Pergamon

Economics of Education Review, Vol. 17, No. 3, pp. 245–256, 1998

Printed in Great Britain
0272-7757/98 $19.00+0.00

PII: S0272-7757(97)00064-2

Health, Wealth and Happiness: Why Pursue a Higher Education?

JOOP HARTOG and HESSEL OOSTERBEEK§

University of Amsterdam, Department of Economics, Roetersstraat 11, 1018 WB Amsterdam, The Netherlands

Abstract—We explore the effect of schooling on health, wealth and happiness for a cohort of Dutch individuals born around 1940. We also use observations on childhood IQ and family background. The most fortunate group is the group with a non-vocational intermediate level education: they score highest on health, wealth and happiness. We find that IQ affects health, but not wealth or happiness. Family background level increases wealth, but neither health nor happiness. With a father who worked independently, health, wealth and happiness are higher. Women are a miracle: compared with men, they are less wealthy, equally healthy but they are definitely happier. [*JEL* I10, J24, D31, D63] © 1998 Elsevier Science Ltd. All rights reserved

1. INTRODUCTION

IN ITS general formulation the human capital theory treats schooling as an investment that may produce different types of returns. Schooling may be beneficial for such different outcomes as: labour market performance, success in the marriage market, health and many other variables. An extensive survey by Haveman and Wolfe (1984) lists 24 different outcomes that are believed to be affected by schooling. Nonetheless, the focus in this literature is on labour market outcomes such as employment probability and earnings. Ignoring other types of returns to schooling seriously affects policy conclusions of studies about rates of returns. This holds, for instance, in the discussion on overschooling. Individuals are called overschooled when they hold a job that does not require the amount of schooling they have attained. It is then implied that this is inefficient, a waste of resources. But it is quite conceivable that other benefits of schooling contribute significantly to the returns. A similar example relates to the comparison of formal schooling and training. The conclusion of underinvestment in training, relative to schooling and based on lower estimated rates of return to training, may similarly be drawn too hastily if other returns to formal schooling exceed those to training.

In this paper we present some new evidence on the "other" returns to schooling. We will focus on the returns in terms of health status, financial wealth and happiness. We include indicators of intelligence and social background into our empirical analysis. Besides purging the estimated schooling effect of biases, this provides us with information about the relative contributions of schooling, intelligence and social background. The topic attracted renewed attention following the publication of *The Bell Curve* by Herrnstein and Murray (1994), who claim that intelligence is the dominant factor in explaining a large number of different outcomes (among others: earnings, employment, poverty, welfare dependency and crime). Interest in the returns to schooling has also received an impetus from renewed attention for the endogeneity of schooling (Card, 1994).[1]

For our analyses we use a unique Dutch data set that has very detailed information about individual intelligence and social background at age 12, and about schooling and health status, wealth and happiness later in life. The data refer to a birth cohort (born in 1940) for which the outcome variables are measured at age 53.

One of the variables we study here is happiness. This is not a common focus in economic research. One may argue that happiness is quite close to the key concept of utility. Standard theory takes utility to be something beyond the immediate reach of the analyst, a ranking of alternatives that cannot meaningfully be observed other than as an *ex post* reconstruction from observed choices. In our view this is to neglect an opportunity. Indeed, research exists that does not impose this voluntary blindfold. In labour economics, survey responses about job satisfaction have been analyzed as meaningful indicators of worker preferences (e.g. Clark and Oswald, 1996).

§Corresponding author.

Van Praag (1991) has developed a direct welfare measure of income and obtained many interesting results with it . In other social sciences, measures of happiness have been analyzed.

In this paper, we look for some other effects of schooling than the well documented effect on earnings. Section 2 gives a brief summary of earlier research about the relations between schooling and health, schooling and wealth, and schooling and happiness. Section 3 introduces the dataset and describes the variables that we use. Sections 4–6 present and discuss the empirical findings. Section 7 concludes.

2. SUMMARY OF EARLIER RESEARCH

2.1. Health

The economics literature analyzing health, draws heavily on the theoretical work by Grossman (1972). Grossman presents a model in which an individual's health is treated as a choice variable which produces direct utility and increases the person's productivity. More highly educated persons are assumed to be more efficient producers of health; they have less unhealthy habits and visit their doctor when required. This relates to the direct effect of schooling on health, but other mechanisms may be at work as well. First, Fuchs (1982) points to different time preferences between people with more or less education and, since health can be regarded as an investment good, individuals with lower discount rates (higher educated) may invest more in their health stock. In this case the relation between schooling and health is artificial; an individual's discount rate affects both schooling and health choices. Second, working conditions may operate as a mediating variable in the connection between health and education. Kemna (1987) attempts to merge the compensating wage literature and the health education literature. Finally, causality may run in the opposite direction: the health status of young children may affect their education choices. Correlation of health status across age will then generate the observed relation (Perri, 1984).

An empirical model that captures all possible relations between schooling and health is very involved. Different variables are potentially endogenous (health, education, occupation, working hours) and causality may operate in different directions. Empirical studies, therefore, tend to focus on a limited number of relations and assume that some potentially endogenous variables are exogenous and/or preclude some possible causalities. Kemna (1987) concentrates on the direct effect of schooling on health and on the indirect effects through the demand for job hazards and the demand for medical care; schooling is treated as an exogenous variable. He finds "that the direct effect of schooling is by far the most important, explaining from 70% to 95% of the total effect of schooling on health" (p. 205). Berger and Leigh (1989) estimate a model in which both schooling and health are endogenous and are allowed to affect each other; working conditions are exogenous. They conclude that "the results uniformly indicate that the direct effect of schooling on health is more important than the effect of unobservables" (p. 433). Haveman *et al*. (1994) develop a model in which health status, work-time and wages are endogenous and they allow for a rather flexible structure of the disturbance terms. In this model schooling is treated as an exogenous variable. They find that "the primary impact of education on health is direct" (p. 175). Behrman and Wolfe (1989) estimate random and fixed effect models, and conclude that women's schooling positively affects their health and nutrient intakes; the positive relation between schooling and health does not reflect ability, knowledge or tastes. Behrman and Lavy (1994) estimate the influence of a child's health condition on achievement in school and conclude that "there is not evidence of an impact of the observed range of child health on child cognitive achievement" (p.x).

