-sectional findings

In Table 1 an overview is given of previous studies in which earnings equations were estimated with education and (an indicator of) experience among the explanatory variables. In each of these studies the dependent variable is the natural logarithm of the gross or net hourly wages. Some of the analyses (Hartog and Oosterbeek, 1988; Hartog et al., 1993) are focussed specifically on the estimation of rates of return to education and use the standard Mincerian model specification:

$$\ln(W) = a + b * EDUC + c * EXP + d * EXP^2$$

where W is the hourly wage rate, EDUC is education, defined as years of schooling (after primary education), and EXP is potential experience, defined as $(AGE - EDUC - 12)$. Other studies were conducted for other purposes and deviate to some extent from the standard Mincerian form, by using levels instead of years of edu-

Table 1. Overview of previous studies including earnings functions for the Netherlands with years or level of schooling as (one of the) independent variables

Author(s)	Code	Year(s)	Data set	N	Wage	Educ	Exp/ age*	Exp ² / Age ² *	Other var.**	Gender
Ordinary Least Squares (OLS):										
Schippers (1986)	S86	1982	NPAO	703	gross	Years	1,3	3	4	separate
Schippers & Siegers (1986)	SS86	1982	NPAO	681	gross	Years	1,3	3	4	separate
Hartog & Oosterbeek (1988)	HO88	1982	NPAO	540	net	Years	3	3	1	separate
Bierens & Hartog (1988)	BH88	1979	LSO	2000	gross	levels	1,3		4	dummy
Mekkelholt & Hartog (1989)	MH89	1986	OSA	1981	net	levels	1,3		31	dummy
De Wit & Van Winden (1989)	WW89	1983	Brabant	1061	net	years	3		13	dummy
Hartog, Oosterbeek & Teulings (1993)	HOT93	1962-89	LSO, NPAO, OSA	varies	gross/ net	years	2	2	1	males
Gelderblom et al. (1994)	GEA94	1990	OSA	1737	net	years	1	1	3	dummy
De Koning et al. (1996)	KEA96	1994	OSA	2211	gross	years	3	3	3	dummy
Odink et al. (1997)	OEA97	1994	OSA	2211	gross	years	3	3	7	dummy
Instrumental Variable (IV):										
Kalwij (1996)		1986-89	SEP	5592	gross	years	3	3	2	males
Levin & Plug (1998)		1983	Brabant	741	net	years	2	2	2/3	males
		1994	OSA	1320	net	years	1	1	2	males

Notes: Educ=Education; Exp.=Experience.

* 1=Age; 2=Potential experience; 3=Actual experience.

** Number of explanatory variables other than schooling.

cation, by using age or actual experience instead of potential experience, and by adding extra explanatory variables to the equation. Most studies use ordinary least squares (OLS), but a few recent ones (Kalwij, 1996; Levin and Plug, forthcoming) present Instrumental Variables (IV) estimates. One study (Hartog et al., 1993) presents comparable schooling and experience coefficients for more than one point in time. The results of the IV analyses and of the trend analysis will be discussed separately.

The coefficients of the schooling variables found in the Dutch studies are presented in Tables 2, 3 and 4. Schippers (1986) and Schippers and Siegers (1986) used the 1982 NPAO labour market survey to estimate earnings equations with the gross hourly wage as the dependent variable. Besides education in years, their equation included actual experience, actual experience squared, age and some other explanatory variables. Schippers (1986) found the rate of return to one year of extra schooling for males to be 6.5 per cent in the private sector of the economy and 4.4 per cent in the public sector. For females the rate of return was somewhat higher in the private sector, 8.6 per cent, and somewhat lower in the public sector, 3.9 per cent. Schippers and Siegers (1986) found the rate of return to be 6.3 per cent for married males and 5.5 per cent for married females. Hartog and Oosterbeek (1988) also used the NPAO survey, but took the net hourly wage as dependent variable. As explanatory variables they used education in years, actual experience and actual experience squared. These authors found the rate of return to be 6.5 per cent for males and 4.7 per cent for females.

