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ENROLMENT IN HIGHER EDUCATION IN THE NETHERLANDS

BY

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1 INTRODUCTION [1]

Over the last two decades we have observed a rapid increase in enrolment in higher education in The Netherlands. By 1990 enrolment had risen to 40 per cent of each birth cohort. From the time series analysis by Huijsman *et al.* (1986), it can be concluded that by far the most important economic factor causing this increase is the growth in per capita national income. Other variables such as expected future earnings, financial aid to students and tuition fees produce the signs theoretically expected, but their influence is small.

The literature on the economics of education distinguishes two sets of motives relating to schooling decisions: consumption motives and investment motives. Consumption motives relate to the usual demand framework with income and prices as explanatory variables. Investment motives relate to the human capital model with future earnings and present costs as the main determinants. As it seems natural to relate per capita income to consumption motives, a straightforward interpretation of the empirical findings is therefore that consumption motives dominate investment motives in enrolment decisions. An alternative interpretation is offered by Hartog *et al.* (1992). The simple human capital model assumes a perfect capital market. In reality, however, capital market imperfections may hinder some people from reaping the benefits of schooling. Rising parental incomes may have lifted capital constraints. If capital constraints are of importance, the returns on education include a rent. Lifting the constraint diminishes the rent and the returns to schooling will then be expected to fall. Hartog *et al.* report a fall in the rate of return from about 13 per cent in 1962 to about 7 per cent in 1989. This decline supports their interpretation.

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The factors affecting the change in higher education enrolment are usually studied in a time series framework.[2] In this paper we adopt a different approach. We have at our disposal information on two cross-sections. The first cross-section contains information about students who in 1982 were in their final year of secondary education and had to decide whether or not to enrol in higher education. The second cross-section contains information about students who were facing the same decision in 1991. The 1982 sample has been studied extensively by Kodde (1985a, 1985*b*, 1986) and Kodde and Ritzen[3] (1984, 1985, 1986).

The structure of this paper is as follows. Section 2 provides a brief sketch of the theoretical framework that we will use for our empirical analysis. Section 3 describes our data sets. Section 4 presents and discusses the empirical findings. This section contains the comparison between the estimation results from the 1982 data set and those from the 1991 data set. Section 5 examines the implications of our results for two policy measures, namely the level of tuition fees and the structure of the financial aid programme. Section 6 draws some conclusions.

2 A THEORETICAL FRAMEWORK FOR THE ANALYSIS OF SCHOOLING CHOICES

Prior to the so-called human capital revolution of the 1960s and 1970s *(cf.* Freeman 1986), schooling was treated by economists in the same way as all other consumption goods. This implies that the standard concepts of substitution and income effects also apply to schooling. A student's decision problem in the consumption model can be pictured as in Figure 1 *(cf* Kodde 1985a). The horizontal axis measures the amount of schooling *(s)*, and the vertical axis measures the amount of a composite consumption good of the student excluding schooling *(Y)*. The line ABS_{max} is the budget constraint, and II an indifference curve.

The distance from A to the origin measures forgone earnings and parental income, while $S_{max}B$ is equal to the sum of grants and parental income. The slope of the budget constraint is determined by the price of education relative to the price of the composite consumption good. The price of education depends on earnings forgone and tuition fees. The effects of changes in grants, parental income, earnings forgone and tuition fees can all be analyzed within this framework. For instance, raising tuition fees pivots line AB around A to AB'. This change can be decomposed into the usual substitution effect and income effect. Whether higher tuition fees increase or reduce the optimal amount of schooling depends on the sign and magnitude of the income effect.