In summary, the empirical evidence seems to indicate that the positive correlation between schooling and health is caused by a direct effect of schooling on health. This result supports the approach followed in this paper in which we estimate single equation models with health as the dependent variable and schooling as one of the regressors.

2.2. Wealth

Wealth and wealth inequality between individuals has been extensively analyzed. One approach focuses on the size distribution of wealth and on effects of such factors as marriage and inheritance on the dynamics of the distribution. While the role of saving behaviour is acknowledged, it is mostly a study of the rich (see Atkinson, 1976 for an overview). The other prominent approach is essentially a study of lifetime accumulation behaviour. Savings, and hence accumulated wealth, will depend on (expected lifetime) income, interest rates, time preference and risk attitudes. This has a vast literature.[2]

In the U.S., a literature has developed that seeks to measure the relative contribution to wealth accumulation of the life-cycle pattern of savings and consumption and that of transfers, *inter vivos* and through bequests. As Gale and Scholz (1994) indicate, there is a wide range of estimates. Some claim that at least 80% of net worth can be explained by life-cycle saving, while others find the opposite, with life-cycle saving contributing no more than 20%. Gale and Scholz estimate that *intended* transfers (*inter vivos*, bequests, college expenses for offspring) can explain more than half of net worth accumulation.

In the research presented here, we use data on individuals all about 53 years old. This is an age at which life-cycle saving, meant for consumption by the end of life, should have substantial impact on the stock of wealth. We might then expect a strong correlation with level of education from the relation between education and wages and from the presumption that

those who invest more in schooling have a strong life-cycle perspective and a low discount rate. However, to the extent that transfers and educational attainment both correlate with parental background, we may also expect a positive relation between wealth and education through the channel of transfers from well-to-do parents. Consequently, it is important at least to control for family background when not knowing the origin of wealth.

2.3. Happiness

Before the ordinalist revolution of the late nineteenth centrury, happiness was a leading variable among economists. In the utilitarian approach, happiness and utility were beacons in policy analyses. However, in this century, utility has become a simple index for ranking alternatives, without reference to measures of individuals' well-being, and only to be discovered from observed choices. Other social scientists have been less neurotic about direct measurement by the individual's own assessment. The "overall satisfaction with the quality of life" has been measured extensively. Recently, some economists have joined this approach (Clark and Oswald, 1994, 1996; Woittiez and Theeuwes, 1995).

Happiness, operationally defined as the overall satisfaction with quality of life, has been demonstrated to be a valid and reliable concept (Veenhoven, 1996). It's a concept with a good test-retest reliability, international comparability and appears not to be a fixed trait but responsive to individuals' changes in circumstances and in very plausible ways. Of course, this is not to deny the importance of measurement errors and biases relating to framing and the technique of interrogation.

A large body of research, summarized by Veenhoven in a number of publications (see Veenhoven, 1996 for an overview), has brought up some empirical regularities. Aggregate scores of happiness vary across nations in relation to national income, with diminishing marginal utility: there is a strong positive relation for poor countries that flattens out for rich countries. The result is an extension and corroboration of earlier research by Cantrill (1965), and refutes claims to the contrary by Easterlin (1973, 1974). Individual scores within countries are also related positively to income; a correlation that is stronger in developed countries than in developing countries. According to Veenhoven (1996), the effect of gender is small and variable. Education correlates strongly (and positively) with happiness scores in poor nations and weakly in rich nations. Recently, in developed nations even negative correlations are found. Happiness is generally found to be unrelated to intelligence as measured by concurrent tests.

Clark and Oswald (1994) measure unhappiness as a composite score of psychological distress. In their British data, happiness, or mental well-being, is negatively correlated with unemployment and education (three levels), positively with health, while the relation with income is inconclusive. Being separated or divorced reduces happiness, being widowed or married has no effect, relative to being single. Woittiez and Theeuwes (1995) use the same measure of happiness as we do (the Cantrill (1965) scale, see below). In their Dutch dataset, they find happiness to be positively related to income and health, higher for women than for men, higher for the married than for the widowed and the divorced (with no difference between these two).

We conclude that happiness is a legitimate and valuable variable for research, that it relates positively to income and health, and that the positive relation with education appears to be eroding in richer countries.

3. DATA AND CHOICE OF VARIABLES

The dataset that we use is the Brabant survey. In 1952, one quarter of the sixth-grade pupils (about 12 years old) in the Dutch province of Noord–Brabant were sampled, collecting information on school performance, intelligence and family background. In 1983 the same persons were interviewed, with data collection focused mainly on education, labour market position and earnings.[3] In 1993 we re-interviewed the respondents; in addition to new questions relating to education, labour market position and earnings, we also included questions on children, on health status and on happiness. In the present paper we only use information from the data collections in 1952 and 1993. In 1993 we sent out 4462 questionnaires; 2050 valid forms (46.4%) were returned. Non-response in 1983 was analyzed in Hartog (1989) and found to be harmless; the analysis was not repeated on the 1993 wave. After deleting the persons that have missing values on their health status, amount of wealth or happiness score, we are left with 1893 records that can be used for our analysis.

The explanatory variables that we include in our analysis can be divided into four categories: schooling variables, ability variables, social background variables and other control variables. The observations on the variables are characterized in Table 1.

