Title
Real and Imagined Barriers to College Entry: Perceptions of Cost

Authors
Grodsky, Eric
Jones, Melanie

Publication Date
2004-06-09

Peer reviewed

Real and Imagined Barriers to College Entry: Perceptions of Cost

Eric Grodsky and Melanie Jones

University of California—Davis

DRAFT 6/7/05

DO NOT CITE WITHOUT AUTHORS' PERMISSION

Please send all comments and criticisms to Eric Grodsky: esgrodsky@ucdavis.edu. This project was supported by a faculty research grant from the University of California—Davis. The second author was supported in part by a fellowship from the Ford Foundation and from the University of California, Davis Office of Graduate Studies.

ABSTRACT

Real and Imagined Barriers to College Entry: Perceptions of Cost

Patterns of postsecondary attendance in the United States continue to be stratified by socioeconomic background and race/ethnicity. We suggest that inequalities in knowledge of the costs of going to college contribute to persistent patterns of stratification. We hypothesize that disadvantaged parents who believe their child will attend college are less certain of the costs of college attendance. As a result, they are less able or willing to provide an estimate of the costs of college attendance, more likely to over-estimate those costs if they do provide an estimate, and make larger errors in estimation than comparable middle class or white parents. Using nationally representative data, we find mixed support for these hypotheses. Socioeconomically disadvantaged parents and minority parents are less likely to provide estimates of college tuition and, when they provide estimates, tend to make larger errors. On average, though, parents provide upwardly biased estimates of cost that are uniform across race, ethnicity and socioeconomic status. We discuss implications of these findings for sociological theory and for inequality in postsecondary education.

Real and Imagined Barriers to College Entry: Perceptions of Cost

Colleges and universities play an increasingly important role in the status attainment process in the United States. Despite substantial movement toward equality in access to higher education, however, patterns of postsecondary attendance in the United States continue to be stratified by socioeconomic background and by race/ethnicity. Rational choice theory suggests the quality of the educational continuation choices parents and their children make—the extent to which those choices serve to maximize their subjective utilities—will in part vary as a function of the quality and quantity of information available to them. As we will argue below, variation in the quality of college-relevant information may contribute to observed inequalities in college preparatory behavior.

We use nationally representative survey data to evaluate the accuracy of parents' perceptions of college costs and the extent to which misperceptions are associated with family income, parental education and parental race/ethnicity. We hypothesize that, among those parents who believe their children will attend college, less educated parents, less affluent parents, and black and Latino parents will be less aware of the costs of college attendance. Furthermore, we expect that less advantaged parents who provide estimates of tuition will on average provide more upwardly biased estimates than white parents, parents with higher incomes, and parents with at least some college education. Finally, we hypothesize that, on

average, disadvantaged parents will make larger errors in estimating tuition than advantaged parents.

We find mixed support for these hypotheses. Education, race/ethnicity and income are all associated with the ability or willingness of parents to provide an estimate of tuition, and in the expected directions. Even net of education and income, substantial racial and ethnic disparities persist in the likelihood of providing a tuition estimate. Furthermore, disadvantaged parents make errors in estimation that are, on average, more substantial than those of advantaged parents. We do not, however, find systematic differences in the average accuracy of the tuition estimates parents provide.

Educational attainment from a rational action perspective

Rational action models of educational attainment generally conceive of educational careers as a series of transitions (Breen 1999; Breen and Goldthorpe 1997; Goldthorpe 1996; Manski and Wise 1983; Mare 1980; Morgan 2002, 2005; Raftery and Hout 1993).[1] At the completion of each year of school, students and their parents weigh the costs and benefits of the student continuing on to the subsequent level of education. If the benefits outweigh the costs, the student will continue to the next level. The theoretical details of these cost/benefit calculations vary across studies. For example, Raftery and Hout (1993) consider taste for

[1] Note that Morgan and Manski and Wise do not evaluate the entire educational career, but instead confine their attention to the transition from secondary school to college.

education among the factors influencing perceived benefits of educational persistence, while Breen and Goldthorpe (1997) view the minimization of downward social mobility as one of the primary determinants of educational benefits. These authors do, however, generally agree that educational continuation decisions are based on subjective perceptions of costs and benefits rather than true costs and benefits.

The infusion of subjectivity into models of educational attainment has a few particularly important implications. First, actors may respond differently to identical increments in absolute cost. Previous research, for example, has found that attendance decisions of more affluent students are less sensitive to an increase in tuition than decisions of less affluent students (Ellwood and Kane 2000; Manski and Wise 1983). Likewise, the benefits of an additional year of education may be perceived as more substantial by children of more educated families than by those of less educated families due in part to differences in the cultural or symbolic value of education (Breen and Goldthorpe 1997; Ellwood and Kane 2000; Raftery and Hout 1993). Second, subjective perceptions of the likelihood of successfully completing a subsequent level of education and of the association between educational attainment and social class destination may influence students' enrollment decisions (Goldthorpe 1996; Breen and Goldthorpe 1997; Morgan 2002, 2005). Such perceptions need not be accurate. Researchers working in the rational choice tradition are sensitive to the importance of the "quantity and

quality of *information* actors typically have available to them, or actively seek, and further of how they process this information" (Goldthorpe 1996: 178, emphasis in original).

Information is an important component of Morgan's model of educational persistence (2002, 2005). Like Breen and Goldthorpe (1997) and Manski (1989), Morgan assumes that the educational attainment process can be represented as a decision tree. Upon completing high school, students confront a choice: they may leave school or continue on to college. They make the choice that maximizes their (subjective) probability of future success. If they choose to stay, they confront an additional branch (or 'intermediate lottery' in the language of Morgan 2002 and Manski 1989). They may fail to complete college or they may attain a degree. If they attain a degree, they are more likely to experience success than if they do not attend college at all.

At each decision point, students (and perhaps their parents) must estimate the probability of success and failure associated with different choices based on subjectively constructed belief distributions. Morgan suggests that these belief distributions are shaped by a range of forces including the quantity and quality of the information available to choosers.

In our work, we focus on parental knowledge of college costs. Parental perceptions of tuition costs are among the forces that shape parental press for college as well as their willingness to help pay for college should their child

attend.[2] Parents who believe that tuition costs are prohibitively high may be less likely to engage in prefigurative and preparatory commitment. They may be less inclined to encourage their children to take challenging courses or succeed in school, or may be less likely to begin saving for their children's college education. Parental knowledge of college costs may thus indirectly shape children's own educational expectations and willingness to exert effort in school to preserve their postsecondary options.

How do parents arrive at their estimate of college costs? According to Morgan, choosers take some estimate of central tendency from their belief distributions to represent their beliefs, generally choosing an arithmetic mean.[3] Assuming that belief distributions are in general unbiased, the relationship between a person's estimate of some quantity like college costs and its true value will be affected by two factors. First, the *variance* of the distribution is directly related to certainty; tighter belief distributions correspond to greater confidence in one's knowledge of the value of the parameter, while wider distributions reflect less confidence. The *number of draws* a chooser takes from the belief distribution will also affect the precision of his estimate. Choosers who base their cost estimates on one or two sources will have less precise estimates than those who base their cost estimates on several sources. The number of draws is influenced by

[2] Morgan (1998) demonstrates the importance of the latter for students' educational plans.
[3] In choosing the mean as the preferred estimate of central tendency Morgan relies on the work of Lehman and Casella (1998).

the chooser's capacity and willingness to exert effort in assessing the value of the underlying parameter. The larger the number of draws, the closer on average their estimate will be to the mean of the sampling distribution which, assuming beliefs are unbiased, is the true underlying parameter. Moving beyond previous work in this area, Morgan argues that students who have less certain beliefs regarding the true probabilities of success and failure "will exhibit less effort in the short run and attain lower levels of the payoff to the decision in the long run" (2002: 390). Information, as a key determinant of beliefs, thus plays a causal role in determining the degree to which actors engage in preparatory behavior.