The shortcoming of the consumption framework is that it focusses solely on a single-period decision problem. It ignores the fact that going to school in the present period may affect earning capacity in the next period. This, of course, is

2 Huijsman *et al.* (1986) provide one example, others include Pissarides (1981, 1982) and Matilla (1982).

3 The current Dutch Minister of Education.

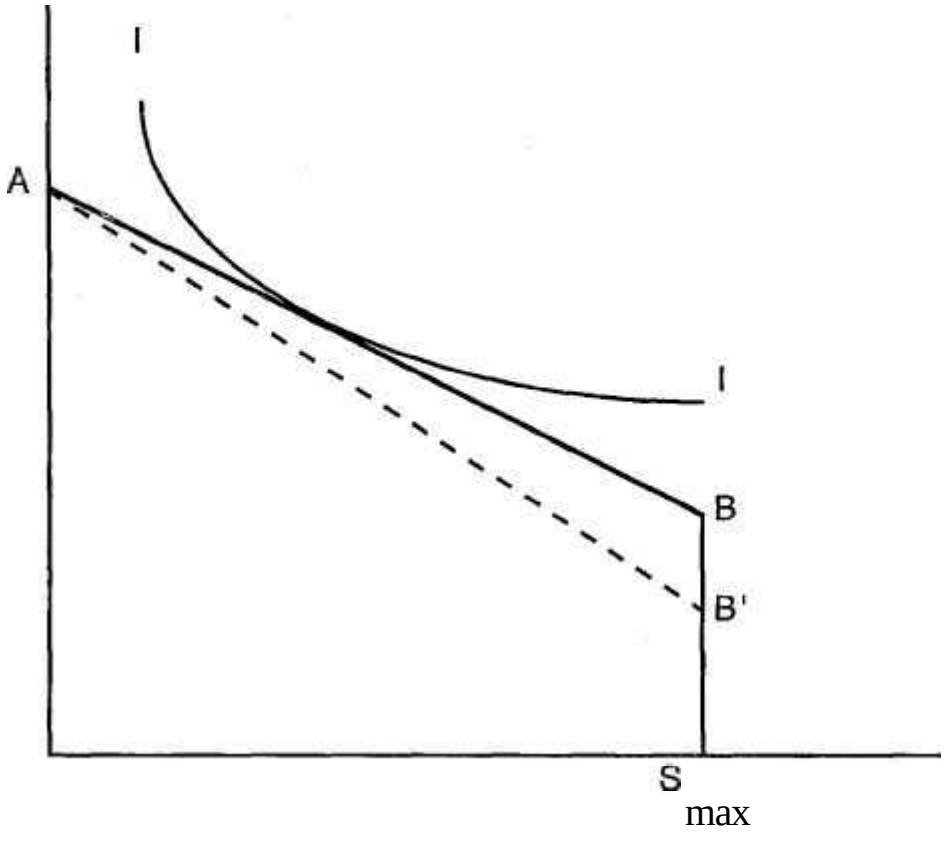

Figure 1 - Demand for education in a consumption model

the key notion in the human capital theory developed by Schultz (1960, 1961) and Becker (1975). According to this theory, individuals aim to maximize the net present value of the lifetime earnings stream.[4] If the human capital production function exhibits decreasing returns, the individual's optimization problem can be visualized by Figure 2. In this figure the horizontal axis again measures the amount of schooling, while the vertical axis now measures the net present value of lifetime earnings *(N).*

The curve AC gives the net present values for differing amounts of schooling. Given the assumptions regarding the human capital production function, the optimum *(s*)* is unique. The human capital theory has been criticized by other social scientists analyzing education, on the ground of its implicit assumption that schooling *per se* generates no utility.

Kodde and Ritzen (1984) merge the attractive features of the consumption model and the investment model. More specifically, they combine the consumption model's objective function with the investment model's budget constraint. This view recognizes on the one hand that schooling in itself produces utility and

4 If the so-called separation theorem holds, this objective is compatible with maximization of an inter-temporal utility function *{cf.* Kodde 1985a, p. 65).

