Economics of Education Review, Vol. 5, No. 2, pp. 107–117, 1986.
Printed in Great Britain.

0272–7757/86 $3.00 + 0.00
Pergamon Journals Ltd.

Wealth Neutrality in Higher Education: The Effects of Student Grants

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Abstract — Public policy has been directed toward increasing equal opportunity of access to higher education for over two decades, yet there has been little systematic investigation of the effectiveness of student financial aid to achieve this goal. This paper examines the effectiveness of publicly provided student grants to achieve wealth neutral college attendance in 1980, where the wealth neutral equity criterion is defined as an equal probability of college attendance across household income. Student grants are seen to encourage a movement toward wealth neutrality, but do not completely remove the positive effect of income on the probability of college attendance.

INTRODUCTION

IN A LANDMARK case, Serrano vs Priest (1971), the California Supreme Court ruled that the California educational system was unconstitutional because it made the quality of a child's education a function of the wealth of his parents' school district. Feldstein (1975) examined the distribution of intergovernmental aid for the consumption of primary and secondary education in light of the decision and refers to the implied categorical equity criterion as "wealth neutrality". The underlying principle of wealth neutrality is that certain categories of services, such as education and health care, are deemed fundamental interests and that consumption of these services should not have a strong relationship to an individual's ability to pay. Wealth neutrality differs from other equity criteria in that it singles out particular goods and services. Other equity criteria, such as vertical and horizontal equity, treat all goods and services alike. The concept of wealth neutrality may be extended from intergovernmental grants for the general provision of public services to student financial aid intended to have a wealth neutralizing effect on the individual consumption of higher education.

Since the mid-1960s the federal government has supported a policy to subsidize college attendance through student financial aid. The Higher Education Act of 1965 aimed to make post-secondary education feasible for the children of low- and moderate-income families. It initiated what were to become large-scale programs to provide general grants and low-interest loans to undergraduate college students from lower-income families.

In the 1970s, middle-income families were included as recipients of student financial aid based on the argument that steadily increasing college costs caught them in the bind of being too wealthy to qualify for existing programs, yet not wealthy enough to afford higher education for their children without aid. The government's response was to broaden the definition of financial need by periodically increasing the maximum income for eligible families. Eventually, legislation eliminated the income ceiling for those qualifying for Guaranteed Student Loans and made Basic Educational Opportunity Grants, now called Pell Grants, available to students from families earning as much as $25,000 a year.

A reversal of the trend of increasing student eligibility has occurred since the early 1980s. The income eligibility requirements for the largest financial aid programs, Pell Grants and Guaranteed Loans, were tightened and resulted in a decrease in both the number and size of student financial aid

awards. Current administration proposals call for further cutbacks in student financial aid programs.

Since all publicly provided student financial aid awards are determined to some degree by family income, equal opportunity of access to higher education is a focal issue in the debate over continued support of student grants and loans. While the research presented here does not advocate an equity criterion, the effectiveness of student financial aid in terms of neutralizing family income as a determinant of college attendance is examined. Wealth neutrality is defined for the purposes of this paper as an equal probability of college attendance across income groups. A previous study by Bishop (1977) found that wealth neutral college attendance was not attained in 1960, well before large-scale student financial aid was available to low-income families. There is a clear need to examine the effects of student financial aid with respect to the wealth neutrality criterion given the recent high levels of public funding of these programs and the current debate over the future levels of these programs.

The purpose of this paper is threefold. First, the probability of college attendance across income groups and the degree of wealth neutrality is determined for the senior high school class of 1980, a group of students for whom financial aid awards were available at their peak levels. Second, the effectiveness of student financial aid to attain the wealth neutrality criterion is examined. And last, the relative effectiveness of student grants and the direct costs of college attendance, as policy variables to promote wealth neutrality, is determined.

The remainder of the paper is divided into four sections. A general description of the behavioral model of college attendance is given in the following section. The second section contains the empirical specification, data description and estimation results for student grants and for the probability that an individual will attend college. The third section contains the analyses of the effects of student grants on the wealth neutrality criterion, and the last section contains a brief summary.

