Student decisions and consequences
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12 Conclusions and summary

In this final chapter we trace out the main lines through the different chapters and we summarise the findings for each separate chapter. In the first section we start with a short summary of the project and the theoretical perspective.

12.1 Project and theoretical perspective

This thesis is about educational decisions and consequences for students in Dutch higher education between 1991 and 1995. A group of students has been followed on their way through the Dutch higher education system to the labour market. During their educational career individual students have to make many decisions. For instance, they have to decide whether to enrol or not and in case of enrolment they have to choose a level and type of higher education. The consequences, in terms of educational performance or returns on the labour market, become clear in the following years as the student moves on in higher education or enters the labour market.

We have analysed several decisions and consequences from an economic perspective based on the human capital theory, as developed by Becker and Schultz. The key notion of the human capital theory is that education is an investment of current time and money for future pay. An individual will choose to follow education until the expected marginal costs equate the expected marginal returns. The variation in schooling choices across individuals is explained by differences in marginal returns or marginal costs between individuals. Individuals with higher ability are assumed to have higher marginal returns. Variation in marginal costs is assumed to be related to variation in ‘access to funds’ (family wealth) or ‘tastes for schooling’. Individuals with a more favourable social background (in terms of family wealth) may have lower transaction costs in obtaining funds needed for schooling. Moreover, marginal costs might be related with ability. Individuals with higher ability have higher probabilities of getting scholarships but also might have higher forgone earnings. If the ability effect on the marginal returns exceeds the ability effect on marginal costs than more able persons will follow more education.

12.2 Main patterns

The classical human capital theory leads to the basic elements in our analysis: the ability of students, the background of students and students expectations. We assumed that the ability of the student is indicated by the educational results before enrolling in higher education. For the background variables we distin-
guished parental income and education, gender and age. In this concluding section we trace out the findings for each basic element in relation with the decisions and outcomes. Moreover, we present the main conclusions on the supply side characteristics and on the effects of policy measures.

The main pattern of the effects of ability, social background, gender and age on the decisions and consequences is summarised in Table 12/1. We considered four decisions: enrolling in higher education, choosing between university and higher vocational education, enrolling in teacher studies at the higher vocational level and enrolling in technical studies at the university level. The consequences that we distinguished are educational performance and returns on the labour market. We give three values to summarise the main findings on the effects of ability and background: positive (+), negative (-) or neutral (=).

Table 12/1 Effects of ability, social background, gender and age on decisions and consequences

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<td>Age</td>
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**Ability**

In 1991 we did not find an effect of the ability of the student on the decision to enrol in higher education. Compared to 1982 there has been a weakening of the self-selection of students enrolling in higher education. In 1982 students with a higher score in mathematics were more likely to enrol.

We found clear effects of ability on the choice of the level and type of higher education. University education attracts Vwo-graduates with on average higher ability than higher vocational education. Between 1991-1995 the self-selection of students choosing between university and higher vocational education increased. The effects of ability variables on this decision increased and the expected probability to graduate for university students increased.

Students with higher ability are more likely to enter technical studies. We found a low correlation between the probability of choosing for technical studies and the probability of persisting in it, implying that a substantial number of technically talented people chooses non-technical studies.

Students with higher ability are less likely to enter teacher studies. The enrolment pattern for teacher studies is dominated by students with an Havo-certificate and a 'no-mathematics package'.

Ability has an effect on the outcomes in higher education. Students with higher ability are less likely to drop out and have less study delay. The ability of stu-
Conclusions and summary

Students is related with performance in higher education but the predictive value of ability variables is low. At the start of the study it is difficult to identify who is going to drop out. The students' own perception of the probability of success in higher education has highly significant effects on the results in the first study and is a better device for entry selection than the score at the final exam. Students who repeated classes in secondary education are often less successful in higher education. We found that the ratio of effort and educational production in the first year has a significant effect on the probability to drop out. A higher ratio increases the drop out probability. Drop outs from higher vocational education with an Mbo-certificate have a low probability to re-enrol.

We also found effects of ability on the first labour market experiences of school-leavers. Graduates with higher ability are less likely to enter jobs which require less education than they supply. Moreover, student who worked during their study or engaged in policy activities more often enter 'good' jobs and on average earn more than other students.

Social background

The social background of the students (still) has an effect on enrolment in higher education in 1991. The magnitude of the effect of social background on enrolment in higher education has diminished since 1982. For 1991 the elasticity of enrolment with respect to tuition fees differs across students from different income groups. Students from the lowest income group were the most sensitive for changes in tuition fees.