Bierens and Hartog (1988) estimated the effect of the *level* of education on gross hourly wages for all employed persons on Structure of Earnings survey data from 1979. Using seven educational levels, they found the rate of return to education to be 13.3 per cent. Mekkelholt and Hartog (1989) also used educational levels instead of years. They found a much lower rate of return, 3.2 per cent. But their analysis differed from Bierens and Hartog's in the data set that was used (OSA 1988), in the use of net instead of gross hourly wages as the dependent variable, and in the use of much more (31) other explanatory variables in the equation.

De Wit and Van Winden (1989) found the rate of return to one year of extra education in terms of net hourly wages to be 3.2 per cent for employees and 3.0 per cent for self-employed workers. These

Table 2. Estimation results for rates of return to education in previous research using OLS

Code	Year(s)	Hourly wage	Sample	Education	Adj. R ²
S86	1982	Gross	Males private sector	0.061	41
	1982	Gross	Males public sector	0.044	40
	1982	Gross	Females private sector	0.086	50
	1982	Gross	Females public sector	0.039	38
SS86	1982	Gross	Married males	0.063	26
	1982	Gross	Married females	0.055	30
BH88	1979	Gross	All	0.133	58
HO88	1982	Net	Males	0.065	33
	1982	Net	Females	0.047	32
MH89	1986	Net	All	0.032	41
WW89	1983	Net	Employees	0.032	37
	1983	Net	Self-employed	0.030	10
GEA94	1990	Net	All	0.030	43
KEA96	1994	Gross	All	0.051	39
OEA97	1994	Gross	All	0.064	42

authors used the 1983 wave of the Brabant cohort data set. Their analysis differed from the foregoing ones in that it has IQ and social status of family background among the explanatory variables. The low rate of return to education in this study might also be due to the fact that all respondents in the Brabant cohort are of the same age (43 in 1983). This might lead to an underrepresentation of the higher income groups and hence to an underestimation of the returns to schooling.

A rather low rate of return to education in terms of net hourly wages was also found by Gelderblom, Hoen and Koning (1994), using the OSA 1990 data. These authors estimated a simple model with, besides education in years, age, age squared, working hours, working hours squared and a dummy for gender. They found the rate of return to one extra year of education to be 3.0 per cent. Somewhat higher rates of return, in terms of gross hourly wages, were obtained by De Koning et al. (1996) and by Odink et al. (1997), who found rates of return of 5.1 and 6.4 per cent, respectively. These two studies used the same data (OSA 1994) but the specification of the educational variable differed in that De Koning et al. used the real number of

years of schooling of the respondents, whereas Odink et al. used the normal number of years it takes to complete the highest educational level attained by the respondents.

4.2 Trends

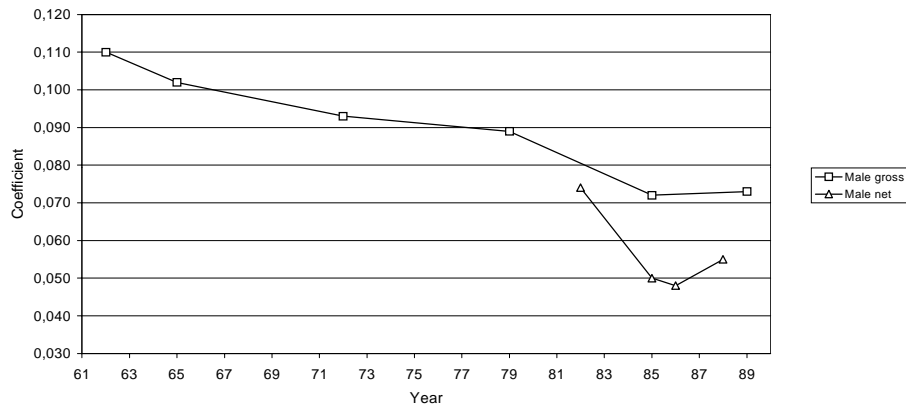
A comprehensive analysis of the trend in returns to education in the Netherlands was conducted by Hartog et al. (1993). These authors estimated 14 Mincerian earnings equations for the period 1962–1989, using crosstabulations from the Structure of Earnings surveys and individual-level data from the 1982 NPAO survey and the 1985, 1986 and 1988 OSA panel waves. In Table 3 and Figure 1 their major findings are presented. We see that from 1962 to 1985 the returns to education in terms of the gross hourly wages of males show a gradual decrease from 11 per cent to slightly more than 7 per cent and from then on to 1989 remain about stable.