Building on Morgan's insights, we argue that parental *uncertainty* about college costs may have important implications for their commitment to their children's postsecondary education. If parents base their cost estimates on sparse information due to wide subjective information distributions, taking a limited number of draws from these distributions, or both, they will be justifiably less confident in their understanding of what is required to attend college. Their uncertainty may reflect an underlying suspicion that college is unaffordable or not for students like their child. Parental uncertainty regarding cost may reflect a combination of structural impediments to their knowledge base and a lack of motivation on their part to obtain better information. For a variety of reasons related to network and residential segregation along racial/ethnic and socioeconomic lines, disadvantaged parents may have to work harder to obtain

information of comparable quality to that held by more advantaged parents. Regardless of the source of parental uncertainty, we believe that uncertainty will contribute to lower levels of preparatory commitment. If parents are not sufficiently confident that college aspirations are realistic, they may be less inclined to make sacrifices to help their children continue their education past high school, and their children in turn may exert less effort in their academic work.

In this project, we document patterns of inequality in the distribution of cost information among parents, not on the consequence of those distributions. We would prefer to analyze both disparities in cost knowledge and the degree to which those disparities are implicated in inequalities in postsecondary attendance. However, to the best of our knowledge there are no data that would support a comprehensive analysis of both parental information and postsecondary preparation and attendance.[4]

Knowledge of College Costs

The literature on parents' and students' knowledge of the costs of college attendance and college admissions requirements is thin. Researchers have generally reported that parents and students overestimate the cost of tuition by a

[4] Plank and Jordan (2001) speak to this issue. In their analysis of the NELS data, they find that students who talk with their parents and teachers about college costs and requirements are more likely to go on to college. The information measures available in the NELS data, however, are quite general. Students can indicate frequency of discussion on these topics, but they are not asked what they actually know.

factor of two or more, and that estimates for tuition at community colleges are more upwardly biased than estimates for tuition at four-year colleges (Avery and Kane, 2004; Ikenberry and Hartle 1998; Post 1990). The quality of cost estimates appears to be stratified by both race/ethnicity and socioeconomic status. Post and Ikenberry and Haertle find that members of minority groups are less informed about college costs than whites, while Avery and Kane report that the levels of dispersion in estimates provided by students at a disadvantaged school were higher than those provided by students attending a relatively advantaged school.

Consistent with other studies, Horn, Chen and Chapman (2003; hereafter HCC) find that family income and parental education predict the likelihood that parents and students provide tuition estimates. Parents of white students are more likely to be aware of college costs than parents of Hispanic or black students, though it appears that Hispanic/white differences may be accounted for by other factors including parental education and household income. Turning to the quality of tuition estimates for those who could provide them, HCC find that just under half of parents offered estimates of tuition within 25% of its actual cost.[5] An additional 39% overestimated tuition and the remaining 13% underestimated tuition. In multivariate models predicting the probability of providing an estimate within 25% of actual tuition, HCC find substantial net racial/ethnic differences in

[5] "Actual" costs were assumed to be the state average tuition for public or private colleges and twice the state average for students who plan to attend public institutions in another state.

the quality of estimates. They also find that the probability of estimating within 25% of actual tuition increases with parental education and income.

HCC provide results that are broadly consistent with our hypotheses. They document racial/ethnic and socioeconomic inequalities in both the probability of estimating tuition and in the accuracy of the estimates parents provide. In our research, we revisit HCC's analyses using the same data source but restricting the sample to parents who believe their children will attend a public institution or a community or junior college. Our project improves on HCC in several important ways. First, restricting the analysis to estimates of public in-state tuition reduces the degree of error in our assessments of parental accuracy. The actual tuition variance for private colleges and public out-of-state colleges is much greater than that of public in-state institutions. By including the former institutions in their analyses, HCC increase the proportion of estimates falsely classified as incorrect. On a related point, HCC impute tuition estimates for parents who said they could estimate tuition but then failed to do so. We believe this overstates parental tuition knowledge. We classify parents who fail to estimate tuition as failing to estimate tuition and discard the imputed values for their tuition estimates. Second, perhaps to adjust for errors associated with their imputation procedure and the assignment of true tuition for students attending private or out-of-state colleges, HCC estimate nominal models of whether or not parents' estimates were within 25% of the 'true' tuition. This approach ignores the richness of the underlying

quantitative measures of tuition accuracy. Rather than estimating nominal models for the accuracy of parents' tuition reports, we estimate linear models that make full use of the data. Finally, we extend our linear model to consider racial/ethnic and socioeconomic differences in the dispersion of parental estimates. We argue that dispersion reflects an often-overlooked dimension of parental uncertainty and find empirical support for this contention.

Data

The data for this study come from a nationally representative sample of parents of adolescents interviewed in 1999 as part of the National Household Education Survey (NHES: 99).[6] Of the 24,600 parents interviewed, the sample for this study is initially reduced to 9,147 parents who were eligible to participate in the branch of the questionnaire that addressed knowledge of college costs.[7] Only those parents who had a child between 6th and 12th grade at the time of the survey or a child age 12 or older if the school was ungraded or the child was home schooled were asked college cost questions. The sample is further restricted by the design of the survey to parents who indicate that their child will continue his or her schooling at the postsecondary level. The latter restriction eliminates only about 6.5% of the sample, as 93.5% of surveyed parents believe their child

[6] Both parents and children were included in NHES: 99. We focus exclusively on the parent data in this paper.
[7] See Appendix 1 for details of our sample restrictions.

will go to a college of some sort.[8] After omitting observations that were imputed for the dependent or independent variables, we are left with 6,872 observations.[9]

Eligible parents were asked a series of questions to ascertain the type of institution they believed their child would first attend. They were asked if the child would attend a four-year or two year college and, conditional on four-year attendance, if the child would attend a private or public school. Parents indicating that their child would attend a public school were asked if the school was likely to be in their state of residence or elsewhere. If the parent indicated that their child would attend a two-year college, they were asked what type of college their child would most likely attend.[10]

Once the type of college was ascertained, parents were asked if they had gotten "information about the cost of tuition and mandatory fees at a specific [COLLEGE TYPE]." If they responded yes, they were asked, "what is the cost of 1 year's tuition and mandatory fees at that school?" If they responded no, they were asked if they "could or could not give a fairly accurate estimate of the cost of 1 year's tuition and mandatory fees at a [COLLEGE TYPE] that [CHILD]

---

[8] This is clearly unrealistic in terms of actual college attendance, though consistent with Avery and Kane's findings (2004). Bear in mind that, as of 2000, about 65% of high school graduates went on to some sort of college in the year after completing high school.

[9] The only imputed variable we incorporate into our analysis is family income (imputed for 490 observations).We compare results based on the NCES hotdeck imputations, multiple imputation and listwise deletion and find negligible differences in coefficients across models.

[10] The exact wording of the question was: Would you say (he/she) is more likely to attend a vocational or technical school, a 2-year community college, a junior college, some other type of school, or have you not thought about this yet?

might attend." Parents who said yes were asked, "About how much would that be?" Parents who responded "haven't thought about it yet" to any of the branching questions were asked if they could give an estimate of the tuition and mandatory fees at a public four-year college or two-year community college in their state, depending on where they thought their child would start college. If they said they could estimate tuition, they were asked to provide an estimate. Finally, regardless of the type of estimate elicited, parents were asked if the estimate was "tuition and fees only, or does that also include other fees such as room and board?"