For schooling, we use dummies for seven different levels: elementary, lower vocational, intermediate general, intermediate vocational, higher general, higher vocational and university. The Dutch system of education has an academic track and a vocational track, up to the highest level. They are not closed tracks however: from "higher general", a secondary level education, one may continue either to the university or to a higher vocational education. In this cohort, the latter had a shorter duration, mostly because university training left students with much freedom for a prolonged stay. We use a separate dummy to indicate whether the respondent obtained a certificate from the highest level attended.

For ability, we have the IQ scores at age 12. The IQ test was specially designed for the purpose of the

Table 1. Descriptive statistics

Variables	Mean	Standard deviation	Minimum	Maximum
Happiness				
= 0 (lowest)	0.005	0.073	0	1
= 1	0.004	0.065	0	1
= 2	0.008	0.089	0	1
= 3	0.012	0.110	0	1
= 4	0.025	0.156	0	1
= 5	0.076	0.265	0	1
= 6	0.118	0.323	0	1
= 7	0.276	0.447	0	1
= 8	0.336	0.472	0	1
= 9	0.090	0.286	0	1
= 10 (highest)	0.050	0.217	0	1
Health status				
Very poor	0.026	0.159	0	1
Poor	0.119	0.324	0	1
Fair	0.174	0.379	0	1
Good	0.471	0.499	0	1
Excellent	0.210	0.407	0	1
Wealth (*x*; guilders)				
$x < -50{,}000$	0.057	0.232	0	1
$-50{,}000 < x < -10{,}000$	0.046	0.209	0	1
$-10{,}000 < x < 0$	0.016	0.129	0	1
0	0.078	0.268	0	1
$0 < x < 10{,}000$	0.060	0.237	0	1
$10{,}000 < x < 50{,}000$	0.114	0.318	0	1
$50{,}000 < x < 100{,}000$	0.129	0.336	0	1
$100{,}000 < x < 250{,}000$	0.267	0.443	0	1
$250{,}000 < x < 500{,}000$	0.144	0.351	0	1
$x > 500{,}000$	0.089	0.284	0	1
Average wealth	154,350	166,915		
Schooling variables				
Lower vocational	0.290	0.454	0	1
Lower general	0.076	0.265	0	1
Intermediate general	0.161	0.368	0	1
Intermediate vocational	0.290	0.454	0	1
Higher general	0.036	0.187	0	1
Higher vocational	0.172	0.378	0	1
University	0.036	0.186	0	1
Education missing	0.087	0.282	0	1
Graduated	0.801	0.399	0	1
Dropout	0.127	0.333	0	1
Not yet finished	0.007	0.083	0	1
Certificate missing	0.065	0.247	0	1
Intelligence variables				
IQ p.m./100	103.09	13.36	75	146
IQ w.s./100	102.85	13.03	73	146
IQ p.m. missing	0.148	0.355	0	1
IQ w.s. missing	0.152	0.359	0	1
Background variables (social)				
Father's education	2.46	0.730	1	6
Father's education missing	0.320	0.467	0	1
Mother's education	2.25	0.530	2	6
Mother's education missing	0.322	0.467	0	1
Occupation father high	0.028	0.165	0	1
Occupation father intermediate	0.107	0.309	0	1
Father self-employed	0.323	0.468	0	1
Occupation father low	0.439	0.496	0	1
Number of siblings	5.02	3.38	0	14
Number of siblings missing	0.060	0.238	0	1
Social status low	0.060	0.238	0	1
Social status missing	0.092	0.289	0	1
Female	0.381	0.486	0	1
Gender missing	0.021	0.142	0	1

Note: Total number of observations = 1893.

survey in 1953. It is divided into two tests. IQ p.m. ("progressive matrices") focuses on mathematical ability, IQ w.s ("woordenschat", vocabulary) focuses on verbal ability. The simple correlation coefficient is only 0.35. We test whether both dimensions of ability affect our variables of interest in a similar manner. IQ p.m spans the range 75–146, IQ w.s spans the range 73–146.

We also have information on social background, observed by the schoolteacher when the child was in sixth grade. We have the level of education of both parents, in six levels. We have information on the father's occupation, measured in dummies: low, intermediate, high and independent. The school teacher was also asked to rate the social standing of the family, distinguishing between normal, weakly social and definitely antisocial. We combined the latter two with a dummy for low social status. The number of siblings was also reported. The average of five signifies that the observations are from the Catholic province of Brabant, where large families were the rule. The fact that 38% of our respondents is female reflects the sampling procedure: in the 1983 wave, only men who did not respond to the mail survey were approached by an interviewer (recall that in Hartog (1989) we found no evidence of a bias on this account).

4. ESTIMATION RESULTS FOR HEALTH STATUS

The dependent variable in our analysis is health status. We use a subjective measure of health.[4] Respondents were asked: How well is your health in general? For their answer they could choose between five different categories: very good, good, fair, bad, very bad (c.f. Table 1 for the scores). To reflect he ordinal character of the dependent variable, we apply the ordered probit model (see e.g. Maddala, 1983 p. 46). We assume that across individuals, the terms "good", "fair", etc. have the same meaning. This is not unreasonable. While no doubt there is some variability, certainly on such a sensitive matter as health assessment, if the differences were large, all attempts to interpersonal communication on such matters would become meaningless. It is important to note that we measure health status as a subjective evaluation: it is the individual's perception of health, not some more or less objective medical classification. Of course, we expect the subjective evaluation to be correlated with a medical assessment, but we also believe that the self-assessment has a virtue in it's own right, as a variable that is related to personal evaluation of well-being.