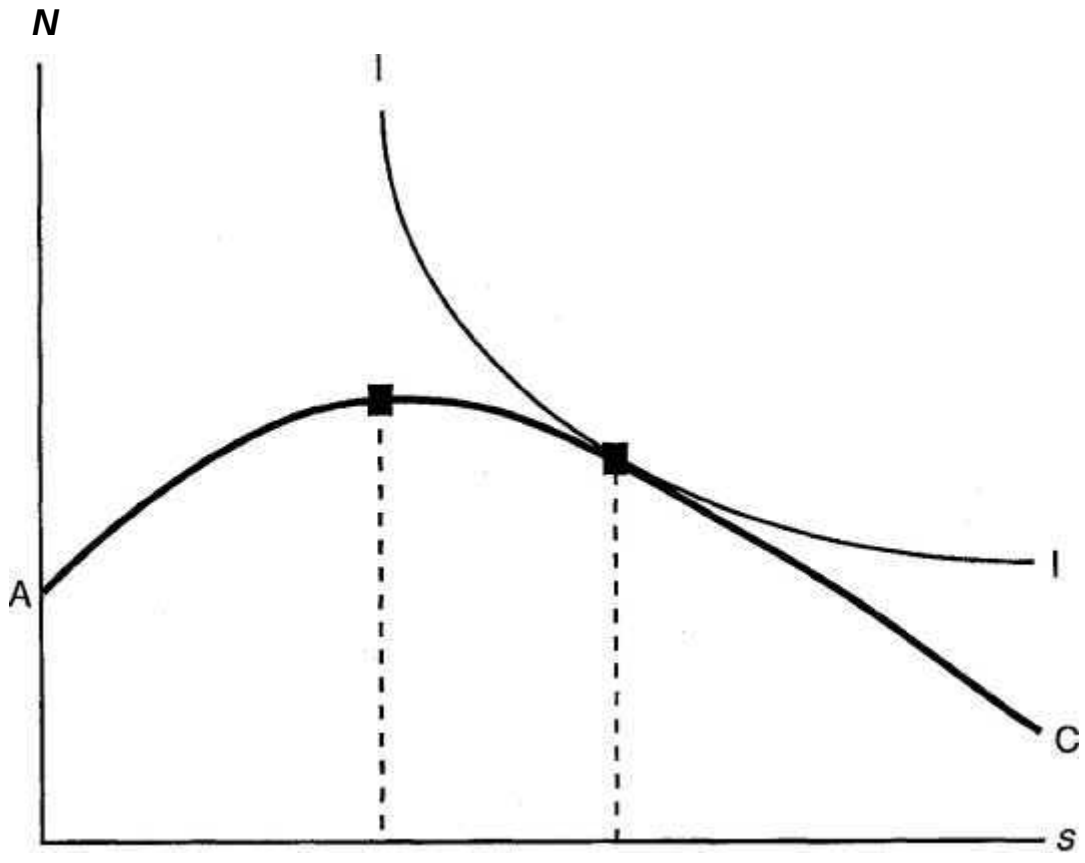

Figure 2 - Demand for education in an investment model

on the other that investments in schooling affect earnings prospects. In the integrated consumption-investment model, the optimal amount of schooling is at the point of tangency of the curve AC and the highest feasible indifference curve (II): s^{**}.[5]

The preceding exposition has assumed that schooling is continuous. In order to analyze the decision to enrol in higher education, we will instead assume that schooling is dichotomous. That is, we shall analyse the decision whether or not to enrol in isolation, and ignore the choice of the optimal amount of higher education.[6] Formulating the model in this fashion, we can adopt the binomial logit model for our empirical analysis. Cramer (1991) provides an exposition of this model, and discusses how it is embedded in a (random) utility maximization framework.

All three models discussed above operate on the implicit assumption that students are the actual decision makers and that their parents have no influence other

5 Where it is assumed that individuals have a utility function over schooling and the net present value of lifetime earnings.

6 We study the same 'probit/logit' decision structure as Willis and Rosen (1979). The alternative 'tobit' decision structure is analysed in Kenny *et al.* (1979).

than providing a financial contribution. In this respect the models are comparable with the classical female labour supply model, in which the income of the partner is exogenous. Possibly the schooling decision models can be extended along the same lines as is done for female labour supply models by introducing elements of game theory. Such an extension is, however, beyond the scope of this paper.