We restrict our sample to those parents who offered an estimate of the costs of attending a public four-year college in their state of residence or a community or junior college. As discussed above, we do not believe that it is reasonable to assert that we know the 'true' tuition and fees charged by a private college, an out-of-state college or a technical/vocational college. This restriction causes us to lose an additional 1,590 observations, bringing our sample size to 5,282 observations for the analysis of the probability that parents estimate tuition. Parents who reported an estimate of tuition and fees were coded as one and those who could not or would not give an estimate, including those who said they could

estimate tuition but then failed to do so, were coded as zero.[11] For distributions of this and all other measures, see Table 1.

The first set of models we present evaluates the conditional probability that a parent offers an estimate of college costs. We consider a parent's latent propensity to report a tuition estimate as a measure of his or her certainty. Assuming that all parents know college is not free, two factors contribute the probability that parents report tuition: actual knowledge of college costs and general confidence. Given identical distributions of knowledge, parents who are more confident will be more willing to report an estimate. Likewise, holding confidence constant, more knowledgeable parents will be better able to estimate tuition, and thus more likely to do so. We cannot adjudicate conclusively between ability and willingness to estimate, but in our discussion we will suggest that the findings are more consistent with differences in knowledge than differences in confidence.[12]

---

[11] One reviewer suggested that those who responded "don't know" to the tuition questions may simply be less likely to respond to survey questions in general. We compared distributions of the tuition estimate measure to distributions of other variables and found some support for this assertion. However, other items were missing for far fewer cases than responded don't know to the tuition questions (generally 1%-4%, compared to 56%) and, though the probability of missing was higher for those who failed to report tuition, it was generally only marginally higher. There seems to be something distinctive about knowledge of college tuition. Keep in mind, however, that the "don't know" option was offered in tuition questions, but not in other questions.

[12] We thank Bob Huckfeldt for suggesting this possibility and for steering us toward the work of Mondak and Anderson (2004). Mondak and Anderson focus on the gender difference in political knowledge, but the logic is essentially similar.

The second set of models estimates the difference between parent reports of college costs and actual college costs (without taking aid into account). Of the 5,282 parents included in our analysis of the likelihood of reporting tuition, 2,346 provided tuition estimates and are thus included in our model of the accuracy of parental cost knowledge.[13] True gross costs are derived from college responses to the 1998 Integrated Postsecondary Education Data System survey (IPEDS), a census collected by the United States Department of Education of colleges and universities eligible to received federal student aid. Based on college reports of their mandatory fees, tuition and average room and board costs, we produce four "true" tuition estimates for public institutions in each state: four year-college mandatory fees and tuition only; four-year college tuition, fees and room and board; junior/community college mandatory fees and tuition only; and junior/community college tuition, fees and room and board. We do not distinguish between junior colleges and community colleges in this project. Note also that our state means are unweighted. Results from models based on enrollment-weighted means were no different than those reported here, nor were the weighted and unweighted results based on data from an alternate source, the College Board's Annual Survey of Colleges. Parents' estimates are compared to "true" tuition based on their survey responses, with parent estimates including "tuition,

[13] This excludes two outliers whose recorded values for tuition were 99,999. We suspect these observations were missing and coded 99,999 at some stage in the data cleaning process.

mandatory fees and other fees" compared with IPEDS means that include room and board.

To compare parents' reports of college costs to actual college costs, we take the ratio of the parent report to true costs. If parents' estimates are accurate the ratio will approach one; over-estimates are greater than one, while under-estimates are less than one. We log the ratio for three reasons. First, the log transformation allows us to report effects of independent variables as percentage changes in parent tuition ratios by exponentiating the regression coefficients. Second, the ratio measure facilitates a more direct comparison of parents estimating tuition at two-year and four-year colleges. Taking the difference between estimated and true costs would implicitly assign greater weight to the estimates of parents reporting four-year colleges due to the greater variance in estimated four-year college costs. Finally, the distribution of the ratio of parent estimates to true tuition and fees is substantially right skewed. The log transformation normalizes the distribution. The log of the ratio is zero if parents accurately report the true gross cost (corresponding to a raw ratio of 1). Negative values indicate underestimates and positive values indicate overestimates.

Independent variables

We are primarily interested in the extent to which knowledge of college costs is stratified by race/ethnicity and by socioeconomic status (SES). We operationalize race/ethnicity as dummy variables for black, Hispanic- Spanish

speaking, Hispanic- English speaking and other, with white omitted. We distinguish between Spanish and English speakers by the language in which the interview was conducted based on the respondent's preference.

We consider two dimensions of socioeconomic status in this project: parental education and parental economic resources. We operationalize education as the higher of the two parents' levels of educational attainment if the child lived in a two-parent family and the reporting parent otherwise. Parental education is categorized as less than high school, high school/GED, vocational training, some college, associate's degree, bachelor's degree, and some graduate school or more. Parents report household income on an ordinal scale, designed to measure lower incomes with greater precision than higher incomes. We recoded income into an interval scale, taking the midpoint of each income range in thousands of dollars. [14] We assigned a value of $100,000 to those top coded at $75,000. We also contrast homeowners with those who rent or have some other living arrangement.

Of course, social origin characteristics are not the only factors that likely contribute to parental knowledge of college costs. Parents may be more likely to learn about college costs if their children have been successful in school. We include in our models parents' reports of whether or not a child has ever repeated

[14] We also evaluated models in which we entered income as a series of dummy variables. Substantive results were no different and BIC model fit statistics suggested that the model with linear income is preferred. The same is true for nominal and linear measures of grade levels and grades, described below.

a grade, the child's grade point average, the child's grade level and an indicator of whether or not the child attends an ungraded school (in which case grades are set to 0). We recoded grades into a single GPA measure from an ordinal scale of "Mostly F's" to "Mostly A's". We also include child's sex to control for any preferences parents might have for educating their daughters over educating their sons. Finally, we add an indicator of whether or not any member of the household is the age of traditional college students (18 to 20 years). We would have preferred to adjust for the presence of siblings in college but lack such information. The presence of a traditionally college-aged student in the household may increase the likelihood that parents have some familiarity with the true costs of college.[15]

In addition to characteristics of respondents' children, we also control for specific information parents claim to have regarding college financing. Parents were asked if they had "talked with someone or read any materials from schools or financial institutions about sources of financial aid for [CHILD'S] education after high school" and if they had heard of the Lifetime Learning tax credit or the HOPE scholarship tax credit. We expect that parents who responded affirmatively to these questions will be more likely to have children who really are going on to college. On the other hand, specific and more general information about college

[15] In models not shown, we also controlled for the number of children in the household. Parents living in households with greater numbers of children were less likely to report tuition, but the number of children in the household did not mediate the associations we report below.

costs may merely be different aspects of the same underlying characteristic. By including controls for college financing information we may artificially reduce the variance in our outcome measures. This should help give a lower bound to our estimates of the extent to which college information is stratified by race/ethnicity and socioeconomic status.

We add three additional dummy variables to our model of tuition accuracy to control for the different types of estimates parents were able to provide. Following the branching patterns in the questionnaire, we distinguish between estimates for four-year and two-year colleges, between parents who report that they got information on a specific college and those who did not, and between reports that include mandatory tuition and fees only and reports that include other fees such as room and board.

