The risk of investment in human capital
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Chapter 7

Summary

7.1. Introduction

Schooling decisions have to be taken under conditions of uncertainty. Most schooling systems confront students with an increasing array of choices as they advance in their schooling career. In this thesis we studied the risk of human capital investment. The existence of risk has implications for schooling choices, for impact of differences in curricula, and for the operation of the markets for educated labour. We estimated rates of return for graduates from a single Dutch university, in an attempt to find in which way the education and the market forces are responsible for the earnings inequality within educational levels in the Netherlands. Just as in the financial markets where the variance in the returns are just as important as the mean, we use the variance of the internal rate of return to get some information on the risk facing investors in human capital. We noted that risk involves choosing an education for which one does not know for sure what earnings this will generate; rather, it gives access to a distribution of earnings. Thus, an obvious step in dealing with the financial risk of an education is to consider how the distribution of earnings varies with education. Therefore we assessed the dispersion in the distributions and we checked whether individuals with more advanced education move into wider or narrower earnings distributions. Since different educations (and occupations) provide different probabilities of success, we also considered how the labour market may compensate for these risks and if
the risk is indeed compensated in individual wages. Finally we construct a theoretical model in which being in school has utility value and the decision to continue or not to invest in school depends on the uncertainty of the labor market.

### 7.2. Summary

Our contribution is focused on schooling as a risky investment, that is, an investment with uncertain pay-offs. That was done in the framework of human capital theory. Attention was restricted to benefits in terms of income, thus ignoring other benefits without in any way denying their importance. In its five chapters, the thesis considers various and separate risk aspects of the investment in human capital.

Chapter 2 has the dual objective of analysing the education (including educational mismatches) and the job allocation effects on the wages for the graduates from an Agricultural University. Therefore, both supply and demand side parameters have been used. In our specification the demand side is measured by job level and by employer's hiring standard. The supply side includes among other things, education, matching in education, fields of study and experience on the labor market. The central results are that prior and post university education makes not much difference in terms of wages, whereas the level of the job is an important variable in the structure of earnings differentials and employers see in it an indicator of the capability to generate commitment, effort and success. We explain these results on the counts of the homogeneity of this special sample with only graduates from a single, specialized university, the Wageningen Agricultural University.

In Chapter 3 we develop a simulation model where, instead of given annual earnings for a given education, individuals face random lifetime earnings profiles for two levels of education (we extend a standard experience-earnings profile with annual random shocks). We solve for the internal rate of return for each set of draws for lifetime earnings shocks, and repeat this 100,000 times. The distribution of the internal rate of return appears to be skewed to the right, with an elongated upper tail. The final conclusion of the chapter answers the key question: how risky is investment in schooling? From our simulations of ex ante risk we conclude that the coefficient of variation in the rate of return to education, for most plausible values of the parameters is about 0.3 (i.e. the standard deviation is about one third of the mean). This makes investment in schooling about as risky as investing in a portfolio of 30
randomly chosen stocks on the New York Stock Exchange, based on stock returns known in the year 1970.

In Chapter 4 our focus was on what earnings distributions by education can tell us about moves to distributions with different variances. We made a targeted investigation on the data from the Luxembourg Income Studies (LIS), for seven OECD countries. We tested for systematic patterns by estimating a general quadratic relationship of residual earnings variance with education and age. We found no evidence of simple relationships that are stable across and within countries. The analysis is made on cross-sections, usually over a large time span and therefore the differences in patterns within countries are not so hard to accept. It may point to the effects of policy changes, structural changes of the educational systems or simply regional or global socio-political and economical factors within a country. Differences in patterns between countries might point to very different effects of education systems, through differences in school admission rules and curriculum structures (e.g. broad versus specialized educations). This suggests that the education systems in different countries function quite differently in segmenting the labor force, and that such different segmentation in school levels and school types has important consequences for the risk associated with different school systems.