Table 3. Mincer models for the log hourly wages of Dutch males, 1962-1989

Year	Wage	Sample	Const.	Educ.	Exp.	Exp. ²
<i>Structure of Earnings Survey</i>						
1962	Gross	White collar >25	-0.320	0.110	0.059	-0.077
1965	Gross	White collar >25	0.095	0.102	0.057	-0.076
1972	Gross	White collar >25	0.838	0.093	0.056	-0.080
1979	Gross	All >25	1.450	0.089	0.038	-0.054
1985	Gross	All >25	1.740	0.072	0.038	-0.052
1989	Gross	All >25	1.740	0.073	0.040	-0.056
<i>NPAO/OSA Surveys</i>						
1982	Net	All	1.283	0.074	0.040	-0.050
1985	Net	All	1.480	0.050	0.040	-0.060
1986	Net	All	1.624	0.048	0.032	-0.040
1988	Net	All	1.410	0.055	0.040	-0.050

Notes: Educ=Education in years; Exp.=Potential experience; Exp.²=Exp²/100.
Source: Hartog, Oosterbeek & Teulings, 1993: Table 8.4.

Figure 1. Effect of one additional year of education on the log hourly wage of male workers in the Netherlands



Source: SOE 1962-1989; NPAO 1982; OSA 1985-1988)

In the analyses with the (log) net hourly wage as the dependent variable, we see a rather strong decrease between 1982 and 1985, (which may be an artefact caused by the use of different data sets) and a small increase between 1985 and 1988.

4.3 Human capital versus screening

According to human capital theory, returns to education are due to the fact that schooling is productivity augmenting. Education pays because valuable skills are learnt in school. An alternative explanation, however, focuses on the information about individuals generated by schooling. Completing an education is indicative of the individual's learning ability, stability of character and perseverance. Education functions as a screening or signalling device. To differentiate between these explanations, Hartog (1983) compares the earnings of individuals who attended a certain educational level but did not obtain a diploma, with the earnings of individuals who graduated from that level and did not continue to the next higher level. He uses data from a nation-wide survey held in 1977.

For the lower and intermediate educational levels no significant effect of graduation is found. Hence, at these levels the diploma seems not to be used as an effective screening device. At the tertiary level, a significant negative effect of the graduation gap – that is, the number of years short of graduation for those who did not graduate – is found. The effect of a year of nongraduation turns out to be of about the same size as the earnings gain per year at school. This result is compatible with a gradual skill-augmenting view of education, and hence with the human capital model.

Evidence in favour of the human capital theory is also found by Groot and Oosterbeek (1994). Using the 1983 wave of the Brabant cohort data they study the effect of dividing actual years of schooling into effective years, repeated years, skipped years, inefficient routing years and drop-out years. They find a negative effect of class-skipping, a neutral effect of class-failing and a positive effect of years spent in schooling without obtaining a diploma; all in line with the predictions of the human capital hypothesis and contrary to what was expected on the basis of the screening hypothesis.

4.4 Undereducation and overeducation

To capture the effects of the individual's overeducation and undereducation, Hartog and Oosterbeek (1988) and Oosterbeek and Webbink (1996) use the so-called ORU specification of the standard earnings function (Hartog, 2000), with separate variables for Over-, Required, and Undereducation. Hartog and Oosterbeek use the 1982 NPAO labour market survey and Oosterbeek and Webbink the IALS data (OECD, 1995). In both studies the returns to overeducation are found to be significantly positive, but somewhat smaller than the returns to required education. The returns to undereducation are found to be negative, and to be smaller than the returns to required education and to overeducation. These findings are largely in line with the results of studies on the effects of over- and undereducation for other countries (Hartog, 2000).