Vwo-graduates with a lower social background are more likely to choose for higher vocational education. Students from high income families are less likely to enrol in technical studies. Moreover, these students are more likely to persist in technical studies. This indicates a hidden potential for technical students in high income families.

In general we hardly found effects of social background on educational performance or on the returns on the labour market.

Gender

Gender has an effect on the level decision and on both type decisions. Female students are more likely to enrol in higher vocational education and in teacher studies. They are less likely to enrol in technical studies but more likely to persist in technical studies. This indicates a hidden potential for technical students in the female student population. We also found that women study faster in university. On the labour market women earn 5% less than men (controlling for other differences).

Age

Older students are less likely to enrol in the highest level (university). The increase of selectivity of university education between 1991 and 1995 can be explained by the fact that students with a history in higher education are more likely to choose for higher vocational education.
Older students are less likely to enrol in technical studies and more likely to enrol in teacher studies. In general we found that older university students have a higher probability to graduate than other students and they have a higher study progress. Older students (or students with a history in higher education) who decide to drop out persist longer than younger drop outs. Moreover, they are less likely to re-enrol (after dropping out).

**Ability versus background**
The effects of gender and age on the last three decisions are the mirror image of the effects of ability on these decisions. This implies that the decisions of female and older students are comparable to the decisions of lower ability students. However, the educational performance of female and older students is on average better than the performances of other students. This leads to the conclusion that the pattern of educational decisions of female and older students is more risk-avoiding than that of other students. The more stringent self-selection of these groups indicates a hidden potential for more demanding studies.

**Earnings expectations**
In the classical human capital theory educational decisions are based on expected marginal costs and returns. This means that expectations on earnings lie at the heart of the human capital model. Despite this pivotal role of expectations most economic studies use realisations assuming that they are equal to expectations. In this thesis we stayed closer to the theoretical model by using students’ expectations on earnings to analyse several decisions.

Most attention was paid to expectations on earnings. We found that students with higher expected future earnings are more likely to enrol in 1991. Expectations on forgone earnings were not related to the enrolment decision. In 1982 for both expectations the theoretically predicted effects were found.

We also used the expectations of future earnings in the analysis on the decision between university and higher vocational education and on the decision to enrol in teacher studies. For both decisions the expected earnings for the alternative option were not available. In the analysis we used predicted expected earnings for the alternative option based on the relation between student characteristics and expected future earnings of students who actually chose this option. Therefore, the estimation results depended on the validity of the predictions on the expected future earnings. In case of the level decision our results were rather disappointing due to the poor predictions of future earnings. In case of the decision to enrol in teacher studies we found the theoretical predicted effect of the earnings differential. An increase of the earnings differential between other studies and teacher studies lowers the probability of enrolling in teacher studies. We also investigated the relation between the expected future earnings and the realised future earnings. Unlike other studies, our data set enables us to compare expectations and realisations at the individual level. We found that large differences between earnings expectations and realisations are rare. Moreover, we did

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*Corrected for selection bias.*
not find systematic differences. The structure of students’ earnings expectations is very similar to the structure of realised incomes.

**Supply side differences**
The students we followed in higher education were divided over both levels and all types of higher education. In many analyses we included the level and type of higher education as control variables for differences in supply of education. We found many differences between university and higher vocational education. After four years the graduation rate and educational progress in higher vocational education is much higher and the study delay in higher vocational education is lower. It is also clear that within university differences in student effort, educational progress and drop out probabilities are much more pronounced than within higher vocational education. The general picture is that the higher vocational system, with more restrictions on student behaviour, is more efficient in bringing students in four years to the graduation line.

We found many differences between the types of education especially in university education. The decision on the level of higher education depends on the type of education. Students in technical, agricultural, medical and economic studies are less likely to choose for university. In university education we found that students in technical, science and medical studies work harder and have a lower educational production. The differences in effort can on average amount to 12 hours weekly. These findings indicate large differences in difficulty between studies. Student performance is lower in economic, cultural and technical studies. The most demanding studies do not get the highest rewards. Earnings of students in technical studies do not lie above the average for university students; students in science studies earn even less than average. The highest earnings are for students in medical and law studies. Combined with the earlier findings on ability we get the following picture for science and technical studies. Students in science and technical studies are on average more able than students in other studies, they work harder and have a higher probability of dropping out and a higher study delay. On the labour market their rewards lie below or are equal to other students who are less able and work less hard.