3 DATA

For our empirical analysis we employ two dataseis. The first dataset relates to a cohort of students who were in the final year of secondary education in 1982 (henceforth the 1982 cohort). The second relates to a cohort of students who were in the same position 9 years later (the 1991 cohort).[7]

In The Netherlands, there are two levels of secondary education which qualify students to enter higher education. Both cohorts include students from both levels of secondary education. After completing their secondary education, these students face the decision whether or not to enrol in full-time post-secondary education.

The economic models presented in the foregoing section hint at a number of financial variables that should be included as regressors. The pure investment model suggests the insertion of forgone earnings and future earnings, while the consumption model implies inclusion of forgone earnings and parental income. In addition, according to both models we should include direct cost variables. However, since these costs are identical for all students, inclusion makes no sense in a regression framework. Questions with respect to forgone earnings, future earnings and parental income have been put to all respondents. It is important to note that the answers to these questions refer to expectations with regard to forgone and future earnings. In this respect, the analysis in this paper differs fundamentally from the studies by (among others) Willis and Rosen (1979), Kenny *et al.* (1979), Garen (1984) and Hartog *et al.* (1989), who all use data on actual earnings. Since in reality schooling decisions are taken before earnings are known, these authors implicitly impose a severe assumption of *ex post* unbiasedness of expectations *(cf.* Manski and Wise 1983, p. 108).

Kodde (1985a) includes additional regressors in the economic models. To the investment model he adds ability scores from secondary education in language and mathematics, arguing that these variables are related to the probability that a student will graduate from higher education and actually reap the expected future earnings gain. It is compatible with the consumption framework to augment the model with variables which might explain differences in preferences. We therefore follow Kodde (1985a) and include the educational levels of the parents, the

7 Extensive descriptions of these datasets are provided in Kodde and Ritzen (1986) for the 1982 cohort, and in De Jong *et al.* (1992) for the 1991 cohort.

gender of the student and the level of secondary eduction. The integrated investment-consumption model involves the explanatory variables of both pure models. Table 1 gives a short description of the variables that we will use in the next section, along with the mean values and standard deviations.

4 EMPIRICAL RESULTS

In this section we present and discuss the empirical results. Table 2 contains the results for 1982.[8] The results for 1991 are given in Table 3.[9]

The main conclusion from the results in Table 2 is that the integrated model is superior to the other two models, which appear to be special cases. It may therefore be concluded that both investment and consumption motives matter. With their restricted dataset, Kodde and Ritzen (1984) conclude the same. In the integrated model, the financial variables have the signs theoretically expected, although the effect of parental income is not significantly different from zero. Higher future earnings increase the probability of enrolment, higher forgone earnings decrease it (significant at the 10% level). Although significant, the magnitude of these effects is very modest. For instance, an increase of 10 per cent in forgone earnings reduces the enrolment probability for an average person by only 0.5 percentage points.

Of the non-pecuniary variables, the ability score in mathematics comes in with an effect that differs significantly from zero. The magnitude of this effect far exceeds that of the financial variables. The socio-economic background of the student is important for enrolment in higher education. The difference between having a father with a high level of education and a father with a low level of education is 10 percentage points.[10] Gender and level of secondary education do not seem to matter in entering higher education.

8 The results in Table 2 differ from the results presented by Kodde (1985a, 1985b, 1986) and Kodde and Ritzen (1984, 1985). These authors restrict their analysis to those students whose parents earn incomes above a certain threshold. Under the financial aid system that prevailed in 1982, this restriction eliminated all students who received a government grant. An argument for this is that it provides a better estimate for the income effect. Under the current financial aid system, which became operative in 1985, however, all students receive a basic grant. To improve comparability between the 1982 and 1991 results, therefore, we prefer to include the full 1982 sample in our analysis.

9 The effects in the tables are derivatives. They measure the percentage point change in the probability of enrolment where the variable changes one unit. For the financial variables we give the so-called quasi-elasticities *(cf.* Cramer 1991, p. 8); these measure the percentage point change in the probability of enrolment induced by a one per cent change in the regressor.

10 In estimating the effect of the educational level of the parents Kodde and Ritzen chose the intermediate level as a reference category. We think that choosing one of the extreme levels as a reference category is a better way to show the difference between a high and a low level of education. Kodde and Ritzen reported that the educational level of the parents had no influence. This differs from our finding on their extended data set (including students receiving a grant).