Table 2 presents the estimation results for different specifications of the model. The first column reports the model in which only schooling variables are included in the set of regressors, the second uses only IQ, the third only family background and the fourth includes all sets of variables. Gender is included in each model although never has a significant effect: women's reported health status does not differ from men's. Schooling clearly affects health, but not monotonically. The results are not very sensitive to either including or excluding the other variables. All schooling beyond the lowest level significantly improves health. The highest health status effect is realized for higher general (secondary) education. The non-monotonicity may have some relation to occupational hazards, which may be correlated with schooling level and type. It is quite conceivable, for example, that intermediate vocational schooling leads to jobs with more health and safety risks than intermediate general education: the former are mostly in blue-collar jobs, the latter in white-collar. At the higher level, this distinction is less obvious: higher vocational education certainly trains also for managerial office jobs; university educations include engineering training in which field work may be hazardous. IQ is clearly associated with health status. Including schooling in the regression reduces the coefficient, yet IQ has an effect independent of schooling. It does not necessarily reflect causality: it may reflect the correlation between IQ and innate health, rather than between IQ and health investment effects. The effect of family background is not upheld if schooling and IQ are included. Only the negative effect of the number of siblings survives. The effect of an independent father has a modest level of significance. This is a fortunate result as it indicates that growing up in a poor family background has no lasting effect on health.

Table 3 translates the estimation results of model IV (all explanatory variables included) into the effect that a change in one of the explanatory variables has on the probability of belonging to each of the five health categories. The first row in the table gives the probability distribution for a reference individual who is defined as a male with lower vocational education, father's education low, from a 'normal' (not low social status) family, with IQ and parent's education at mean values, and no missings. Each of the following rows indicates how the probability distribution of this reference person changes if the value of a dummy variable is altered or if we change the value of a continuous variable by two standard deviations. As the last column shows, the effects of schooling are substantial, while the effects of IQ and number of siblings are rather modest in magnitude. The results suggest that one of the benefits of raising the minimum level of compulsory schooling is a better health condition of the population.

5. ESTIMATION RESULTS FOR AMOUNT OF WEALTH

Wealth has been measured in 10 intervals, from a lowest interval with debt greater than Dfl 50,000 to a highest interval for wealth greater than Dfl 500,000 (the intervals are not equally spaced).[5] It is measured as joint wealth with the partner, if present, and it is explicitly defined in the questionnaire as value of pro-

Table 2. Ordered probit estimates for health status

Explanatory variables	Model I	Model II	Model III	Model IV
Schooling variables (reference is lower vocational without a degree)				
Lower general	0.003 (0.1)			0.023 (0.2)
Intermediate general	0.404 (5.4)**			0.381 (5.0)**
Intermediate vocational	0.205 (2.6)**			0.178 (2.2)**
Higher general	0.799 (5.8)**			0.733 (5.1)**
Higher vocational	0.450 (6.1)**			0.404 (5.0)**
University	0.627 (4.6)**			0.535 (3.5)**
Graduate	0.093 (1.3)			0.078 (1.0)
Intelligence variables				
IQ p.m./100		0.665 (3.5)**		0.388 (2.0)**
IQ w.s./100		0.418 (2.2)**		− 0.207 (0.9)
Social background variables (reference is father's occupation low and normal family)				
Father's education			0.091 (2.1)**	0.046 (1.1)
Mother's education			0.020 (0.4)	− 0.009 (0.2)
Occupation father high			0.243 (1.5)	0.144 (0.9)
Occupation father intermediate			0.213 (2.5)**	0.088 (1.0)
Occupation father independent			0.119 (2.2)**	0.091 (1.7)*
Number of siblings			− 0.022 (3.0)**	− 0.018 (2.4)**
Social status low			− 0.176 (1.8)*	− 0.110 (1.1)
Female	0.065 (1.3)	0.038 (0.8)	0.046 (0.9)	0.034 (0.7)
Loglikelihood	− 2724.27	− 2755.45	− 2744.79	− 2712.26

Notes: Absolute values of asymptotic *t*-values in brackets. * Indicates significance at the 10% level; ** indicates significance at the 5% level. The list of regressors also includes dummies for missing values. Total number of observations = 1893.

Table 3. Predicted probabilities of health status categories

	Health status				
	Very poor	Poor	Fair	Good	Very good
Reference individual	4.1	16.0	20.8	44.9	14.1
Intermediate general schooling	1.7	9.4	15.9	48.5	24.4
Intermediate vocational	2.8	12.7	18.7	47.3	18.5
Higher general	0.7	5.1	11.0	46.5	36.7
Higher vocational	1.6	9.1	15.6	48.5	25.1
University	1.2	7.3	13.8	48.2	29.5
IQ pm plus 2 standard deviations	3.3	14.1	19.7	46.4	16.6
Number of siblings minus 2 standard deviations	3.2	13.7	19.4	46.7	17.0

Note: Reference is a male with completed lower vocational education, with father's occupation low from a normal family, with parent's education and own IQ at mean values, and no missing values for any variable.

perty (cash, home, shares, business firm) minus debts (mortgage, loans, etc.). The wealth distribution in our sample is characterized in Table 1. The average wealth is just over Dfl 150,000, and the standard deviation is larger than the mean. There is no easy comparison with the Dutch wealth distribution from other sources, but it's obvious that the specific age of our sample implies higher than overall average wealth. For example, in 1988, according to the Central Bureau of Statistics, there were about 125,000 fortunes over 500,000 guilders in the entire population, a number representing some 2% of the number of households. In our sample, about 9% of the respondents indicate this level of household wealth. For our analysis, again we use the ordered probit model; this does justice to the interval nature of the dependent variable, even though the interval boundaries have more than ordinal meaning.[6] Results are given in Table 4.