BEHAVIORAL MODEL

In order to determine the influence of student financial aid on the college attendance decision, a multi-period utility maximization model is used to derive the determinants of demand for higher education.[1] The model hypothesizes that the household, comprised of parents and a potential college-going individual, chooses whether to purchase college for the individual on the basis of whether a college education will provide a higher level of utility to the household over the lifetime of the individual, rather than choosing not to attend college. As such, the model allows for both the consumption utility and investment utility from college attendance that may accrue to both the parents and individual to explicitly enter the model as determinants of the demand for higher education.

The model extends previous single-period utility maximization models developed by Bishop (1977), Miller and Radner (1970), Kohn *et al.* (1976), and Fuller *et al.* (1982), to capture the future utility from investments in human capital by including the present value of lifetime benefits and costs of college. These variables are traditionally used in wealth maximization models such as those developed by Willis and Rosen (1979) and Abowd (1980).

The college attendance decision is assumed to be made final at the end of the individual's senior year in high school and to be one whose effects extend into the future, with associated monetary and nonmonetary benefits and costs. The valuation of benefits and costs by the parents and individual is, by nature, highly subjective. Households base their calculations on imperfect information, uncertainty and expectations that may or may not be realized. The model assumes that households faced with these uncertainties do form single-value expectations of the benefits and costs of each alternative at the time of the decision and use these expectations to determine the optimal choice for the individual. Theoretically, the model allows for households to change their expectations and behavior in future periods; however, the college attendance decision made at the end of the senior year in high school is based on the information available to the household at that time.

The household forms expectations for the future income stream of the individual for the college and non-college alternatives, the direct costs of attending college, and the amount and types of student financial aid that the household may receive, whether the college alternative is chosen or not. The non-attendance alternative assumes that the individual enters the full-time labor force upon high school graduation.

The household selects the optimal alternative, either college or non-college, based on the alterna-

tive which yields the highest level of utility. The model yields a demand function of the determinants of college attendance which include parental income, student financial aid, the direct costs of college, the difference between lifetime earnings of the individual under the college and non-college alternatives, and household attributes which serve as proxies for the tastes and preferences of the parents and individual.[2] Household and individual attributes include parental education, the individual's academic achievement level, sex, race, geographic location and the distance to college.

ESTIMATION AND RESULTS

The empirical model used to estimate the probability that a household chooses college attendance for the individual is derived directly from the demand function for the discrete choice between the college and non-college alternatives discussed in the previous section. The primary purpose of the model is to examine the effects of student financial aid on the demand for college, while controlling for other variables which may influence the post-secondary decision. Some of the demand determinants require pre-estimation of instrumental variables. In particular, four general types of student financial aid are estimated then entered separately in the demand for college equation.[3]

The primary source of data used for the empirical estimation is the High School and Beyond (HSB) data set, a nationally representative longitudinal survey of over 28,000 high school seniors sponsored by the National Center for Education Statistics, taken in the spring of 1980. The survey was conducted at a time when student financial aid programs were well established, and proposals to reduce the funding of student financial aid occurred nearly one year after the senior cohort had been sampled. Thus, the sample contains households who were expecting student financial aid programs to continue at 1980 levels, and so provides an ideal base year sample from which to predict the effects of recent decreases in funding on the wealth neutrality criterion. Most of the data required for the analysis is provided by the HSB including socioeconomic and demographic background data, SAT-type test scores, and high school curriculum and grades. An exception is the data required for the estimation of the future return to a college degree. The investment payoff portion of the demand for college is modeled separately, and its estimated value then applied to the observations in the HSB data. The data used for the estimation of age-earnings profiles are provided by the March 1980 Current Population Survey data from the Census Bureau.