TABLE 1 - DESCRIPTION OF THE VARIABLES

variable	description	means and standard deviations	
		1982	1991
enrolled	yes=1; no=0	0.80	0.93
forgone earnings*	log of guilders per month net	7.02	6.90
		(0.37)	(0.35)
future earnings*	log of guilders per month net	7.46	7.49
		(0.41)	(0.38)
ability score in language	measured on a scale from	6.78	6.78
	1 (low) to 10 (high)	(0.64)	(0.70)
ability score in mathematics	measured on a scale from	6.44	6.61
	1 (low) to 10 (high)	(0.86)	(0.87)
gender	male=0; female=1	0.48	0.60
level of secondary education	low=0; high=1	0.51	0.53
education father: low	low=1; other=0	0.34	0.21
intermediate	intermediate = 1; other=0	0.39	0.46
high	high=1; other=0	0.27	0.33
education mother: low	low=1; other=0	0.48	0.30
intermediate	intermediate = 1; other=0	0.43	0.52
high	high=1; other=0	0.08	0.18
family income*	log of guilders per month net	8.07	7.97
		(0.50)	(1.17)
# of observations		1706	744

* Deflated by consumption price index (1982=1) (1991 = 1.17).

The results for 1991 differ considerably from the 1982 results. First of all, the integrated model is no longer superior to the pure investment model; a likelihood ratio test shows that the set of restrictions implied by the investment model cannot be rejected at conventional levels of significance. Secondly, in the integrated model for 1991, future earnings is the only financial variable that continues to have any effect. The insignificance of forgone earnings might be imputed to the ambiguity of this variable in the consumption model. Whereas the pure investment model predicts that this variable will have a negative effect on the probability of enrolment, the prediction of the pure consumption model depends on the sign and magnitude of the income effect of a change in this variable. Apparently, between 1982 and 1991 higher education became an inferior good (for the population qualified to enrol). The insignificance of the effect of family earnings in 1991 points in the same direction.

The ability score for mathematics no longer affects the decision to enrol. This result points to a weakening of the selection taking place in secondary education.

TABLE 2 - EFFECTS OF REGRESSOR VARIABLES ON HIGHER EDUCATION ENROLMENT; 1982

	type of model		
	investment	consumption	integrated
forgone earnings	-0.059*	0.015	−0.052**
future earnings	0.211*		0.187*
ability score in language	1.0	0.9	0.4
ability score in mathematics	3.8*	3.8*	3.5*
gender		-2.6	-0.5
level of secondary education		4.2*	0.8
education father intermediate		-0.2	0.1
education father high		10.4*	10.0*
education mother intermediate		4.2*	3.7**
education mother high		1.5	0.0
family earnings		0.009	0.000
loglikelihood	-801.35	-814.39	-788.36
# of observations	1706	1706	1706

* Significant at the 5% level; ** significant at the 10% level.

Our speculation is that this weakening reflects a policy on the part of secondary schools to accommodate changes in the government's financing scheme and the appearance of smaller cohorts. In The Netherlands, secondary education is almost completely financed by central government. To give secondary schools an incentive to increase their numbers of graduates and to reduce the number of students needing to repeat their final year, central government no longer provides schools with funds for students repeating their final year. Final grade marks are the average of school-specific tests and nation-wide exams. The school-specific tests are held before the nation-wide exam. The elimination of funding for repeaters gave schools an incentive to compensate weak students in advance by giving them high school-specific test scores. As students typically make a decision about enrolling in higher education before the nation-wide exams take place, they can do so only on the basis of information from the school-specific test. Due to the compensation strategy of the schools, the information from these tests may be relatively misleading. Our interpretation is supported by our finding in an earlier analysis that enrolment plants are significantly positively influenced by the school-specific test scores (De Jong *et al.* 1992, p. 123).