**Policy effects**
The analysis of decisions and consequences shed light on the effects of several instruments of educational policy. We found that the decision to enrol in higher education is related with the expected future earnings. The results were used to simulate the effects of some policy measures. We found that the elasticity of enrolment with respect to tuition fees is very low which is a confirmation of earlier findings. Replacement of the current grants system by a loans system has a modest effect on the overall enrolment rate, but this effect differs significantly across students from different income groups. Students from the lowest income group were the most sensitive to changes in tuition fees.

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For example Kodde (1985).
The weighted lottery scheme for medical studies has a perverse effect on enrolment in technical studies. We found that many technically talented students, with favourable odds in the weighted lottery scheme, choose for medical studies in which they are no more likely to persist than other students. Our findings indicate that technical studies would benefit from a random lottery scheme.

The decision to enter teacher studies is sensitive to changes in the salary structure. We also found that the expected starting salaries by teacher students lie far below the real starting earnings. An adequate communication of the real salary structure could attract many new students.

Characteristics of students at the start of the study have a low predictive value for their educational performance in the following years. It is difficult to identify who will drop out. Entry selection based on the score on the final exam does not improve the results of the educational system. The self-selection of students seems superior to all selection devices.

Between 1991 and 1995 there were many changes in the financial aid system for students. Our findings indicate that these measures especially influence students with a history in higher education in their decision between university and higher vocational consequences.

12.3 Summary

The analytical chapters of this thesis have been divided in two groups: decisions and consequences.

Decisions
In Section B of this thesis we analysed educational decisions on the length (enrolment or not), the level (university or higher vocational education) and the type of education (enrolment in technical studies; enrolment in teacher studies).

The determinants of higher education enrolment in the Netherlands have been investigated in Chapter 4. Three different economic models have been estimated for two different years. The economic models are a so-called pure consumption model, a pure investment model and a model that merges these two pure models. An attractive feature of these models is that they stay close to the economic theory by using expectations on future and forgone earnings as key variables. For 1982, the integrated model is superior to both pure models. All the financial variables (future earnings, forgone earnings and parental income) have coefficients differing significantly from zero, and have the predicted signs. Ability variables affected the enrolment probability positively and variables relating to personal taste have no influence.

The results for 1991 differ considerably. The pure investment model can no longer be rejected. The only financial variable that stands up is future earnings. The insignificance of forgone earnings and parental income suggests that higher education is a non-normal good. Furthermore, we find that ability scores no
longer affect enrolment. This finding can be interpreted as the result of the accommodation by secondary schools of changing financing schemes.

The change in the enrolment probability between 1982 and 1991 has been decomposed into a population-effect and a parameter-effect. Almost the entire change can be attributed to a change in the distribution of population characteristics.

We utilised the estimation results to simulate the effects of some policy measures. Our results confirm Kodde’s (1985b) finding that the elasticity of enrolment with respect to tuition fees is very low in the Netherlands. Replacement of the current grants system by a loans system has a modest effect on the overall enrolment rate, but the effect differs significantly across students from different income groups. This implies that such replacement should be accompanied by special measures to help students from poor families.

The decision on the level of higher education has been analysed in Chapter 5. On average university education attracts students with higher ability than higher vocational education. Moreover, students with a lower social background, female students and older students are more likely to choose for higher vocational education. Another important finding is that the decision on the level of higher education is related with the type of education. For example, students in technical studies are less likely to choose for university education than students in social studies.

This enrolment pattern has been found for 1991 and 1995. An inter-temporal comparison reveals that there has been an increase in the selectivity of university education after 1991. Both the effects of ability and background variables on the level decision increase. The increase is further corroborated by an increase in the expected probability to graduate by freshmen in university between 1991 and 1995. In simulations on the total size of the increase in selectivity we found a drop in the enrolment rate in university of 4 percent points. The higher selectivity of the university enrolment could lead to a increase in the graduation rate in university of around 1 percent point. The increase in selectivity disappears after exclusion of students with a history in higher education.

Between 1991 and 1995 there were many changes in the financial aid system for students. Our finding indicate that these measures especially influence students with a history in higher education.

Furthermore, we found clear differences in the expected study duration between university and higher vocational education. At university students with higher ability expect to study shorter, students with higher social background expect to study longer. These effects were not found in higher vocational education. In case the difference between university and higher vocational education as perceived by students was only a difference in duration we would expect the same pattern for the two levels. Thus, our findings indicate a quality difference between university and higher vocational education.