Student Financial Aid

In order to model correctly the demand for college, the availability of student financial aid for college attendance must be included in the estimation. If college attendance is chosen, then student financial aid provides an incentive to attend; if college is not chosen, then financial aid is an opportunity foregone in lieu of some non-college alternative. Student financial aid is available to households from both public and private sources in the form of non-repayable grants and the interest subsidy from low-interest student loans. Four student financial aid variables: (1) public grants, (2) private grants, (3) public loans and (4) private loans are estimated for each individual in the HSB data set.

The data used in the estimation of student financial aid is restricted to those individuals who indicated plans to attend college, some of whom received one or more types of financial aid, and many who did not receive financial aid of any type. That is, many observations of student financial aid are zero-valued while others form increasing continuous variables. Due to this truncated nature of the dependent variables, a tobit model is used for each of the four equations used to estimate the student financial aid variables.

The independent variables chosen for the estimation of student financial aid are those factors primarily used by the government and higher education institutions to determine financial aid awards. In addition, variables have been included to control for demographic characteristics and for the availability of funds. The independent variables, coefficient estimates and asymptotic *t*-ratios for the tobit estimation of publicly provided student grants are given in Table 1.[4]

Public grants are defined as all non-repayable student financial aid from federal and state programs. Since student grants from the government are specifically intended to favor lower-income families, the highly significant and negative coefficient on parental income suggests that households from these groups do receive larger public grant awards than higher-income households as

Table 1. Tobit coefficient estimates of publicly provided student grants

Variable	Coefficient	Asymptotic *t*-ratio
Constant	1.6744*	1.728
Parental income	−0.5911†	−22.706
Direct costs	0.1115†	5.368
Academic achievement	0.1061†	2.820
Dependent siblings	0.8579†	4.975
College siblings	0.1413	0.252
Sex (male = 0)	−3.0334†	−4.978
Race (white = 0)	8.4922†	8.222
Race × sex	0.3637	0.275
New England region	2.7902*	1.744
Middle Atlantic region	3.5473†	3.241
South Atlantic region	0.6680	0.603
East South Central region	2.9295‡	2.205
East North Central region	2.7760†	2.808
West South Central region	3.2662†	3.004
West North Central region	2.9241†	2.474
Mountain region	4.4796†	3.224
Sample size	4,145	
Limit observations	2,105	
Non-limit observations	2,040	
−2 log likelihood ratio	940.06	

†Significant at the 0.01 level.
‡Significant at the 0.05 level.
*Significant at the 0.10 level.

expected. In addition, the direct cost of college, including tuition, books, materials and fees has the expected positive and significant influence on the level of public grants. The household's financial need is increased as the direct cost of college increases and this is seen to increase the size of the student grant award. Financial need also suggests that family size increases the amount of the student grant, and this is confirmed by the estimated significant and positive coefficient on the number of dependent siblings in the household.

Although the distribution of publicly provided student financial aid is not expected to discriminate on the basis of variables unrelated to financial need, the estimation results show that several other demographic variables are statistically significant in the allocation of student grants. These include academic achievement, sex, race and geographic location. The positive coefficient found for academic achievement indicates that there is a systematic bias in favor of higher qualified students, all else equal. The result suggests that colleges favor individuals with higher academic potential in the award process.

Both sex and race are found to be significant factors in the estimation of student grant awards. The negative coefficient on sex indicates a bias against females and the positive coefficient on race indicates a bias in favor of nonwhites in the award process. The estimated coefficients in the dummy variables which correspond to geographic region of the household suggest a bias in favor of the Middle Atlantic, East North Central, West Central and Mountain regions. The result suggests that government grants are not uniformly distributed across regions. Perhaps states with these regions provide a higher level of federal matching student grants.