[TABLE 1 ABOUT HERE]

Results

Estimating tuition

We first evaluate separate models of the odds of reporting tuition conditional on race/ethnicity (Model 1), parental education (Model 2), and parental economic resources (Model 3). Model 4 combines Models 1-3 to provide a net baseline estimate for the association between social origins and the odds of estimating tuition. Finally, Model 5 adds characteristics of students and measures of information about financial assistance. For each model, we present coefficients

and standard errors in the log-odds metric in Table 2. In the text, we discuss findings in the odds metric with 95% confidence intervals in brackets.

[TABLE 2 ABOUT HERE]

Results of these models are consistent with our hypotheses. Race and ethnicity are strongly associated with the odds of estimating tuition (Model 1). The odds of African American parents and English-speaking Hispanic parents providing cost estimates are about half those of white parents. Spanish-speaking Hispanic parents are least likely to estimate tuition, with odds 92% lower than those of whites [87.6%-94.8%].

Like race/ethnicity, parental education is strongly associated with the willingness or ability of a parent to estimate tuition (Model 2). The odds of providing a tuition estimate for a parent in a household in which neither parent completed high school are about 56% lower than the odds for a family in which the more highly educated parent is a high school graduate [40.4%-66.8%]. The odds of reporting college tuition increase monotonically across parental education. Economic resources also predict the likelihood of reporting tuition among these parents (Model 3). Each thousand-dollar increase in family income is associated with a 2% increase in the odds of reporting tuition [1.8%-2.2%]. Those who own their own homes and those in other living arrangements are more likely to report tuition than those who rent.

Of course, many of these social origin factors are related. Comparing estimates from the social origins model (Model 4) to estimates in the previous three reduced models, we find that racial/ethnic differences are substantially mediated by differences in parental education and economic resources. The magnitude of the racial/ethnic difference in the log-odds of reporting tuition declines by 50% or more with the inclusion of parental education and income. Nonetheless, differences across racial/ethnic groups remain substantial and statistically significant after adjusting for differences in parental education and economic attainment.[16]

In the full model (Model 5), we adjust for differences in the sex of the child, parent reports of the child's academic success, the child's grade level in school, the presence of traditionally college aged youth in the household and specific information parents may have about financing college. As we expected, child's grade level and the presence of college-aged children in the home predicts whether or not parents estimate tuition. For example, the odds of reporting tuition for a parent with a college-aged child in the home are about twice the odds of an otherwise similar parent who does not live with a college-aged child [177%-245%]. Likewise, those parents who claim specific information about college

[16] Because the probability of estimating tuition is a latent construct, changes in coefficients across models are conflated with changes in the scale of the model variance (Long 1997). We compared results reported here with results based on standardized coefficients that take into account changes in scale and found the degree to which social origins mediated racial/ethnic differences to be identical.

financing are more likely than other parents to report a tuition estimate, all else equal. The covariates we add to Model 5 do little to mediate racial/ethnic and socioeconomic differences in the odds that parents estimate tuition costs.[17]

Average accuracy of tuition estimates[18]

Next, we turn our attention to the degree to which race/ethnicity, education and income are associated with the quality of the tuition estimates offered by parents. Parameter estimates presented in Table 3 give almost no support to the hypothesis that members of minority groups and those less economically or educationally advantaged have more upwardly biased estimates of tuition and fees than more advantaged parents. With the exception of members of 'other' racial/ethnic groups, differences in the accuracy of parent estimates of tuition by socioeconomic status and race/ethnicity are statistically non-significant and substantively slight in magnitude (around 5% to 10%).

---

[17] We ran a number of alternative models specification, including models with race/ethnicity by information interactions, and separate models by student grade level (6-8, 9-10, 11 and 12) We found no significant race/ethnicity interactions and few differences across grade levels. The cross-grade difference between African American and white parents, however, is a notable exception. The black: white contrast was consistently negative but increased in magnitude across grades and attained significance only among parents of 11th graders. Results of these models are available upon request.

[18] As suggested above, we believe that our two dependent variables, ability to estimate tuition and the quality of estimates provided by those able to do so, are related. Those least likely to provide an estimate may also be those whose estimates are the most biased or subject to the greatest error. We tried to address this potential flaw in our research design by estimating a Heckman selection model but ran into two problems. First, we are not confident that any measures available to us would be related to the respondent's ability to provide an estimate of tuition but conditionally unrelated to the quality of that estimate. For identification purposes, we excluded student grade level, grade point average, and whether the student had ever been retained from the tuition ratio equation. The combined models were poorly identified, showing substantial collinearity between the inverse Mills ratio and our independent variables.

Though differences across social groups in the quality of tuition estimates appear random, the estimate of the average parent is far from accurate. Consistent with other research, we find that parents tend to substantially overestimate tuition. There are, however, differences in the accuracy of the average parent for different types of institutions and different estimates. Table 4 shows expected ratios of reported to actual costs for the average parent of an 11^{th} grader. The 13% of parents who claim to have information on a specific two-year college and who estimate mandatory tuition and fees only are quite accurate on average, over-estimating by only 5%. Not surprisingly, parents who lack information generally over-estimate tuition by a greater magnitude, generally 2 to 3 times the actual cost. Estimates of the costs of attending a four-year college are unresponsive to parental claims regarding information. If anything, the estimates of parents lacking information on a specific school appear to be more accurate than estimates of parents who claim such knowledge. In general, and consistent with past research, parents' estimates of gross costs are upwardly biased.

[TABLE 4 ABOUT HERE]

Errors in tuition estimates

Though there are few significant differences across groups in the average of their estimates of tuition, there may be differences in the variance of their estimates. We expect groups with high-quality information to provide estimates with less variability than those provided by groups with low-quality information.

If Morgan is correct in arguing for a causal relationship between information and preparatory commitment, differences across groups in estimation variance may be consequential for differences in group patterns of educational attainment.

Ideally we would like to compare confidence about educational costs elicited directly form parents. In the absence of such data, however, we rely on model-based estimates of their uncertainty. We assume that the standard deviation of each group represents the average level of uncertainty experienced by group members in much the same way that we assume the predicted tuition ratio captures the average point estimate for each group. Members of groups with larger estimation variance are, on average, less certain of the costs of college.

Our estimates of the errors parents make in estimating tuition are the residuals from the full model shown in Table 3 (Model 5). The errors are therefore conditional on parent race/ethnicity, economic resources, child's academic achievement, grade level and sex, any household members of college age, the type of college the parent believes the child will attend, information measures and whether the parent estimate was for mandatory tuition and fees only or mandatory tuition, fees and other expenses.[19] Standard deviations for error distributions by social origin characteristics are shown in Table 5. These standard

[19] We also examined standard deviations based on models including only statistically significant terms and including only indicators for the type of estimate provided. Though standard deviations varied modestly, results for group differences in the dispersion of residuals were consistent across analyses.

deviations are the root of the mean squared error conditional on controls for various characteristics. For example, we find that the average absolute value of the difference between our estimates of the log of the tuition ratio for white parents and the log of the tuition ratio we actually observe for white parents is about 0.635. The average absolute value of the difference between our estimates for black parents and their observed values is 0.771. Thus, errors in estimation, holding constant all of the independent variables in the information model, are around 16% larger for black parents than they are for white parents.[20]

One can also think of these statistics as related to the distribution of predicted values of the log tuition ratio for parents with different characteristics. Following Morgan, one could conceive of parental beliefs about college costs as a distribution heavily influenced by information quality and quantity. In considering the costs of college, parents take draws from this distribution of tuition. Differences in the dispersion of parent estimates about the mean are a function of the variance in the distributions of information at their disposal and the number of draws they make from that distribution in forming their estimates of tuition. By modeling the conditional means of parent tuition estimates we purge these estimates of *systematic* variation associated with parent and child characteristics,

---

[20] One critic suggested to us that the observed difference in error dispersions might be due to difference in intra-state variation in the tuition of public institutions. To test for this possibility, we regressed intra-state tuition variance on intra-state error variance. We found no evidence for a relationship between the two.

the type of schools parents believe their children will attend, and other attributes included in the regression model. Even after conditioning on the observed characteristics, however, we find that the distributions from which black and Hispanic parents draw their tuition estimates are on average wider than the distributions from which white parents draw their estimates. This is consistent with our hypothesis that black parents estimate with less certainty than white parents, possibly as a function of the quality of the information available to them.