In Chapter 5 the effect of risk on wages has been tested empirically. The problem, of course is to find a measure of risk. The basic approach is to consider variation in wages around the mean in the alternatives. Risk is then measured as the variance around the mean in a group to which the individual belongs: education and intelligence cells. The argument is that individuals can foresee average wages for alternative educations and proven abilities, by just looking at the average wages for individuals who have selected that alternative and who are already in the labour market. The variance around the mean, within schooling-ability groups, is a measure of ignorance, of the unpredictability of wages and hence, of risk. With data from the 1980’s and 1990’s in the United States (NLSY 1979) we reproduce the basic results of risk compensation. In the American dataset we test for risk compensation in wages by calculating risk (and skewness) for education-ability cells. We do so to generate sufficient observations on the measures of risk and skewness. Using annual data, we find solid evidence of positive compensation for risk and negative compensation for skewness, in every single year. The data allow to distinguish "permanent risk", associated with persistent differences between individuals, and "temporary risk", as the variance in earnings over time for given individuals. Compensation for temporary risk is larger than for permanent risk,
which is compatible with the thesis that individuals are better informed on these permanent effects than on the transitory effects. If the permanent effect reflects differences between individuals that they are well aware of (as they know their abilities and motivation), this would involve no risk and would require no compensation. The final conclusion of the chapter answers the key question: Does the market provide any compensation to risk? And the answer is yes.

In Chapter 6 we treat education as a sequential choice that is made under uncertainty. Being in school has utility value, and the shadow wage to be realized when leaving school follows a certain stochastic motion. Once the decision to leave school is made, it is irreversible and the shadow wage becomes the wage during the working life. We find that an increase in risk (high volatility of labor earnings) delays the option of leaving school. Intuitively, this is not very appealing but it stems from the irreversibility assumption. Risk-aversers are more reluctant to abandon the school. On the other hand, the probability of a major event that drops the wage and the percentage of the income falls have an important negative effect on the value of waiting: they stimulate individual to leave earlier. This result is more in tone with intuitive anticipation of the effect.

7.3. Concluding Remarks and Policy Recommendations

This chapter provided a brief and non-technical summary of our contributions in the assessing of the risk in human capital investment. Perhaps our contribution to analysing the effects of risk on human capital issues is more in opening up the research area, and providing some initial results, than in establishing solid new truths. In fact, we had to acknowledge in many cases that there barely exists a literature on important and relevant issues. The existence of risk is obvious but we did not discern simple stable relationships between risk and education level between countries. This clearly suggests that risk properties of different schooling systems are quite different. We also have found evidence that the labour market generates compensation, in the form of higher wages for higher risk, and lower wages for more skewness in the earnings distribution. Our theoretical and empirical results indicate that the risk involved in choosing an education is by no means negligible. It might be that in some countries, the market compensation is indeed commensurate with what individuals demand.
Chapter 7. Summary

Should we worry about risk? The effect of risk and risk attitudes on schooling participation decisions is quite important from the perspective of barriers that may hold back children from lower social backgrounds. Higher aversion to take risks is often stated as a possible explanation for lower schooling participation from these backgrounds. The existence of heterogeneity in risk attitudes, in relation to a single market compensation and its magnitude is certainly a line of research worth noting. The potential policy implications for promoting efficient decisions on schooling participation of these results are obvious but we should hasten to add that the numbers we report are no more than first indications of very relevant parameters. Already the finding that the financial risk of an education finds compensation in mean earnings implies a mitigation of financial risk as a deterrent to participation in extended education. If the market compensates sufficiently, students will not be deterred from starting a risky education as the ex ante reward is high enough, even though some will ex post find that they have drawn a blank.

Much work remains to be done. The most pressing issue is to allow for heterogeneity among individuals and selective allocation in the labour market. Indeed, risky education might be undertaken more easily by individuals who are less risk averse. But in such issues, our evidence is sketchy, and inferences are speculative but there is an interesting challenge for very relevant research. On several issues, our research has broken new ground. On some of these issues, further tests and replications are needed before we can draw reliable, robust conclusions. In terms of modeling the individual perception of risk and the consequences for behavior, it would be interesting to move from expected utility theory to prospect theory. Expected utility theory has increasingly been attacked, on a priori grounds and for lack of performance in laboratory experiments, but is still the main approach in empirical work. The attraction of prospect theory is the explicit allowance for individual response to the probabilities of alternative outcomes and the use of reference situations for the assessment of gains and losses. Prospect theory seems ready to leave the laboratory setting and be used in empirical applications. It may also pay off to focus more on modeling schooling choices sequentially, rather than as a single choice for a lifetime plan.