Whether we control for other variables or not, schooling increases wealth. Adding controls does not affect the magnitude of the effects for the lower levels of education, but it reduces the coefficients for the higher levels. The positive effect of IQ does not survive if we control for schooling and family background: wealth derives from schooling, not from "raw ability". It is quite remarkable that once again we find a non-monotonic pattern. The effect of schooling peaks for those with a higher general (secondary) education, not for those with tertiary educations. The

Table 4. Ordered probit estimates for wealth

Explanatory variables	Model I	Model II	Model III	Model IV
Schooling variables (reference is lower vocational without a degree)				
Lower general	− 0.151 (1.4)			− 0.120 (1.1)
Intermediate general	0.114 (1.6)			0.104 (1.4)
Intermediate vocational	0.289 (3.7)**			0.223 (2.8)**
Higher general	0.702 (5.6)**			0.614 (4.5)**
Higher vocational	0.349 (4.7)**			0.243 (2.9)**
University	0.663 (5.3)**			0.440 (3.2)**
Graduate	0.120 (1.3)			− 0.015 (0.2)
Intelligence variables				
IQ p.m./100		0.578 (3.0)**		0.292 (1.5)
IQ w.s./100		0.294 (1.5)		− 0.052 (0.2)
Social background variables (reference is father's occupation low and normal family)				
Father's education			0.045 (1.1)	0.014 (0.4)
Mother's education			0.068 (1.2)	0.032 (0.6)
Occupation father high			0.700 (4.6)**	0.638 (4.1)**
Occupation father intermediate			0.350 (4.0)**	0.259 (2.9)**
Occupation father independent			0.511 (9.6)**	0.480 (8.9)**
Number of siblings			0.008 (0.8)	0.012 (1.4)
Social status low			− 0.404 (3.5)**	− 0.337 (3.0)**
Female	− 0.039 (0.8)	− 0.100 (2.0)**	− 0.099 (2.0)**	− 0.108 (2.0)**
Loglikelihood	− 3927.28	− 3955.71	− 3892.85	− 3866.44

Notes: Absolute values of asymptotic *t*-values in brackets. * Indicates significance at the 10% level; ** indicates significance at the 5% level. The list of regressors also includes dummies for missing values. Total number of observations = 1893.

same relation holds for the effect of schooling on earnings (see Appendix A). Including IQ scores in the earnings function reduces each of the schooling coefficients by 10 to 15%, which is modest but in line with similar studies in the international literature. With both IQ variables included in the earnings function, IQ w.s. is not significant while IQ p.m. does significantly increase earnings.

Women have significantly less wealth than men. This may reflect their lower lifetime earnings, but no doubt there is also some interaction with marital status and the financial arrangements that women may have with their husband. However, we lack the information to disentangle these components.

Family background clearly affects wealth, in an expected way. Parental education is irrelevant, but the father's occupation level increases wealth, as does the father's status as an independent worker. Moreover, coming from a low status family reduces wealth. One can easily imagine that these results reflect direct transfers of wealth, as inheritance, financial support for homes and business firms, or transfer of the parental firm (or farm: many respondents come from farming homes, as the province of Brabant had a relatively high share of agriculture in the 1950s). We have no direct information on such transfers although, given the age of our respondents, much of the intergenerational wealth transfer may indeed have been accomplished. It is interesting to note that family background has no significant effect on wages (see the wage equation in Appendix A), so that the wealth effect of family background must reflect direct transfers rather than an effect through higher wages (ruling out that the entire effect is due to increased thriftiness).

In Table 5 we illustrate the magnitude of the effects. Starting from the predicted wealth distribution for reference individuals, we indicate the consequences of different characteristics of individuals. The reference individual has a probability of 4.6% to be in the highest wealth interval at age 53. The probability strongly increases with a high general education, a university education, coming from a good social background, a father that is self-employed or has a high level occupation. Coming from a low-status family cuts the probability by half.

6. ESTIMATION RESULTS FOR HAPPINESS

Happiness is measured on an interval scale, presented to respondents as follows: "Below, you see a scale with ten steps. The lowest level stands for the worst possible life. If you go up you arrive at the tenth step, which stands for the best possible life. Can you indicate at which step you consider yourself at present?". The frequency distribution of the scores is given in Table 1. The mode is at grade 8, the median is slightly below 7. About 5% of the respondents evaluate their life at the highest possible level. We analyze the scores with an ordered probit model, and the results are given in Table 6.

Happiness follows, once again, a parabolic relation with education. If we add controls, we find the same results with only small reductions in the values of the coefficients. The highest level of happiness is reached for individuals with higher level secondary schooling

Table 5. Predicted probabilities of wealth categories

	Wealth class									
	1	2	3	4	5	6	7	8	9	10
Reference person	8.0	5.7	1.9	9.3	7.1	13.1	14.1	25.4	10.8	4.6
Intermediate vocational	5.2	4.2	1.5	7.5	6.1	12.0	13.9	28.4	14.0	7.2
High general	2.2	2.2	0.8	4.6	4.1	9.1	12.1	30.6	20.0	14.2
High vocational	5.0	4.1	1.4	7.4	6.0	11.9	13.9	28.5	14.4	7.4
University	3.3	3.0	1.1	5.9	5.0	10.5	13.1	30.1	17.4	10.6
Father occupation high	2.1	2.1	0.8	4.5	4.0	8.9	12.0	30.6	20.3	14.7
Father occupation intermediate	4.8	4.0	1.4	7.3	5.9	11.8	13.8	28.7	14.6	7.7
Father self-employed	3.0	2.8	1.0	5.6	4.8	10.2	12.9	30.3	18.0	11.4
Low social status	14.3	8.2	2.6	11.6	8.1	13.7	13.1	19.7	6.6	2.1
Female	9.8	6.5	2.1	10.1	7.5	13.5	13.9	23.7	9.3	3.6

Note: Reference is a male with completed lower vocational education, with father's occupation low froma normal family, with parent's education and own IQ at mean values, and no missing values for any variable.