[TABLE 5 ABOUT HERE]

The standard deviations presented in Table 5 suggest that, as educational attainment and family income increase, the variance of the estimation error declines. For example, the mean absolute difference in observed and predicted estimates for parents in families receiving around $22,500 per year is about 20% larger than the mean absolute difference for parents in families earning $100,000 per year (0.71/0.59). Likewise, those who own their homes have slightly less dispersion in their conditional estimates than those who rent.

We apply two tests to differences in the conditional dispersion of estimation errors across groups. First, we apply Bartlett's test for the homogeneity of variances among groups as defined by race/ethnicity, parental education,

family income and home ownership.[21] Each test is statistically significant at the α=0.001 level, leading us to reject the hypothesis of variance homogeneity. Next, we estimate Levene's test statistics for pairwise comparisons of residual dispersion. Levene's statistic is more robust to violations of normality and less sensitive to outliers than Bartlett's test. P-values for Levene's test are presented in Table 5, with the contrast categories in italics. For example, under Levene's test we cannot reject the hypothesis of no difference in the dispersion of estimation errors between parents in families where the more educated parent completed high school or a GED and parents in families where the higher level of education was less than high school, vocational training, some college or an associate's degree. We can, however, reject equality of variance for families with a college graduate and those in which the more educated parent completed high school. Both tests are generally consistent with our hypotheses. The estimates of less advantaged parents are more widely dispersed than the estimates of more advantaged parents.

Discussion

Rational choice theories of educational stratification assert that information about the costs and benefits of continuing in school, or the subjective probability of success if one decides to continue, are important determinants of

[21] The Bartlett test assesses the null hypothesis that variance is homogenous across groups. For *m* groups, the Bartlett statistic is distributed χ^2 with *m*-1 degrees of freedom. For details on the Bartlett and Levene tests, see StataCorp 2003 and NIST/SEMATECH, respectively.

the decisions parents and students make regarding educational persistence. These theories tend to conceive of deficiencies in information in terms of bias. Parents and students who are economically disadvantaged may have beliefs about the costs of college that are, on average, higher than the true costs, leading them to end their educational careers earlier than more advantaged students. Morgan (2002) argues that inequalities in belief distributions extend beyond bias to certainty. According to Morgan, decision makers who are less confident in their beliefs will tend to under invest in actions that could help them achieve their goals. We have argued that, in the context of research on perceptions of college costs, parents who are less certain of the costs of college will be less likely to act in ways that help their children pursue college even if on average their estimates of college costs are no different from parents who are better informed.

Despite the importance rational choice theorists assign to information, there is relatively little empirical work to document the extent to which information on the benefits and costs of higher education is unequally distributed. We seek to address this shortcoming in our work. We hypothesized that economically and educationally disadvantaged parents and parents who are racial/ethnic minorities would be less likely to provide estimates of college tuition, would provide more upwardly biased estimates of tuition, and would have greater dispersion in their tuition estimates. Our hypotheses receive mixed support.

Consistent with prior research, we find that disadvantaged parents are less likely than more advantaged parents to provide an estimate of college tuition. The dimensions of disadvantage are distinct, though they overlap. For example, racial/ethnic disparities in the odds of providing an estimate of college tuition are partly mediated by differences in economic resources and parental educational attainment. However, even after adjusting for difference in other resources, noticeable disparities persist in the log odds that African American, Hispanic and white parents will provide estimates of college tuition (Table 2).

Do these differences reflect variation in the quality of the information parents have available to them or variation in their willingness to speculate? One could argue that white, educated and affluent parents are more confident in general than non-white, less-educated and economically disadvantaged parents. Given identical levels of information, advantaged parents may simply be less averse to guessing. If this were the case, however, we would expect that the greater propensity of advantaged parents to guess would lead advantaged groups to have greater dispersion in their estimates of tuition. We observe just the opposite; in fact, estimates of conditional variance in Table 5 show that dispersion is inversely related to social standing. Thus, differences in the propensity to guess probably do not account for much if any of the observed differences in the likelihood of reporting tuition.

We believe that patterns of inequality in tuition knowledge may be attributable to two complementary processes that restrict the flow of information to disadvantaged parents. First, informal social networks are generally segregated along the lines of race/ethnicity, education and income (Louch 2000; Marsden 1988; McPherson, Smith-Lovin and Cook 2001). To the extent that information about college preparation, including the costs of college attendance, flows through networks, those in advantaged networks will have more points of generally higher-quality information. Other members of their networks will have had direct experience with college both as students and as parents helping their children navigate the path to higher education.

Second, African Americans continue to be affected by high levels of residential segregation. Although socioeconomic status accounts for some of the residential segregation black families experience, even net of differences in education and income, blacks remain spatially segregated from otherwise similar whites (Alba et al. 2000; Charles 2001; Clark and Blue 2004; Logan 2002). When well-off blacks do live in predominantly white neighborhoods, their white neighbors tend to be of lower socioeconomic status than they are (Alba et al. 2000). Such segregation will contribute to parent networks through both the neighborhood context (Dornbusch, Ritter and Steinberg 1991; Haynes 2001) and the schools their children attend.

Our findings on average differences in tuition estimates across groups fail to support our hypotheses. Instead, we find general uniformity in the average quality of parents' estimates of tuition across indicators of social background. Consistent with Ikenberry and Hartle (1998), we find that parents overestimate the price of tuition and mandatory fees, often substantially. The average parent estimates tuition and fees at 175% of their true price. However, the quality of tuition estimates varies by type of college parents thought their child would attend and by whether or not parents claimed to have cost information from a specific school.

The implications of our findings regarding the average accuracy of parents' tuition estimates are complex. On the one hand, these findings may be regarded as reassuring from a stratification perspective. Though parents' estimates of tuition are poor, they are on average uniformly poor with respect to race/ethnicity, parental education and household income. On the other hand, there is a substantial body of literature that suggests that sensitivity to tuition is inversely related to family income (Manski and Wise 1983; Kohn, Manski and Mundel 1976; Kane 1994). If this is so, the same bias in tuition estimates will have a greater effect on the preparatory commitment of working class parents and their children than on the preparatory commitment of middle class parents and their children. Equality in bias need not imply equality in the consequences of misinformation. This is consistent with the rational choice arguments advanced by

Raftery and Hout (1993) and by Goldthorpe (1996). Unfortunately, we lack the data on outcomes necessary to empirically test the differential effects of information bias on college enrollment decisions.[22]

Another issue that qualifies our reading of these results relates to the design of the NHES instrument. Parents were asked to estimate the "costs of one year's tuition and mandatory fees." In responding to this question, did parents consider the 'sticker price' of tuition and fees, or did they try to estimate the amount of tuition and fees their family would actually have to pay? These quantities are often quite different, and more so for working class families than for middle class families. We believe that parents probably reported sticker price rather than the price they would pay, though it is not clear how well parents distinguish between these two quantities. Table 4 is reassuring on this count, as the estimate of a sample member at the mean for all characteristics was quite accurate for two-year colleges for which a parent had gotten specific tuition information. If parents estimated actual price, or if they are unaware of the differences between sticker price and actual price, then the estimates provided by working class parents are more biased than the estimates provided by middle class parents. The average price working class parents would have to pay is lower than

[22] We did try to look at the association between the propensity to report tuition and the propensity to report saving money for a child's college education. We found that the percentage of respondents saving money increased with their predicted probability of reporting tuition. Lacking decent instruments for reporting tuition, however, we were unable to estimate an adequately identified model for both outcomes simultaneously.

what middle class parents would have to pay, so if parent perceptions were unbiased then the average estimate provided by working class parents would have to be lower than the average for middle class parents.