Finally, we estimated a double switching regression model for the decision on higher education consisting of five equations: one choice equation, two wage
equations and two duration equations. Again we find a different pattern of effects on study duration in university compared to higher vocational education. This means, we have more evidence for the quality difference between university and higher vocational education.

The results for the structural model are not completely in line with our theoretical predictions. This might be caused by the fact that in the estimation of the model we do not take account of the full range of cost and benefits variables, like earnings growth or non-financial costs and benefits variables. Moreover, the results for the reduced form models on expected wages and duration are rather poor.

In Chapter 6 we analysed the determinants of choosing a technical study at university level and of persistence in such a study. We found a low correlation between the probability of a student choosing a technical study and the probability of persistence in it. This implies that a substantial number of technically talented people choose non-technical studies. Especially female students and students from high income families are unlikely to attend a technical study but these students are relatively successful in such studies. A large fraction of these technically talented students are attracted to medical studies and law schools, where they are no more likely to persist in these studies than other medical and law students. This finding is predicted by a tournament model in which rewards are based on relative performance instead of absolute performance. Given the finding that being female and coming from a high income family are the characteristics that make people qualify as hidden technically talented persons, it is not unexpected that these students can be found in the medical studies and law studies. In Dutch law schools about 50% of the students is female, while in medical schools this is about 60%. Furthermore students in these schools on average come from families with above average incomes.

During the Summer of 1996, headlines in Dutch newspapers paid a lot of attention to one particular case which perfectly fits the results of this chapter. A very bright girl (presumably from an upper-class family), who achieved the highest possible marks for her final examinations in secondary school, applied for a place at the medical school of the university of Rotterdam. Against the favourable odds that the weighted lottery scheme gave her, she was not admitted. The board of the university to which she applied announced to admit her anyway, thereby disrespecting the Dutch law. A professor in physics commented on this case by asking why such a smart girl wants to study medicine instead of the more demanding courses taught to science students. The results in this chapter support this view, and (partially) answer this question.

In Chapter 7 the decision on enrolling in teacher studies at the higher vocational level has been analysed. First, the recruitment pattern for teachers and the inter-temporal change between 1982 and 1995 has been analysed. The main finding is that more than other studies in higher vocational education teacher studies recruit from the pool of lower ability students. Students enrolling from Havo and students with a ‘no mathematics’ package have a higher probability of choosing
Conclusions and summary

for both teacher studies for primary and secondary education. This pattern is fairly stable between 1982 and 1995. The analysis corroborated the well-known fact that teacher studies for primary education are dominated by female students.

Second, we looked at the relation between labour market developments, especially changes in salaries, for the educational profession and the educational decisions of Dutch students. Evidence was found that the decision on enrolling in teacher studies is sensitive to changes in the salary structure. We found that the earnings differential between teaching and non teaching matters in the decision on choosing for teacher studies. An increase in top salaries for teachers would increase the probability of choosing for teaching. Students in teacher studies expect lower wages on top of their careers than students in other studies. Moreover, teacher students expect to earn more with non-teacher studies than with teacher studies. This clearly indicates that money is just part of the story in choosing for teaching.

The expected starting earnings for students in teacher studies for primary education increased between 1991 and 1995. This is in line with real labour market developments in the nineties. However, the expected starting salaries by teacher students lie far below the real starting salaries. The real starting earnings for teachers seem to be very competitive. Most students in other studies expect lower starting earnings with the study they have chosen than the real starting earnings for teachers.

An adequate communication of the real salary structure could attract many new students. We simulated the effect of improving the communication on teacher salaries by predicting the enrolment in teacher studies with the real starting earnings instead of the expected starting earnings. The results indicate a substantial increase of enrolment in teacher studies.

Consequences

In Section C several consequences for the students in higher education have been analysed. The first two chapters deal with educational performance, the last two chapter deal with results on the labour market. Again, the models applied have been derived from the same basic human capital model**.

In Chapter 8 we estimated an economic model for student drop out on a sample of students from university and higher vocational education. This model has been developed and empirically tested in Oosterbeek (1992). The key variables in the model are the probability of graduation and the expected effort. In both models the theoretically predicted effect of the expected probability of graduating on drop out has been found. The probability of dropping out reduces with a higher expected probability to graduate. The theoretically predicted direct effect of effort on drop out (the higher the expected effort the higher the probability to drop out) was not found in the basic model for both levels of education: the effects were not significant. We modified the model with new assumptions for the

** Except for the models in Chapter 9.
expected effort in the second period. With the assumption that students infer their expected expectation from the ratio of effort and educational production in the first period we find the theoretically predicted effects in the drop out equation. Students who need more effort for each study point and thus expect to need more effort in the second year are more likely to drop out. This finding is a further corroboration of the validity of the theoretical model since it is in line with the findings in the previous work.