4.5 Ability bias and endogeneity of schooling

Several problems might bias the estimation of returns to schooling using the standard Mincerian earnings equation: the endogeneity

of the schooling decision, the lack of adequate measures for ability, and measurement errors with regard to the schooling variable (Card, 1999). It is very well possible that the choice for a certain type of schooling is related to one's earnings potential. Individuals with higher ability may take more years of schooling or, alternatively, they may leave school earlier because they can make a lot of money anyway. Institutions for higher education may also select their students on the basis of ability test scores or their performance in primary or secondary education.

In an early study on the internal rate of returns to education in the Netherlands, De Wolff and Van Slijpe (1974) used Swedish data to make an estimation of the proportion of the difference in income between educational levels that can be attributed to education (see also De Wolff & Van Slijpe, 1974). They found this proportion to be 31.4 per cent. More recently, Kalwij (1996) and Levin and Plug (forthcoming) have employed instrumental variable (IV) techniques, to control for the endogeneity of schooling. The results of their analyses are presented in Table 4.

Table 4. Estimation results for rates of return to education in previous research using Instrumental Variable techniques (IV)

Code	Year(s)	Wage	Sample	Technique	Instrument	Educa- tion	Adj. R ²
K96	1986- 1989	Gross	Male	OLS		0.069	31
	1986- 1989	Gross	Male	IV	Age	0.148	14
LP98- Brabant	1983	Net	Male	OLS		0.024	27
	1983	Net	Male	IV	Family background	0.045	23
	1983	Net	Male	IV	Season of birth	0.164	22
	1983	Net	Male	IV	School leaving age	0.027	23
LP98- OSA	1994	Net	Male	OLS		0.036	36
	1994	Net	Male	IV	Family background	0.050	27
	1994	Net	Male	IV	Season of birth	0.040	25
	1994	Net	Male	IV	School leaving age	0.064	23

Kalwij (1996) exploits the fact that older individuals on average have less schooling than younger individuals, to construct an instrument to control for the endogeneity of schooling. He uses the 1986, 1987, 1988 and 1989 waves of the Dutch Socio-Economic Panel and finds the rate of return to education to be 6.9 per cent in a baseline OLS model and to increase to 14.8 in the IV model. Levin and Plug (forthcoming) experiment with three different instruments: family background (parental education and job level), season of birth, and changes in compulsory school leaving age. Their data sources are the 1983 Brabant Survey and the 1994 wave of the OSA panel. As can be seen in Table 4, the rate of return in their IV models is higher than in the baseline OLS models. The family background instruments – parental education and job level – perform best in the Dutch situation. These instruments have significant influence on schooling while exerting a negligible influence on earnings.

The general conclusion of the IV analyses is that in the Netherlands, as in most other countries (e.g. Card, 1999; Ashenfelter, Harmon & Oosterbeek, 1998), using OLS to estimate the rate of returns to education leads to an underestimation of the true schooling effect.

5 Conclusions

Given the results of the previous analyses of the rates of return to education in the Netherlands, some general conclusions can be drawn:

- The rate of return to education in terms of the gross hourly wage of males in the Netherlands was about 11 per cent in 1962. From then on it decreased to about 7 per cent in 1985, and remained at about that level between 1985 and 1989.
- The rate of return to education in terms of the net hourly wage is generally somewhat lower than the rate of return in terms of the gross hourly wage.
- There are only a few studies in which comparable equations for males and females were estimated and these studies all use the same data set: the 1982 NPAO labour market survey. The

results of these studies suggest that in the early 1980s the average rate of return to education for females was somewhat lower than for males.

- The results of tests of the human capital explanation of the relationship between education and earnings versus the screening explanation of this relationship tend to support the human capital explanation of the relationship.
- The returns to overeducation are positive, but somewhat smaller than the returns to required education. The returns to undereducation are negative, and smaller than the returns to required education and to overeducation.
- Estimates of rates of return to education on the basis of instrumental variable techniques are higher than estimates based on OLS.

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