Our findings for the conditional distributions of parents' tuition estimates support our hypothesis that disadvantaged parents are more prone to error in their estimates of the costs of college than advantaged parents. The average absolute value of the difference between predicted and observed tuition ratios declines as family income and parental education increase and is lower for whites than it is for blacks or Hispanics. In models not shown, we also matched parents to the costs of attending the college closest in actual cost to the estimates they provide. This optimal matching approach gives parents the benefit of the doubt by assuming that their estimates are as close to the actual cost of attendance as possible. Models based on optimal matching show the same pattern of coefficients for average estimates and appreciably smaller estimates of error variance. However, the fundamental patterns of inequality in the variance of parent tuition reports remain unchanged.

If Morgan is correct in arguing that those with broader belief distributions (greater uncertainty) are less likely to engage in activities in support of their stated goals, this differential dispersion in errors has implications for persistent inequalities in educational attainment. Morgan's assertion gets at the heart of an important issue of causality. Morgan argues (and we agree) that beliefs play a

causal role in stratification.[23] Poor information weakens preparatory commitment. Although all parents in our sample (and 94% of those surveyed) *say* that their child will attend college, it is not clear to us what proportion of parents truly believes this to be the case and what proportion merely hopes that their child will attend. However, one could also make the opposite argument. Those who are not serious about (their child) going on to college are least likely to gather information about college costs and, when they do have information, that information is likely to be fairly unreliable. The costs of learning about tuition and fees may outweigh the benefits of having such knowledge for parents who do not really believe their child will go on to college.

This is a classic problem of reciprocal causality for which we have no solution. It is notoriously difficult to find good instruments with which to model reciprocal causality. Challenges in formal modeling, however, are separate from real world processes. Our inability to formally identify such a process does not preclude the possibility of its existence.

Finally, one might wonder whether parents are aware of the quality of their information. It may be that certainty regarding tuition varies little across respondents, or alternatively that it varies at random with respect to social origins or the quality of tuition estimates. Without directly asking parent to express their

[23] Morgan's argument is actually more nuanced than this in that he distinguishes between the accuracy and quantity of information available to the chooser (see Morgan (2005): Chapter 4). We lack the data to make such a distinction here.

certainty, either as a separate questionnaire item or by eliciting confidence intervals for the costs of tuition and fees, we cannot be sure that parents are conscious of the quality of their information. We believe, however, that the indirect evidence we have presented is more consistent with the conclusion that parents are aware of the quality of their information. As discussed above, similar characteristics are implicated in both the decision to report a tuition estimate and the conditional dispersion of parent estimates. Furthermore, though we cannot control for factors like network composition that we believe are associated with information quality, there is substantial empirical evidence (cited above) that these networks tend to be homogenous with respect to race/ethnicity and socioeconomic status. We hope that future research will take the role of information and uncertainty seriously and will collect measures of respondent uncertainty along the lines advocated by Manski (2004), including eliciting expectations in probabilistic form through confidence intervals or subjective probabilities. In addition, we recognize the need to understand "how persons revise their expectations with receipt of new information" (Manski 2004: 1371) and by extension how those revised expectations may affect their preparatory commitments.

Despite these threats to causal inference, we believe that our findings are important for both rational choice theories of educational inequality and educational policy. We have demonstrated that there are substantial differences in

college knowledge by parent race/ethnicity and social class. Black and Hispanic parents are less likely than white parents to be able to estimate the costs of college, as are less educated and lower income parents.

Our work extends Horn, Chen and Chapman's research on inequalities in knowledge of college costs. In particular, we qualify their analysis of the relative accuracy of parental estimates. Rather than compensating for unobserved variations in true costs by ignoring variation in the degree to which parents' estimates are accurate, we have restricted the sample to parents estimating tuition and fees for public in-state institutions and taken full advantage of the data available to us. Doing so allows us to qualify HCC's findings regarding inequality in the accuracy of parents' tuition estimates. HCC report that disadvantaged parents are less likely than advantaged parents to provide estimates within 25% of 'actual' costs. We find, however, that *average* differences in the quality of tuition estimates among parents are negligible. Instead, HCC's findings are driven by *variation* in the estimates less advantaged parents provide. Disadvantaged parents appear to make errors greater in magnitude than more advantaged parents. As Goldthorpe (1996) argued, differences in the quantity and quality of information may be part of the solution to the puzzle of persistent inequalities in postsecondary attainment.

In terms of policy, our findings highlight the need for more effective means of informing parents about the costs of a college education. The most

generous aid policies and most aggressive selective tuition discounting will be ineffective if parents and students are unaware that such policies exist. Perhaps knowing that the cost of higher education is affordable, or at least more reasonable than they imagine, will help parents and students more effectively maintain their postsecondary options. Without observing behavioral outcomes such as course selection, academic effort, and college application and matriculation behavior, the importance of the information differences we document to postsecondary stratification remains unclear. Making sure parents and students have accurate information about the costs of attending college seems important, but without observing how choosers use that information it is impossible to say how important the information really is. We hope that this work will help draw attention to the magnitude of misinformation parents have about the costs of higher education, and to the racial, ethnic and socioeconomic dimensions of parents' misperceptions of college costs.

Works cited

Alba, Richard, John R. Logan, and Brian J. Stults. 2000. "How Segregated Are Middle-Class African Americans?" *Social Problems* 47:543-558.

Avery, Christopher and Thomas Kane. 2004. "Student Perceptions of College Opportunities: The Boston COACH Program." in *College Choices: The Economics of Where to Go, When to Go, and How to Pay for It*, edited by C. M. Hoxby. Chicago: University of Chicago Press.

Breen, Richard. 1999. "Beliefs, Rational Choice and Bayesian Learning." *Rationality and Society* 11:463-479.

Breen, Richard and John H. Goldthorpe. 1997. "Explaining Educational Differentials: Towards a Formal Rational Action Theory." *Rationality and Society* 9:275-305.

Charles, Camille Zubrinsky. 2001. "Socioeconomic Status and Segregation: African Americans, Hispanics, and Asians in Los Angeles." in *Problem of the Century: Racial Stratification in the United States at Century's End*, edited by E. Anderson and D. S. Massey. New York: Russell Sage.

Clark, William A.V. and Sarah Blue. 2004. "Race, Class, and Segregation Patterns in U.S. Immigrant Gateway Cities." *Urban Affairs Review* 39:667-688.

Dornbusch, Sanford M., Philip P. Ritter, and Laurence Steinberg. 1991. "Community Influences on the Relation of Family Statuses to Adolescent School Performance: Differences between African Americans and Non-Hispanic Whites." *American Journal of Education* 99:543-567.

Ellwood, David T. and Thomas J. Kane. 2000. "Who is Getting a College Education? Family Background and Growing Gaps in Enrollment." Pp. 283-324 in *Securing the Future: Investing in Children from Birth to College*, edited by S. Danziger and J. Waldfogel. New York: Russell Sage Foundation.

Goldthorpe, John H. 1996. "Class Analysis and the Reorientation of Class Theory: The Case of Persisting Differentials in Educational Attainment." *The British Journal of Sociology* 47:481-505.