Probability of College Attendance

College attendance is defined as the binary dependent variable indicating full-time attendance at a four-year private or public college or university. As such, each individual in the HSB data set is categorized as either a college or non-college attender on the basis of responses to questions indicating post-secondary activities. The estimation technique used to determine the probability of college attendance is a logit model.[5] The results of

Table 2. Logit coefficient estimates of the probability of college attendance

Independent variable	Coefficient estimate	Asymptotic *t*-ratio
Constant	−10.4381*	−10.715
Parental income	0.0052*	6.500
Public grants	0.0075*	2.642
Direct costs	−0.0031*	−7.750
Academic achievement	0.1762*	42.951
Private grants	−0.0033	−0.375
Public loan subsidy	0.0325	0.235
Private loan subsidy	−0.6878	−0.435
Future return	0.0003	0.056
Parental education	0.1676*	13.462
Distance	−0.0030*	−2.727
Sex (male = 0; female = 1)	0.0198	0.278
Race (white = 0; nonwhite = 1)	0.8917*	5.837
Race × sex (other = 0; nonwhite female = 1)	−0.0434	−0.059
New England region	0.5986*	4.128
Middle Atlantic region	0.5678†	1.808
South Atlantic region	0.4211†	1.708
East South Central region	0.7338*	5.742
East North Central region	0.6971*	7.628
West South Central region	0.7061*	3.604
West North Central region	0.6255*	5.666
Mountain region	0.5306*	2.638
−2 log likelihood ratio	4641.949‡	
Estimated R^2	0.2857	
Sample size	11,500	

*Significant at the 0.01 level.
†Significant at the 0.10 level.
‡All coefficients in the equations are jointly significant at the 0.01 level.

the estimation are given in Table 2, which lists the independent variables, coefficient estimates and asymptotic *t*-ratios.

The estimated coefficient found for parental income is positive and statistically significant. The result indicates that, while controlling for other variables, including student financial aid, individuals from higher-income households have a higher probability of attending college than lower-income individuals. Publicly provided grants are found to have a positive and significant effect on the probability of attending college indicating that higher levels of student grants increase the probability that a household chooses to send the individual to college. These results, taken together, suggest that while the probability of college attendance is strongly and positively related to the household's ability to pay, student grants tend to moderate differences in college attendance rates across income groups. Lower-income households receive larger student grant awards and these awards are seen to increase the probability that the individual attends college. This relationship is explored in detail in the following section.

Other results of the estimation indicate that the direct costs of college have the expected negative influence on the probability of college attendance and that academic achievement has a significant and positive effect. Higher tuition costs, materials and fees tend to decrease the odds of college attendance, all else equal. Other student financial aid, including privately funded student scholarships, and the interest subsidy from student loans are not found to have a statistically significant influence on the probability of college attendance. Other factors, such as academic achievement, parental income and the direct costs of college, which are included in the estimation and which in part determine the levels of

these types of student financial aid tend to diminish the direct effects of these awards on the probability of college attendance.

WEALTH NEUTRALITY

Simply stated, wealth neutrality in higher education requires that the household's decision of whether the individual will attend college will not be influenced by the household's ability to pay the costs of college. In a situation of wealth neutrality individuals who are equally qualified to attend college, but who are unequally circumstanced with respect to parental income, should have equal opportunity of access to higher education. Operationally, the wealth neutrality criterion is taken to be an equal probability of college attendance irrespective of parental income, while controlling for all other variables. Since in the reported research parental income was found to be positively related to the probability that an individual would attend college, wealth neutral college attendance does not appear to have been obtained by those entering college in 1980.

In an attempt to clarify the situation with respect to these students, the following analysis focuses on the relationship between parental income, publicly provided student grants, and the degree of wealth neutrality attained. In addition, the degree of effectiveness of student grants and the reduction of direct costs of college, as policy variables to attain wealth neutrality, are compared.

Direct and Indirect Effects

The analysis of the effects of student financial aid on the extent of attainment of wealth neutrality is limited to publicly provided student grants, the only type of student financial aid found to be statistically significant in the estimation of the probability of college attendance. In order to determine how the probability of college attendance varies with parental income, both the direct effect of income and the indirect effect of income through its influence on the amount of student grant awards must be considered. The estimation equation for the level of student grants is of the general form:

$$G_i = \alpha_o + \alpha_1 Y_i + \ldots + \mu_i \qquad (1)$$

where G_i is the amount of the publicly provided student grant, Y_i is parental income and μ_i is the disturbance term. Student grant amounts are estimated for the entire sample, and fitted values, $\hat{G}_i$, are used as instrumental variables in the college attendance equation:[6]