Table 6. Ordered probit estimates for happiness

Explanatory variables	Model I	Model II	Model III	Model IV
Schooling variables (reference is lower vocational without a degree)				
Lower general	− 0.060 (0.6)			− 0.042 (0.4)
Intermediate general	0.276 (3.8)**			0.263 (3.5)**
Intermediate vocational	0.315 (3.9)**			0.291 (3.5)**
Higher general	0.612 (4.4)**			0.567 (3.8)**
Higher vocational	0.450 (6.1)**			0.396 (4.7)**
University	0.419 (5.4)**			0.395 (2.2)**
Graduate	0.122 (1.7)			0.102 (1.4)
Intelligence variables				
IQ p.m./100		0.200 (1.0)		− 0.029 (0.1)
IQ w.s./100		0.534 (2.8)**		0.104 (0.5)
Social background variables (reference is father's occupation low and normal family)				
Father's education			0.004 (0.1)	− 0.033 (0.8)
Mother's education			0.068 (1.2)	0.045 (0.7)
Occupation father high			0.118 (0.7)	0.040 (0.2)
Occupation father intermediate			0.232 (2.7)**	0.113 (1.2)
Occupation father independent			0.176 (3.3)**	0.152 (2.8)**
Number of siblings			− 0.014 (2.1)**	− 0.011 (1.5)
Social status low			− 0.249 (2.6)**	− 0.158 (1.6)
Female	0.187 (3.8)**	0.157 (3.1)**	0.143 (2.9)**	0.166 (3.2)**
Loglikelihood	− 3311.86	− 3338.94	− 3326.91	− 3301.52

Notes: Absolute values of asymptotic *t*-values in brackets. * Indicates significance at the 10% level; ** indicates significance at the 5% level. The list of regressors also includes dummies for missing values. Total number of observations = 1893.

of a general nature. IQ is not significant if controls are added. Without controls, the significant IQ variable is the verbal IQ, whereas in the earlier analyses (health, wealth) the significant one if controls are suppressed is IQ p.m., the more mathematical type. Family background does not affect happiness later in life. Parental education has no effect, and neither does the father's level of occupation. If father's occupational position was independent, however, the happiness score is significantly higher. Women report significantly higher levels of happiness, virtually independent of the controls in the equation. Hence, the significant variables for happiness are schooling, gender and having a father with an independent business position. IQ and other variables representing family background have no effect.

In Table 7 we show the magnitude of the effects of education, family background and gender. Gender has a modest effect on the distribution of happiness, approximately equal to the effect of having a father with an independent occupational status. The effect of schooling is larger than these two. Moving from lower vocational to intermediate general education already has a stronger effect on the distribution than any of these two variables. Schooling is the overriding factor if we consider significance and magnitude of effects.

In Table 8 we move to an extended analysis of hap-

Table 7. Predicted probabilities of happiness categories

	Happiness value										
	0	1	2	3	4	5	6	7	8	9	10
Reference individual	1.1	0.8	1.4	2.0	3.9	11.0	15.2	29.8	27.3	5.3	2.2
Intermediate general schooling	0.5	0.4	0.8	1.2	2.6	8.0	12.6	28.9	33.0	7.9	4.0
Intermediate vocational	0.5	0.4	0.8	1.2	2.4	7.7	12.3	28.6	33.5	8.3	4.2
Higher general	0.2	0.2	0.4	0.6	1.5	5.1	9.3	25.7	37.9	11.7	7.4
Higher vocational	0.4	0.3	0.6	0.9	2.0	6.7	11.1	27.8	35.4	9.5	5.3
University	0.4	0.3	0.6	0.9	2.0	6.7	11.1	27.8	35.4	9.5	5.3
Female	0.7	0.5	1.0	1.5	3.0	9.1	13.6	29.5	31.0	6.9	3.2
Father's occupation independent	0.7	0.6	1.0	1.5	3.1	9.2	13.8	29.5	30.7	6.7	3.1

Note. Reference is a male with completed lower vocational education, with father's occupation low from a normal family, with parent's education and own IQ at mean values, and no missing values for any variable.

Table 8. Ordered probit estimates for happiness: extensive specification

Variable	Estimate	*t*-value
Schooling variables (reference is lower vocational without a degree)		
Lower general	0.096	(1.0)
Intermediate general	0.135	(1.7)*
Intermediate vocational	0.200	(2.3)**
Higher general	0.245	(1.6)
Higher vocational	0.232	(2.6)**
University	0.163	(0.9)
Graduate	0.056	(0.7)
Intelligence variables		
IQ p.m./100	– 0.086	(0.4)
IQ w.s./100	0.193	(0.8)
Social background variables (reference is father's occupation low and normal family)		
Father's education	– 0.055	(1.2)
Mother's education	0.032	(0.5)
Father's occupation intermediate	0.046	(0.5)
Father's occupation high	– 0.096	(0.5)
Father's occupation independent	0.017	(0.3)
Social status low	– 0.085	(0.9)
Number of siblings	– 0.004	(0.5)
Gender and family status (reference is married male)		
Female	0.329	(4.9)**
Divorced	– 0.565	(5.3)**
Widow	– 0.683	(4.8)**
Single	– 0.173	(1.3)
Number of children	– 0.013	(0.5)
Labour market status (reference is employed in private sector)		
Public sector	0.022	(0.3)
Self-employed	– 0.094	(1.0)
Unemployed	– 0.627	(5.2)**
Disability	– 0.426	(4.1)**
Work in home	– 0.227	(2.6)**
Health status (reference is very poor)		
Very good	1.000	(6.2)**
Good	0.682	(4.4)**
Fair	0.266	(1.7)*
Poor	0.021	(0.1)
Wealth/10,000	0.011	(6.7)**
Loglikelihood	– 3116.88	

Notes: Absolute values of asymptotic *t*-values in brackets. * Indicates significance at the 10% level; ** indicates significance at the 5% level. The list of regressors also includes dummies for missing values. Total number of observations = 1893.

piness. We included health and wealth among the explanatory variables, and we added family status variables. Again, the model used is the ordered probit regression. Health and wealth each have important positive effects on happiness. Adding the controls to the regression has only small effects on coefficient values and their significance levels, and we do not report results without them. The parabolic effect of schooling on happiness is upheld. But the coefficients are now much closer together, and significance levels are drastically reduced. Apparently, the parabolic schooling effect on happiness works through a parabolic relation with health and wealth, both of which positively relate to happiness. The case with family background is similar: adding health and wealth eliminate its impact. The influence of gender is not affected, however. Women are still definitely happier, even after accounting for health, wealth and other controls.