Haynes, Bruce D. 2001. *Red Lines, Black Spaces: The Politics of Race and Space in a Black Middle-Class Suburb*. New Haven: Yale University Press.

Horn, Laura, Xianglei Chen, and Chris Chapman. 2003. "Getting Ready to Pay for College: What Students and Their Parents Know about the Cost of College Tuition and What They are Doing to Find Out." U. S. Department of Education, National Center for Education Statistics: Washington, D.C.

Ikenberry, Stanley O. and Terry W. Hartle. 1998. *Too Little Knowledge is a Dangerous Thing*. Washington, D.C.: American Council on Education.

Kane, Thomas J. 1994. "College Entry by Blacks Since 1970: The Role of College Costs, Family Background, and the Returns to Education." *Journal of Political Economy* 102:878-911.

Kohn, Meir G., Charles F. Manski, and David S. Mundel. 1976. "An Empirical Investigation of Factors which Influence College-Going Behavior." *Annals of Economic and Social Measurement* 5:391-419.

Lehman, E. L. and George Casella. 1998. *Theory of Point Estimation*. New York: Springer.

Logan, John R. 2002. "Separate and Unequal: The Neighborhood Gap for Blacks and Hispanics in Metropolitan America."

Long, J. Scott. 1997. *Regression Models for Categorical and Limited Dependent Variables*. Thousand Oaks: SAGE Publications, Inc.

Louch, Hugh. 2000. "Personal Network Integration: Transitivity and Homophily in Strong-Tie Relations." *Social Networks* 22:45-64.

Manski, Charles F. 1989. "Schooling as Experimentation: A Reappraisal of the Postsecondary Dropout Phenomenon." *Economics of Education Review* 8:305-397.

—. 2004. "Measuring Expectations." *Econometrica* 72:1329-1376.

Manski, Charles F. and David A. Wise. 1983. *College Choice in America*. Cambridge, MA: Harvard University Press.

Mare, Robert D. 1980. "Social Background and School Continuation Decisions." *Journal of the American Statistical Association* 75:295-305.

Marsden, Peter V. 1988. "Homogeneity in Confiding Relations." *Social Networks* 10:57-76.

McPherson, Miller, Lynn Smith-Lovin, and James M. Cook. 2001. "Birds of a Feather: Homophily in Social Networks." *Annual Review of Sociology* 27:415-444.

Mondak, Jeffrey J. and Mary R. Anderson. 2004. "The Knowledge Gap: A Reexamination of Gender-Based Differences in Political Knowledge." *The Journal of Politics* 66:495-512.

Morgan, S. (1998). Adolescent Educational Expectations: Rationalized, Fantasized, or Both? *Rationality and Society, 10*, 131-161.

--. 2002. "Modeling Preparatory Commitment and Non-Repeatable Decisions: Information-Processing, Preference Formation and Educational Attainment." *Rationality and Society* 14:387-429.

—. 2005. *On the Edge of Commitment: Educational Attainment and Race in the United States*. Palo Alto: Stanford University Press.

NIST/SEMATECH e-Handbook of Statistical Methods. "1.3.5.10. Levene Test for Equality of Variances." vol. http://www.itl.nist.gov/div898/handbook/eda/section3/eda35a.htm.

Plank, Stephen B. and Will J. Jordan. 2001. "Effects of Information, Guidance, and Actions on Postsecondary Destinations: A Study of Talent Loss." *American Educational Research Journal* 38:947-79.

Post, David. 1990. "College-Going Decisions by Chicanos: The Politics of Misinformation." *Educational Evaluation and Policy Analysis* 12:174-87.

Raftery, Adrian E. and Michael Hout. 1993. "Maximally Maintained Inequality: Expansion, Reform, and Opportunity in Irish Education, 1921-75." *Sociology of Education* 66:41-62.

StataCorp. 2003. "oneway." Pp. 105-114 in *Stata Reference Manual*, vol. 3. College Station: TX.

Table 1: Descriptive statistics

Logit Model (n=5,282)			**OLS Model (n=2,345)**		
Variable	Mean	Std. Dev.	Variable	Mean	Std. Dev.
Dependent Variable			Dependent Variable		
can estimate tuiton	0.444	0.497	log of tuition ratio	0.559	0.716
Independent Variables			Independent Variables		
Parent Race/ ethnicity			**Parent Race/ ethnicity**		
White [omitted]	0.630	0.483	White [omitted]	0.734	0.442
Black	0.144	0.351	Black	0.107	0.309
Hispanic (English)	0.115	0.320	Hispanic (English)	0.090	0.287
Hispanic (Spanish)	0.057	0.232	Hispanic (Spanish)	0.010	0.101
Other race	0.054	0.226	Other race	0.058	0.235
Parent education					
<HS	0.105	0.307	<HS	0.029	0.169
HS/ GED [omitted]	0.217	0.412	HS/ GED [omitted]	0.119	0.324
vocational	0.035	0.184	vocational	0.028	0.165
some college	0.188	0.391	some college	0.193	0.394
associate's	0.088	0.284	associate's	0.105	0.306
baccalaureate	0.176	0.381	baccalaureate	0.243	0.429
graduate school	0.190	0.392	graduate school	0.283	0.451
single parent	0.307	0.461	single parent	0.247	0.431
Income (thousands)	51.586	30.930	Income (thousands)	62.6	30.0
Home ownership			**Home ownership**		
Own home	0.736	0.441	Own home	0.839	0.368
Rent home [omitted]	0.224	0.417	Rent home [omitted]	0.130	0.336
Other home arrangement	0.040	0.196	Other home arrangement	0.031	0.174
any household members of college age	0.212	0.409	any household members of college age	0.281	0.450
Child characteristics			**Child characteristics**		
Female	0.518	0.500	Female	0.520	0.500
ever repeated a grade	0.092	0.289	ever repeated a grade	0.062	0.242
grade level - 6	2.715	1.961	grade level - 6	3.073	2.007
GPA	2.976	0.691	GPA	3.026	0.658
no letter grades	0.033	0.179	no letter grades	0.029	0.169

Table 1: Descriptive statistics

Logit Model (n=5,282)			**OLS Model (n=2,345)**		
Variable	Mean	Std. Dev.	Variable	Mean	Std. Dev.
College information			**College information**		
talk/read about financial aid	0.354	0.478	talk/read about financial aid	0.483	0.500
talk with counselor/ teacher about college course reqs	0.229	0.421	talk with counselor/ teacher about college course reqs	0.307	0.461
know about Lifetime Learning credit	0.184	0.388	know about Lifetime Learning credit	0.269	0.443
know about HOPE Scholarship	0.208	0.406	know about HOPE Scholarship	0.269	0.443
			Type of fees estimated		
			4 year institution	0.767	0.423
			2 year institution		
			got info: 4year	0.286	0.452
			got info: <4 year	0.143	0.350
			mandatory tuit/fee only: 4yr	0.414	0.493
			mandatory tuit/fee only: <4yr	0.210	0.407