$$\ln [p_i/(1 - p_i)] = \beta_o + \beta_1 Y_i + \beta_2 \hat{G}_i + \ldots + \epsilon_i \qquad (2)$$

where p_i is the probability that the ith household chooses college for the individual and ϵ_i is the disturbance term. Thus, parental income is seen to influence the probability of college attendance in two ways. The independent and direct effect of parental income on the probability of college attendance, $(\partial P_i/\partial Y_i)$, is found to be positive and statistically significant. The indirect effect of parental income on the probability of college attendance through student grants, $(\partial P_i/\partial \hat{G}_i)(\partial \hat{G}_i/\partial Y_i)$, is found to be negative, i.e. higher parental income leads to lower levels of student grants. Because student grants are positively related to the probability of college attendance, the indirect effect of income through grants is a negative influence on the probability of college attendance for individuals from higher income households, and a positive influence for individuals from lower income households. The full effect of parental income, $(\partial P_i/\partial Y_i) + (\partial P_i/\partial \hat{G}_i)(\partial \hat{G}_i/\partial Y_i)$, contains both the direct and indirect income effects (which are opposite in direction) on the probability of college attendance.

Other independent variables included in the estimation of student grant amounts and in the estimation of the probability of college attendance (such as the academic achievement of the individual and the costs of college) have similar direct and indirect effects on the probability of college attendance. In the case of academic achievement, both the direct and indirect effects are found to have positive impacts on the probability of college attendance. The money costs of attending college are found to have negative direct effects and positive indirect effects on the probability of college attendance.

Estimated college attendance probabilities and changes in probabilities for five values of parental income are contained in Table 3. Probabilities are estimated for an individual with sample mean characteristics, and sample mean probabilities ($\bar{P}$) and standard deviations (σ_P) of the probability distribution are given for comparison purposes. The probability distribution for the base case, presented in column (1), illustrates the degree of wealth

Table 3. Estimated college attendance probabilities and changes in probabilities*

Parental income	Base (1)	Income effects Direct (2)	Indirect (3)	Full (4)
Low ($5,000)	0.4872	+0.0259	+0.1026	+0.1285
Low-middle ($15,000)	0.4949	+0.0761	+0.0601	+0.1362
Middle ($25,000)	0.5026	+0.1331	+0.0161	+0.1439
High-middle ($35,000)	0.5386	+0.1797	0.0	+0.1797
High ($45,000)	0.5895	+0.2308	0.0	+0.2308
$\bar{P}$	0.5016	+0.1211	+0.0217	+0.1428
σ_p	0.0423	+0.0812	−0.0389	+0.0423

*Probabilities are estimated for an individual with sample mean characteristics.

neutrality of college attendance attained in 1980. The estimated mean probability of college attendance is seen to increase as parental income increases. The standard deviation of the distribution measures the degree of dispersion about the mean probability, and, to the extent that it differs from zero, may be interpreted as a measure of the degree of lack of wealth neutrality in college attendance; the lower the standard deviation of the distribution, the greater the degree of wealth neutrality.[7]

The direct and indirect effects of parental income and the degree of wealth neutrality are closely related. The base case college attendance probability distribution includes the full effects of parental income, both the direct and indirect influences, on achievement of the wealth neutrality criterion. The independent and direct effect of parental income increases the probability of college attendance and, therefore, decreases the degree of wealth neutrality. This direct effect of parental income is shown in column (2) and is defined as the difference between the estimated base probability of college attendance and the probability when parental income is set equal to zero in the college attendance equation. As can be seen from the results in column (2), the direct effect of income accounts for over 12 percent of the mean probability, $\bar{P}$, and increases the dispersion and skewness of the distribution in favor of higher income households. Not only does the direct effect of parental income increase the probability that an individual will attend college, but the effect is such that those with higher parental incomes receive the largest direct effects. The result is a less equal probability distribution and a smaller degree of wealth neutrality.