The newly introduced family status variables have strong effects, in line with results found in the international literature. Divorced and widowed individuals are unhappier than married persons. Being single has no effect on happiness however. Unemployment and disability significantly reduce happiness. This indicates that unemployment generally must be involuntary, a result also found by Clark and Oswald (1994) and Woittiez and Theeuwes (1995). Using the same argument, working in the home must be mostly involuntary also, considering its negative coefficient. Given a strong social emphasis on labour market participation of married women, this might indeed be true.

Table 9 illustrates the magnitudes of the effects for our key variables. Health has a stronger effect than wealth. For example, increasing wealth by one standard deviation increases the probability of happiness level 8 from 0.35 to 0.38, increasing health by one standard deviation increases it to almost 0.41.

We can use the results to calculate the marginal rate of substitution between health and wealth, i.e. the monetary equivalence of health status differences. If the health status worsens from "very good" to "good", a wealth increase of 288,182 guilders is required to keep a reference person at the same level of happiness. If health status falls from "good" to "fair", a financial compensation of 377,715 guilders is required, while a further fall from "fair" to "poor" requires a compensation of 233,313 guilders. These are large magnitudes, considering the average wealth of 154,000 guilders. The implication is that people are willing to spend large amounts on maintaining or improving their health. This is in line with the high willingness to pay for medical services that is evident from spending behaviour and that gives the medical sector such a strong market position.

7. CONCLUSION

The 1993 round of the so-called Brabant survey, a follow-up interview of individuals surveyed initially at age 12 (grade 6 of primary school), included responses on health, wealth and happiness. This paper is a first analysis of the data. Perhaps the most remarkable finding is the result that those with only a secondary education of a general, non-vocational nature, appear to come out on top: they are healthier, happier and wealthier than any of the other schooling groups. Thus, the highest level of education neither produces the highest wealth, nor the highest health nor the highest happiness! Our results indicate that the parabolic effect of schooling on happiness is mostly created through the parabolic effect on health and wealth. We have no real explanation why in this cohort, a group of secondary educated individuals, come out on top. The results are in line with findings reported by Veenhoven (1996) that, in advanced countries, the effect of education may have become negative. Our results indicate that it is worthwhile to allow for nonlinearity in the relation.

IQ independently affects health status, even after controlling for schooling. This either points to innate correlation between ability and health, or to higher IQ stimulating more prudent health care. The effect that IQ has on wealth and happiness disappears once we control for schooling. The insignificance of IQ for happiness has also been reported in the international literature. Family background has no effect on happiness if we allow for health and wealth. Wealth, observed at age 53 years, may be higher as a result of higher wages, more savings or higher family transfers. The effect of schooling on wealth probably reflects an effect through wages, considering the effect of schooling on wages. The substantial effect of family background on wealth reflects the effect of

Table 9. Predicted probabilities of happiness categories

	Happiness value										
	0	1	2	3	4	5	6	7	8	9	10
Reference individual	0.2	0.2	0.5	0.8	2.0	7.0	12.3	30.3	34.8	8.0	3.8
+ 1 s.d. of wealth	0.1	0.1	0.3	0.6	1.4	5.3	10.2	28.3	37.9	10.1	5.5
+ 1 s.d. of health	0.1	0.1	0.2	0.3	0.9	3.7	7.8	25.0	40.6	13.0	8.4
+ 1 s.d. of wealth and 1 s.d. of health	0.0	0.0	0.1	0.2	0.6	2.6	6.1	21.9	41.6	15.4	11.4

Note: Reference is a person with mean wealth and health.

transfers, from inheritances, etc: there is no family background effect on wages. A more precise disentangling of life-cycle saving effects from transfer effects is an interesting topic for further research, but requires data different from that we used here. The effect of IQ on wealth is sufficiently accounted for if schooling is included in the regression equation.

Women, clearly, make the best of it: their health status is no different from men's, their wealth is less, yet still they manage to be happier. This also raises further questions. Perhaps women are less dependent on wealth for their happiness. Again, to estimate separate happiness functions for men and women requires more observations on women than we have available.

Acknowledgements—An earlier version was presented at the European Economic Association Meetings in Istanbul, August 1996; we thank participants for their comments.

NOTES

1. Card's contribution led to a literature on estimating the effect of schooling with the method of Instrumental Variables. Such estimation is highly sensitive to the specification; we do not wish to be involved in those issues in the present paper.
2. See for an introduction, Deaton and Muellbauer (1980) (chapters 12 and 14) and, for more recent work, Deaton and Paxson (1994).
3. These data have been analyzed in work by, among others, Hartog *et al*. (1989), Hartog and Oosterbeek (1993), Oosterbeek (1990), and Groot and Oosterbeek (1994).
4. The health literature reveals that an individual's subjective perception of own health status is a good indicator of overall health; see Kemna (1987) pp. 194-5) and the references given therein.
5. One dollar is about Dfl 1.60.
6. Fixing the interval boundaries of the ordered probit a priori equal to the interval boundaries in the questionnaire did not lead to convergence.

REFERENCES

Atkinson, A. B. (1976) *The economics of inequality*. Oxford University Press, Oxford.