Table 2: Logistic regression model of probability of being able to estimate tuition

	race/ ethnicity	education	capital	origins	full
black	-0.787**			-0.310**	-0.391**
	(0.085)			(0.095)	(0.101)
Hispanic (Spanish)	-2.518**			-1.175**	-1.255**
	(0.216)			(0.232)	(0.239)
Hispanic (English)	-0.702**			-0.283**	-0.278**
	(0.092)			(0.101)	(0.105)
other	-0.143			-0.033	-0.096
	(0.124)			(0.135)	(0.141)
parent: <HS		-0.810**		-0.332*	-0.277
		(0.146)		(0.155)	(0.160)
parent: vocational		0.533**		0.556**	0.602**
		(0.168)		(0.174)	(0.181)
parent: some college		0.946**		0.852**	0.815**
		(0.094)		(0.096)	(0.101)
parent: associate's		1.222**		1.060**	1.034**
		(0.116)		(0.119)	(0.124)
parent: baccalaureate		1.556**		1.247**	1.172**
		(0.097)		(0.101)	(0.107)
parent: grad school		1.773**		1.403**	1.294**
		(0.097)		(0.102)	(0.108)
single parent		-0.149*	0.152*	0.232**	0.179*
		(0.067)	(0.071)	(0.076)	(0.080)
income (thousands)			0.020**	0.011**	0.010**
			(0.001)	(0.001)	(0.001)
own home			0.578**	0.443**	0.405**
			(0.082)	(0.087)	(0.090)
other home arrangement			0.372*	0.402*	0.370*
			(0.163)	(0.171)	(0.179)
female					-0.013
					(0.065)
grade (years)					0.086**
					(0.018)
any hh members college age					0.733**
					(0.082)
GPA (from ltr grade)					0.053
					(0.082)
no letter grades					0.347
					(0.311)
ever repeated grade					-0.257*
					(0.119)
talked/ read about financial aid					0.647**

Table 2: Logistic regression model of probability of being able to estimate tuition

	race/ ethnicity	education	capital	origins	full
					(0.070)
heard of lifetime learning tax credit					0.519**
					(0.089)
heard of HOPE scholarship tax credit					0.226**
					(0.084)
talk w/counslr abt coll course reqs					0.274**
					(0.081)
Constant	0.072*	-1.074**	-1.767**	-1.888**	-2.709**
	(0.035)	(0.074)	(0.091)	(0.119)	(0.283)
Observations	5282	5282	5282	5282	5282
log likelihood	-3459.45	-3233.98	-3326.63	-3119.79	-2907.99
Deviance	6918.89	6467.95	6653.26	6239.59	5815.98
BIC'	-303.19	-728.41	-568.82	-896.77	-1234.65
Var y*	3.68	4.04	3.81	4.37	4.98
HL chi-square				2.40	4.46

* significant at 5%; ** significant at 1%

Table 3: Exponentiated coefficients for log of ratio of estimated to true tuition

	race/ ethnicity	education	capital	origins	full
black	0.943			0.930	0.941
	(0.044)			(0.045)	(0.046)
Hispanic (Spanish)	1.152			1.167	1.190
	(0.162)			(0.174)	(0.177)
Hispanic (English)	1.071			1.073	1.069
	(0.053)			(0.055)	(0.054)
other	1.256**			1.260**	1.282**
	(0.077)			(0.078)	(0.079)
parent: <HS		0.935		0.915	0.923
		(0.087)		(0.088)	(0.088)
parent: vocational		1.013		1.021	1.011
		(0.096)		(0.096)	(0.095)
parent: some college		0.982		0.987	0.973
		(0.051)		(0.052)	(0.051)
parent: associate's		0.929		0.931	0.915
		(0.056)		(0.056)	(0.055)
parent: baccalaureate		0.919		0.916	0.905
		(0.047)		(0.047)	(0.047)
parent: grad school		0.936		0.932	0.918
		(0.047)		(0.048)	(0.048)
single parent		1.003	1.003	1.010	1.022
		(0.034)	(0.036)	(0.037)	(0.037)
income (thousands)			1.000	1.000	1.000
			(0.001)	(0.001)	(0.001)
own home			0.943	0.958	0.961
			(0.043)	(0.044)	(0.044)
other home arrangement			0.796*	0.790**	0.785**
			(0.071)	(0.071)	(0.070)
female					0.970
					(0.028)
grade (years)					0.979*
					(0.008)
GPA (from ltr grade)					1.097*
					(0.042)
no letter grades					1.186
					(0.173)
ever repeated grade					0.999
					(0.060)
any hh members college age					0.945
					(0.031)

Table 3: Exponentiated coefficients for log of ratio of estimated to true tuition

	race/ ethnicity	education	capital	origins	full
talked/ read about financial aid					1.024
					(0.031)
heard of lifetime learning tax credit					0.923*
					(0.033)
heard of HOPE scholarship tax credit					0.945
					(0.033)
talk w/counslr abt coll course reqs					1.111**
					(0.037)
4yr institution	0.476**	0.491**	0.484**	0.491**	0.478**
	(0.048)	(0.050)	(0.049)	(0.049)	(0.048)
got info: 4yr	0.790**	0.792**	0.792**	0.794**	0.813**
	(0.026)	(0.027)	(0.027)	(0.026)	(0.029)
got info: <4yr	0.669**	0.669**	0.665**	0.690**	0.700**
	(0.041)	(0.041)	(0.040)	(0.041)	(0.042)
mandatory tuit/fee only: 4yr	1.108**	1.121**	1.118**	1.104**	1.104**
	(0.036)	(0.037)	(0.037)	(0.036)	(0.036)
mandatory tuit/fee only: <4yr	0.457**	0.468**	0.467**	0.451**	0.452**
	(0.045)	(0.046)	(0.046)	(0.044)	(0.044)
Observations	2345	2345	2345	2345	2345
r2	0.09	0.08	0.08	0.09	0.11
BIC'	-146.48	-109.33	-134.58	-82.02	-45.05

Standard errors in parentheses
* significant at 5%; ** significant at 1%

Table 4: Expected ratio of reported tuition to actual tuition, by type of college and type of estimate**

	Type of college	
	2 yr	4 yr
information		
mandatory fees only	1.05	1.42
fees and other expenses	1.54	1.75
no information		
mandatory fees only	2.28	1.28
fees and other expenses	3.35	1.58

** For parents of 11th graders, holding all other variables at their sample means

Table 5: Dispersion in residual variation from final tuition model

	Std dev	Freq	Levene test p-value
Race/ ethnicity			
white	0.635	1721	
black	0.771	250	<.001
Hispanic/ English	0.817	212	<.001
Hispanic/ Spanish	0.766	25	0.037
other	0.738	137	0.031
Parent education			
<HS	0.790	69	>.100
HS/GED	0.770	279	
voc	0.767	66	>.100
some college	0.711	451	>.100
associate's	0.730	246	>.100
baccalaureate	0.645	569	<.001
grad school	0.589	665	<.001
Family income			
2.5	0.998	12	<.001
7.5	0.834	32	0.007
12.5	0.793	57	0.003
17.5	0.804	54	<.001
22.5	0.713	103	<.001
27.5	0.759	126	<.001
32.5	0.844	116	<.001
37.5	0.670	168	0.012
45	0.667	296	0.015
62.5	0.676	596	<.001
100	0.590	785	
Home ownership			
own	0.667	1967	0.029
rent	0.697	305	
other arrangement	0.825	73	>.100

Appendix 1: Sample size reductions

Sample Size Table for Logit Models

Sample loss	Sample size	
	24600	NHES 1999 total sample size
-15453	9147	no children in grades 6-12, or if ungraded then no children above 12 years old
-708	8439	child will not attend college (38 imputed) or is homeshooled (51)
		hot deck imputation by NCES on questions leading up to tuition estimates
-1352	7087	or tuition estimates
-215	6872	missing data on independent variables (excluding income)
-738	6134	child will attend a private 4 year school
-320	5814	child will attend an out-of-state public four-year college
-532	5282	child will attend a 2 year college *other than* a junior college or community college
	5282	logit analytic sample

Sample Size Table for OLS Models

Sample loss	Sample size	
	5282	logistic regression sample
-2936	2346	cannot provide estimate of tuition
	2346	OLS analytic sample