The estimates of the indirect effect of parental income through student grants is shown in column (3). It is the difference from the base case in the estimated probability of college attendance that results when student grants are removed, i.e. when parental income in the estimation of student grants is set equal to zero. This indirect effect of parental income is seen to account for over 2 percent of the mean probability of attendance, $\bar{P}$. Because student grants favor low-income households, this indirect effect of income causes a decrease in the dispersion of the distribution, and an increase in the degree of wealth neutrality. Student grants induce higher college attendance probabilities in the lowest income groups which receive larger student grant awards. The effect of student grants is smaller for those with higher incomes because they receive smaller student grant awards. The grants tend to have no effect for high-middle and high income individuals who usually are ineligible for student grants. Thus, the allocation of student grant awards tends to increase the equality of college attendance rates across parental income groups.

Estimates of the full effect of parental income on the probability distribution of college attendance are shown in column (4). These estimates represent the college attendance probability for each group when both the direct income effects and the effects of student grants are removed. The total income effect (direct and indirect) accounts for approximately 14 percent of the mean probability of attendance, $\bar{P}$. Individuals with higher parental income have larger increases in probability due to the full effects of income than do those with lower incomes. The direct income effect, which decreases the degree of

wealth neutrality, is larger than the offsetting indirect effect of student grants which tends to increase the degree of wealth neutrality in college attendance.

Academic Achievement and Student Grants

The essential requirement for obtaining the wealth neutrality criterion is that individuals who are equally qualified to attend college have equal access of opportunity to college. As is noted above, the academic achievement level of the individual is seen to increase the level of publicly provided student grants which, in turn, has a direct and positive influence on the probability of college attendance. It is also true that academic achievement has an independent and direct positive influence on the probability of college attendance. Individuals who are better qualified to attend college are not only more likely to attend college, but also to receive larger student grant awards which will also increase their probability of college attendance.

The measure of academic achievement used for the estimation is a composite index of SAT-type achievement tests, high school course grades and high school curriculum.[8] As such, the academic achievement index is a measure of how well prepared to attend college is the individual. In Table 4, the estimated amount of student grants for individuals at each of five academic achievement levels are presented, broken down by parental income level. The estimated student grant amount represents the annual amount of the award available if the individual chooses to attend college. Estimates are given for individuals who have sample mean characteristics for the other variables.

For each parental income level the estimated amount of student grant increases as academic achievement increases. The results suggest discrimination in the award process in favor of better qualified students. All else equal, more highly academically prepared students receive larger grants. On the other hand, note that at each level of academic achievement an inverse relationship between parental income and available student grants is evident. The estimated award decreases as parental income increases.

A student grant can be said to be effective to the extent that its availability increases the likelihood that an individual attends college. Table 5 presents estimated college attendance probabilities by academic achievement and parental income levels and Table 6 shows the part of the total probability of college attendance for each group attributable to student grants.

In Table 5, we see that as academic achievement increases, both the direct and indirect effects of achievement increase the probability of college attendance both for each parental income level and for the total sample. We note that individuals in the lowest achievement levels are less likely to attend college, and that individuals at or above the mean levels of achievement and income are more likely to attend, all else equal. The indirect effects of achievement, shown in Table 6, reveal that student grants, as expected, have the largest effects on the probability that individuals from the lower parental income groups attend college. These effects, which are largest for students of average academic achievement, help to account for the fact that the probability that these individuals attend college is near the sample mean probability (0.5016).

Table 4. Estimated student grant awards*

	Academic achievement (percentiles) (Base)				
Parental income	10	25	50	75	90
Low	$1,285	$1,329	$1,397	$1,461	$1,516
Low-middle	694	738	806	870	925
Middle	103	147	215	279	334
High-middle	0.0	0.0	0.0	0.0	0.0
High	0.0	0.0	0.0	0.0	0.0
Mean	178	222	289	353	409

*Estimates are obtained by using tobit coefficients shown in Table 1. Student grants include all non-repayable awards from federal and state government student financial aid programs.