We found many differences in student effort between the two levels of education, university and higher vocational education. In university education there are large differences in average weekly effort between types of education which can amount to 12 hours. Moreover, students in types of education with the highest effort (technical, natural and medical studies) have the lowest educational production. This probably indicates large differences in difficulty between studies. In higher vocational education differences in effort are much smaller between students and types of education. We think that differences in the supply of education are much more pronounced in university education.

Quite remarkable are the differences in effort between the first and second year. Effort drops in the second year and differences in effort between students seem to reduce. Students with previous experience in higher education have a lower effort in the first year than students with no previous experience.

In Chapter 9 we analysed the relation between characteristics of the student at the start of the study and several indicators of educational performance in the next four years. The main pattern we found is that educational performance is primarily determined by ability and supply side characteristics and that background variables hardly influence the results in higher education. Ability variables have an effect on all the indicators of educational performance (drop out, the share of educational program finished and the study delay). The students' own perception of the probability of success in higher education (the subjective probability to graduate) has highly significant effects on the results in the first study. Students with a history in higher education have a higher probability to graduate and are also less likely to re-enrol. Class repetition in secondary education is a bad signal for success in higher education. We found that students who repeated classes are more likely to drop out or have more study delay in university and are less likely to re-enrol in higher vocational education. Students with a Vwo- or Mbo-certificate study faster in higher vocational education. Students with an Mbo-certificate have a high probability of not returning after drop out.

In general the background of students in higher education does not effect the results in higher education. However, there are some exceptions. Women study faster in university. Older students have a higher probability to graduate in university, a higher study progress and a lower probability to re-enrol. The social background (parents education or income) hardly has an effect on student performance.
The level and type of study is clearly related with our indicators of educational success. We found a clear difference between university and higher vocational education. The type of study has an effect on drop out, study progress and study delay. In general student performance is lower in economic, cultural and technical studies.

We compared the total effect of student characteristics (ability and background variables) with the effect of study characteristics (level and type of education) on educational progress and study delay. For both indicators we found that the effects of study characteristics dominate the effects of student characteristics.

The estimation results on the indicators of educational performance have been used for predicting educational success. The results showed that the predictive value of our 1991-variables is relatively low. At the start of the study it is difficult to identify who will drop out. Entry selection based on the score on the final exam does not improve the results of the educational system. Self-selection by students (indicated with the subjective probability to graduate) gives the best results, entry selection does not work.

The main conclusion is that the Dutch higher education system is governed by meritocratic selection with important differences between the levels and types of higher education.

In Chapter 10 the first results on the labour market have been analysed. We considered various aspects of 'overeducation'. The main findings are that:

- components of human capital and ability matter for the probability of entering a 'bad' job (a job with lower educational requirements than supplied by the school-leaver);
- job mobility is higher for workers in 'bad' jobs;
- workers in 'bad' jobs don't get a return on their schooling surplus;
- policy activities or work during study matters for the probability of entering 'good' jobs and for earnings.

School-leavers who enter 'bad' jobs have less human capital or ability. 'Bad' jobs pay less than 'good' jobs but this seems to be a temporary situation because school-leavers tend to leave these jobs soon. These findings picture a labour market governed by demand side opportunities in which school-leavers seek their way to a proper matching job.

In Chapter 11 the relation between earnings expectations of students in 1991 and their realisations four years later has been investigated. Contrary to other studies, we were able to compare expectations and realisations at the individual level. We found that at the individual level large differences between earnings expectations of students and realisations by graduates are rare. Moreover, there are no systematic differences between expectations and realisations. These results show that findings by Dominitz and Manski (1994) that students are capable of making realistic estimates of future incomes not only hold at the group level but also hold at the individual level.
A very interesting finding is that the structure of students' earnings expectations is very similar to the structure of realised incomes. Especially the coincidence of the effects of the type of education on earnings expectations and realisations is remarkable.

From a theoretical point of view we can conclude that expectations of earnings are not perfect but do make sense. The economic model of realised earnings gives a better prediction of future income than students' own predictions.