As a final remark on the results in Table 3, we note that the level of secondary education in which students qualify is relevant to their higher education plans, and that socio-economic status (level of father's education) still counts. However, the magnitude of the effect of the educational level of the father has diminished

As a final remark on the results in Table

TABLE 3 - EFFECTS OF REGRESSOR VARIABLES ON HIGHER EDUCATION ENROLMENT; 1991

	type of model		
	investment	consumption	integrated
forgone earnings	0.094	-0.028	-0.002
future earnings	0.288*		0.062*
ability score in language	-1.1	-1.1	0.7
ability score in mathematics	1.8	2.2*	1.8
gender		-1.0	0.0
level of secondary education		-2.2	-4.0*
education father intermediate		3.8*	4.0*
education father high		5.1*	5.0*
education mother intermediate		-0.9	-1.2
education mother high		1.6	-2.1
family earnings		0.001	-0.004
loglikelihood	-176.74	-178.07	-171.93
# of observations	744	744	744

* Significant at the 5% level.

and the difference between the intermediate level and the high level has disappeared. The latter effect may be caused by a change in the financial aid system (see footnote 8). The negative effect of the level of secondary education deviates from the conclusions suggested by causal observation. Apparently the higher enrolment rate for students from the highest level is caused by other more favourable characteristics (parental education).

With cross-section results from consecutive years, it is possible to decompose the change in enrolment between 1982 and 1991 into a part that can be attributed to changes in the characteristics of the sample and a part associated with changes in the parameter estimates. Gomulka and Stern (1990) derive the following expression for 'growth accounting' if the dependent variable is binary:

$$\hat{y}^{91} - \hat{y}^{82} = \{P(\beta^{91}, X^{91}) - P(\beta^{82}, X^{91})\} + \{P(\beta^{82}, X^{91}) - P(\beta^{82}, X^{82})\}$$

where the left-hand side is the change in the enrolment rate between 1982 and 1991, and $P(\beta^i, X^j)$ is the average across the sample X_j of the predicted probabilities using the parameters of year *i*. The first term in braces on the right-hand side gives the effect of changes in the parameters, the second term in braces gives the effect of changes in the distribution of sample characteristics. Table 4 gives the results of predicting enrolment in year *j* given the parameters of year *i* (*i*,*j*= 1982, 1991).

TABLE 4 - PREDICTED ENROLMENT WITH ROW-YEAR CHARACTERISTICS GIVEN COLUMN-YEAR PARAMETERS

	1982	1991
1982	80.2	82.8
1991	92.2	93.1

Applying the equation proposed by Gomulka and Stern to the results in Table 4, we can conclude that most of the overall 12.2 per cent increase in enrolment can be attributed to changes in the population, while changes in the parameters affect the enrolment shift only slightly. The economic interpretation of this result is that different enrolment patterns in the selected years can be attributed almost entirely to the composition of the population and are not caused by a change in preferences and/or in the environment (restrictions). The major change in the composition of the population is the rising level of parental education. Most of the 1982 students have parents born before World War II, whereas most of the 1991 students have parents born after it. This explains the large increase in the level of parental education.

That changes in the parameters have not affected the probability of enrolment does not imply that these parameters have not changed, but only that their joint effect has remained stable. In fact, a likelihood ratio test on the hypothesis that the 1991 coefficients are equal to the 1982 coefficients has to be rejected at the 1% level.

5 POLICY ISSUES

Research on the economics of education is closely related to issues in the field of educational policy. In this section we address two such issues. The first deals with the elasticity of enrolment with respect to changes in the level of tuition fees. The second addresses a recent proposal to replace the current Dutch system of student grants by a system of loans.

5.1 *Tuition Fees*

In The Netherlands, all students entering full-time higher education pay the same tuition fees.[11] Therefore, no immediate information is available regarding the effect of tuition fees on the enrolment decision. Kodde (1985b) proposes an ingenious trick. This trick is most easily understood in the context of the pure consumption model. An increase in the tuition fee pivots the budget constraint in

11 Different fees are levied from students who study part-time or who have exceeded the maximum study duration of six years. Neither exception is relevant to our sub-sample of enrollers.