Behrman, J. R. and Lavy, V. (1994) *Children's health and achievement in school.* LSMS Working Paper No. 104. The World Bank, Washington.

Behrman, J. R. and Wolfe, B. L. (1989) Does more schooling make women better nourished and healthier? Adult sibling random and fixed effects estimates for Nicaragua. *Journal of Human Resources* **24**, 644–663.

Berger, M. C. and Leigh, J. P. (1989) Schooling, self-selection and health. *Journal of Human Resources* **24**, 433–455.

Cantrill, H. (1965) *The pattern of human concerns*. Rutgers University Press, Rutgers NJ.

Card, D. (1994) Earnings, schooling and ability revisited. NBER Working Paper 4832. Cambridge, Ma.

Clark, A. E. and Oswald, A. J. (1994) Unhappiness and unemployment. *Economic Journal* **104**, 648–659.

Clark, A. E. and Oswald, A. J. (1996) Satisfaction and comparison income. *Journal of Public Economics* **61**, 359–381.

Deaton, A. and Muellbauer, J. (1980) *Economics and consumer behaviour*. Cambridge University Press, Cambridge.

Deaton, A. and Paxson, C. (1994) Intertemporal choice and inequality. *Journal of Political Economy* **102**, 437–467.

Easterlin, R. A. (1973) Does money buy happiness? *The Public Interest* **30**, 3–10.

Easterlin, R. A. (1974) Does economic growth improve the human lot? In *Nation and households in economic growth*, ed. P. A. David and W. R. Mervin. Stanford University Press, Stanford CA.

Fuchs, V. R. (1982) Time preference and health: an exploratory study. In *Economic aspects of health*, ed. V. R. Fuchs. University of Chicago Press, Chicago IL.

Gale, W. G. and Scholz, J. K. (1994) Intergenerational transfers and the accumulation of wealth. *Journal of Economic Perspectives* **8**, 145–160.

Groot, W. and Oosterbeek, H. (1994) Earnings effects of different components of schooling: human capital versus screening. *The Review of Economics and Statistics* **76**, 317–321.

Grossman, M. (1972) On the concept of health capital and the demand for health. *Journal of Political Economy* **80**, 223–255.

Hartog, J. (1989) Survey non-response in relation to ability and family background: structure and effects on estimated earnings functions. *Applied Economics* **21**, 387–395.

Hartog, J. and Oosterbeek, H. (1993) Public and private sector wages in the Netherlands. *European Economic Review* **37**, 97–114.

Hartog, J., Pfann, G. A. and Ridder, G. (1989) (Non-)graduation and the earnings function: an inquiry on self-selection. *European Economic Review* **33**, 1373–1395.

Haveman, R. H. and Wolfe, B. L. (1984) Schooling and economic well-being: the role of non-market effects. *Journal of Human Resources* **19**, 377–407.

Haveman, R. H., Wolfe, B. L., Kreider, B. and Stone, M. (1994) Market work, wages and men's health. *Journal of Health Economics* **13**, 163–182.

Herrnstein, R. J. and Murray, C. (1994) *The Bell Curve: Intelligence and Class Structure in American Life*. The Free Press, New York.

Kemna, H. J. M. I. (1987) Working conditions and the relationship between schooling and health. *Journal of Health Economics* **6**, 189–210.

Maddala, G. S. (1983) *Limited-dependent and qualitative variables in econometrics*. Cambridge University Press, Cambridge.
Oosterbeek, H. (1990) Education and earnings in the Netherlands: an empirical analysis. *European Economic Review* **34**, 1353–1375.
Perri, T. J. (1984) Health status and schooling decisions of young men. *Economics of Education Review* **3**, 207–213.
Van Praag, B. M. S. (1991) Ordinal and cardinal utility: an integration of the two dimensions of the welfare concept. *Journal of Econometrics* **50**, 69–89.
Veenhoven, R. (1996) Developments in satisfaction research. *Social Indicators Research* **37**, 1–46.
Woittiez, I. and Theeuwes, J. J. M. (1995) Well-being and labor market status. Research Memorandum 95.01. Cerra, Leiden.

APPENDIX A

OLS estimates wage equations

Explanatory variables	Model I	Model II	Model III	Model IV
Schooling variables (reference is lower vocational without a degree)				
Lower general	–0.057			0.023
	(0.9)			(0.2)
Intermediate general	0.142			0.381
	(3.2)**			(5.0)**
Intermediate vocational	0.214			0.178
	(4.9)**			(2.2)*
Higher general	0.799			0.733
	(5.8)**			(5.1)**
Higher vocational	0.450			0.404
	(6.1)**			(5.0)**
University	0.627			0.535
	(4.6)**			(3.5)**
Graduate	0.093			0.078
	(1.3)			(1.0)
Intelligence variables				
IQ p.m./100		0.665		0.388
		(3.5)**		(2.0)**
IQ w.s./100		0.418		–0.207
		(2.2)**		(0.9)
Social background variables (reference is father's occupation low and normal family)				
Father's education			0.091	0.046
			(2.1)**	(1.1)
Mother's education			0.020	–0.009
			(0.4)	(0.2)
Occupation father high			0.243	0.144
			(1.5)	(0.9)
Occupation father intermediate			0.213	0.088
			(2.5)**	(1.0)
Occupation father independent			0.119	0.091
			(2.2)**	(1.7)*
Number of siblings			–0.022	–0.018
			(3.0)**	(2.4)**
Social status low			–0.176	–0.110
			(1.8)*	(1.1)
Female	0.065	0.038	0.046	0.034
	(1.3)	(0.8)	(0.9)	(0.7)
Loglikelihood	–2724.27	–2755.45	–2744.79	–2712.26

Notes: Absolute values of asymptotic *t*-values in brackets. * Indicates significance at the 10% level; ** indicates significance at the 5% level. The list of regressors also includes dummies for missing values. Total number of observations = 891.