Table 5. Estimated college attendance probabilities by income and academic achievement

Parental income	Academic achievement (percentiles) (Base) 10	25	50	75	90
Low	0.1262	0.2321	0.4872	0.7362	0.8774
Low-middle	0.1296	0.2376	0.4949	0.7421	0.8806
Middle	0.1331	0.2432	0.5026	0.7479	0.8838
High-middle	0.1549	0.2746	0.5384	0.7767	0.8944
High	0.1841	0.3179	0.5895	0.8054	0.9125
$\bar{P}$	0.1326	0.2425	0.5016	0.7472	0.8834
σ_p	0.0243	0.0358	0.0423	0.0283	0.0142

Table 6. Effects of student grants on the probability of college attendance

Parental income	Academic achievement (percentiles) (Base) 10	25	50	75	90
Low	+0.0368	+0.0635	+0.1026	+0.0933	+0.0579
Low-middle	+0.0217	+0.0378	+0.0601	+0.0529	+0.0324
Middle	+0.0058	+0.0117	+0.0161	+0.0160	+0.0107
High-middle	0.0	0.0	0.0	0.0	0.0
High	0.0	0.0	0.0	0.0	0.0
$\bar{P}$	+0.0060	+0.0120	+0.0217	+0.0155	+0.0132
σ_p	−0.0133	−0.0234	−0.0389	−0.0371	−0.0227

The effects of grants for individuals who are below average in academic achievement, and who, therefore, have less than even odds of attending college, are smaller than the effects for their better qualified counterparts at each achievement percentile. In the lowest income level, for example, grants account for 3.68 percentage points of the probability of a student in the 10th percentile of achievement attending college, while for a student in the 90th percentile these effects explain 5.79 percent of the total probability. The availability of student grants for below-average achievement individuals, who are less likely to attend college and who generally receive smaller than average grants, therefore, does little to increase the probability of college attendance. On the other hand, student grants to higher than average achievement individuals, who are more likely to attend college and who tend also to receive larger than average grant amounts provide smaller than average increases in the probability of college attendance. It is those students between the low- and high-achievement extremes for whom grants have the most important impact on the attendance decision.

If the goal of student grant programs is simply to induce college attendance, the above results suggest that student grants are very effective for average achievement individuals, less effective for below average achievement individuals, and essentially turn out to be gifts to high achievement individuals who generally attend college anyway. Student grants do, however, tend to equalize college attendance probabilities for individuals from different parental income levels when academic achievement percentile is controlled. The changes in the standard deviation of the probability distribution shown in Table 6 indicate the influence of student grants on the movement of the distribution toward wealth neutrality.

Student Grants versus Direct Costs

In Table 7 the effectiveness of an increase in student grants to induce college attendance and equalize college attendance probabilities across

Table 7. Effects of changes in student grants and direct costs

Parental income	Base (1)	Increase in grants (2)	(3)	Decrease in costs (4)	(5)
Low	0.4872	0.4891	+0.0019	0.4872	0.0
Low-middle	0.4949	0.4968	+0.0019	0.4949	0.0
Middle	0.5026	0.5045	+0.0019	0.5026	0.0
High-middle	0.5386	0.5386	0.0	0.5392	+0.0008
High	0.5895	0.5895	0.0	0.5903	+0.0008
$\bar{P}$	0.5016	0.5035	+0.0019	0.5016	0.0
σ_p	0.0423	0.0414	−0.0009	0.0467	+0.0044

parental incomes is compared to that of a decrease in the direct costs of college. Column (2) shows the estimated college attendance probabilities when student grant awards are increased by $100 and column (3) presents the result in terms of change from the base probabilities. The increase in grants would be estimated to increase the probability of college attendance by about 0.2 percent for those individuals at the low to middle parental income levels who were eligible for student grants in 1980. Overall, the increase in student grants by this amount would be expected to decrease the dispersion of the distribution from 0.0423 to 0.4014, a movement toward wealth neutral college attendance.