Figure 1 around point *A* to the right. This change can be decomposed into an increase in forgone earnings of such an amount that the slope of the budget constraint is equal to that occurring in the case of a higher tuition fee (this pivots *AB* around *B* to the right such that the lines pivoted around *A* and *B* are parallel), accompanied by a decrease in parental income. Since the estimation results provide information on the quasi-elasticities of the probability of enrolment with respect both to forgone earnings and parental income, it is possible in this way to mimic an increase in the tuition fee.

Basing his calculation on the mean values of forgone earnings and parental income, Kodde (1986) calculates for 1982 that increasing the annual tuition fee from 1200 guilders to 1800 guilders would reduce the enrolment rate by 0.5 percentage points. This outcome points to a very low elasticity in the demand for higher education with respect to price changes. For 1991 the results are even more dramatic: from the insignificance of the effects of forgone earnings and parental income we must conclude that the demand for higher education is completely inelastic.

5.2 *Loans Instead of Grants*

A related issue concerns the design of the financial aid system for students. At present, students in The Netherlands receive a grant which is not related to the income of their parents. Within limits, earnings from part-time work are allowed. Now, however, policy proposals are under consideration with regard to replacing the grant system by a system of interest-bearing loans. Assuming either that all students take out such loans or that borrowing is compulsory, the replacement is equivalent to a reduction in future earnings. We inserted reductions in future earnings amounting to 200 and 400 guilders per month. Also, we made separate calculations for students from different categories of parental income. Results are given in Table 5.

The results in Table 5 are quite interesting. Overall, the implementation of an

TABLE 5 - SIMULATING THE EFFECTS OF A LOANS SYSTEM IN 1991; ENROLMENT RATES IN PERCENTAGES BY LEVEL OF PARENTAL INCOME

	Level of parental income (in guilders per month)						
	All	≤ 1500	1500-2500	2500-3500	3500-4500	4500-5500	≥ 5500
Current enrolment	93.1	91.3	92.8	92.9	93.5	93.6	93.4
After 200 reduction	92.1	87.1	91.7	91.9	92.5	92.8	92.4
After 400 reduction	90.7	85.6	90.0	90.6	91.0	91.8	91.1
# of observations	744	22	111	168	151	85	170

interest-bearing loans system will reduce the enrolment rate from 93.1 per cent to 92.1 or 90.7 per cent, depending on the size of the reduction in future earnings. This overall effect might be regarded as modest. However, whereas the parental income group-specific enrolment rates reveal no significant differences before the implementation of the loans system, these rates differ significantly after its implementation. This result is due to the fact that expected future earnings increase in line with parental income, and the *relative* earnings reduction is therefore larger for students with low-income parents. The important policy implication of this result is that the replacement of a grants system by a loans system must be accompanied by special measures to help students from poor families, unless government is willing to sacrifice the objective of equal access. It may be that the lower earnings expectations of students from low-income families are incorrect. Perhaps they are too pessimistic. In that case, the objective of equal access can be fulfilled by providing these students with more information.

6 CONCLUSIONS

In this paper we have investigated the determinants of higher education enrolment in The Netherlands. 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. For 1982, Kodde and Ritzen (1984) reported that the integrated model is superior to both pure models. They found that all the financial variables (future earnings, forgone earnings and parental income) had coefficients differing significantly from zero, and had the predicted signs. They also reported that ability variables affected the enrolment probability positively and that variables relating to personal taste had 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 enrolment in 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 to changing financing schemes.

We decomposed the change in the enrolment probability between 1982 and 1991 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 utilized the estimation results to simulate the effects of some policy measures. Our results confirm Kodde's (1985*b*) 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.

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Summary

ENROLMENT IN HIGHER EDUCATION IN THE NETHERLANDS

In this paper we investigate the determinants of higher education enrolment in The Netherlands and estimate three different economic models referring to investment motives, consumption motives, and a combination of these two. By estimating these models for different years (1982 and 1991) we identify changes over time. The importance of financial variables appears to be vanishing. Moreover, we find that enrolment is no longer related to ability variables. We offer explanations for these findings. Finally, we employ the results to simulate some policy measures.