For comparison, the effects of an across the board decrease of $100 in tuition, materials and fees on the probability of college attendance is shown in columns (4) and (5). The results indicate that the decrease in costs would not tend to increase the probability of college attendance for an individual at the low to middle parental income levels, because the increase in the probability caused by the lower tuition would generally be offset by a decrease in student grant awards. For these income groups a decrease in direct costs tends to cause a decrease in student grant awards, and the indirect effect on attendance is of sufficient magnitude to negate the positive direct effect of the cost reductions. For individuals from high-middle and high-income families, who are not eligible to receive student grants anyway, the indirect tuition effect is absent and these individuals have their probabilities of college attendance increased as a result of the direct effect of the cost reduction. The estimates indicate that the probability of attending college for an individual with sample mean characteristics is not changed from the base result by lowered tuition costs, but that the offsetting effects of a cost reduction resulting from reduced grants at lower income levels tend to increase the dispersion of the distribution, from 0.0423 to 0.0467, and to lessen the degree of wealth neutrality. This result, that reduced tuition will tend to decrease the degree of wealth neutrality, while to an extent surprising, is not illogical once the mechanisms through which the changes occur are understood.

A comparison of the two policies shows that either increases in student grants or decreases in tuition of the amounts suggested would result in little or no change in the overall mean probability of college attendance. Neither policy appears to be a very effective means to substantially increase the odds of college attendance for the average individual in the sample. It is noteworthy that increases in student grants are seen to induce a movement toward wealth neutrality, whereas tuition reductions tend actually to decrease the degree of wealth neutrality. Only if it were possible to prevent the expected reduction in aid to poorer students that would tend to occur along with tuition reductions, would the effect of the decreases be increased wealth neutrality. The results suggest that actual practices would lead to a decrease in the degree of neutrality.

SUMMARY

For over two decades, the government has subsidized college attendance by providing student grants to individuals from lower-income families who historically have had lower college attendance rates than higher-income families. The results presented in this paper suggest that the policy has

been generally consistent with a goal to improve the opportunity of access to higher education. In 1980 student grants tended to equalize college attendance probabilities across household income and thereby are seen to effectively promote wealth neutrality in higher education.

The analysis also shows, however, that wealth neutrality, defined as an equal probability of college attendance across all incomes, was not achieved. At 1980 levels student grants only partially offset the influence of household income as a determinant of whether an individual attends college. Individuals from higher income families are seen to have a higher probability of attending college than individuals from lower income families, even while controlling for the availability of student grants.

The results further suggest that recent cutbacks in student grant funding and proposals to eliminate specific student grant programs (Supplemental Educational Opportunity Grants and State Student Incentive Grants) will tend to decrease the probability of college attendance by individuals from lower-income families. These reductions are likely to reverse the trend toward wealth neutrality in higher education.

Acknowledgement — The author wishes to thank John Akin for useful comments and suggestions. Any remaining errors are, of course, my own.

NOTES

1. For those interested in the fully developed theoretical and empirical models, see Schwartz (1985).
2. All monetary variables are expressed in present value terms at the time of the college attendance decision.
3. Pre-estimation is also required for the future return to college. Details of the empirical specification, data, and results for the future return instrument are given in Schwartz (1985).
4. Estimation results for the other three financial aid variables are similar to those found for publicly provided student grants and are given in Schwartz (1985).
5. The model is a reduced form of a structural model of both the household's decision and college admission, where admission is assumed to be independent of the error term. The logit model was chosen over a probit model for computational ease.
6. Some may argue that a selection bias is present in the data since only those individuals who enroll in college can be observed to receive student grants. However, correction of the potential bias is impossible in the model. See Schwartz (1985).
7. As a measure of the degree of wealth neutrality, the standard deviation is useful for comparison purposes only. A zero standard deviation implies that wealth neutrality requires that college attendance probabilities across parental incomes be set equal to the mean probability, which may not be the intent of student financial aid programs.
8. Details of the method used to construct the academic achievement index are contained in Schwartz (1982).

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