MIND OVER A MATTER OF MONEY: TWO ESSAYS ON COLLEGE PERSISTENCE AND GRADUATION OUTCOMES FOR LOW-INCOME AND AFRICAN-AMERICAN STUDENTS

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A dissertation submitted to the faculty of the University of North Carolina at Chapel Hill in partial fulfillment of the requirements for the degree of Doctor of Philosophy in the Department of Economics.

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ABSTRACT

VALERIE RAWLSTON WILSON: Mind Over a Matter of Money: Two Essays on College Persistence and Graduation Outcomes for Low-Income and African-American Students
(Under the direction of H Wilbert van der Klaauw)

This study consists of a pair of papers which examine the relative effects of academic, social and financial characteristics on four-year college persistence and completion outcomes, conditional upon initial enrollment. I employ discrete time event history modeling to control for duration dependence in estimating the probability of stopping out before the completion of a bachelor's degree.

In the first paper I test whether persistence and graduation rates for African-American students at Historically Black Colleges and Universities (HBCU) differ from those at Traditionally White Institutions (TWI). The results of my analysis reveal that overall, African-American students who attend HBCUs are no more likely than those who attend TWIs to experience an interruption in enrollment before the end of the fourth year or to return to the same university after a period of non-enrollment. However, during the 1980s, HBCU students were more likely than those at TWIs to receive a bachelor's degree within six years. During the 1990s, there was no statistical difference in graduation rates between students attending HBCUs and those attending TWIs.

In the second paper, I estimate the effects of the Pell grant, total grant aid, and total financial aid (including grants and loans) on college persistence behavior. I adopt estimation methods that take advantage of discontinuities in the Pell grant and EFC formulas in order to obtain unbiased estimates of the effect of financial aid on persistence behavior. The results suggest that a $1,000 increase in the scheduled Pell grant reduces the probability of stopout for four-year college students by 0.5 to 0.8 percentage points. The total effect of grant aid, which included the Pell grant as well as other types of need-based and merit-based grant aid, was found to have no effect on stopout behavior among four-year college students. On the other hand, a $1,000 increase in the total aid package, including grants, loans and work-study, increased the likelihood of stopping out by 0.6 to 1.1 percentage points. In both papers, academic performance and family background were the greatest determinants of persistence and degree attainment.

To my parents, Mrs. Shirley Rawlston and the late Mr. Gilford Rawlston (1942-2006), who have always been avid supporters of my educational pursuits. This dissertation is as much a result of your efforts as my own so to you I say thank you and congratulations. You now have a "Dr." in the family.

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LIST OF ABBREVIATIONS

Abbreviation	Definition
BPS	Beginning Postsecondary Students
FAFSA	Free Application for Federal Student Aid
HBCU	Historically Black Colleges and Universities
HSB	High School and Beyond
IV	Instrumental Variable
LP	Linear Probability
PDLP	Panel Data Linear Probability
PDP	Panel Data Probit
PH	Proportional Hazard
SPH	Semiparametric Proportional Hazard
TWI	Traditionally White Institutions

CHAPTER I

THE EFFECT OF ATTENDING AN HBCU ON PERSISTENCE AND GRADUATION OUTCOMES OF AFRICAN-AMERICAN STUDENTS

1. Introduction

In America, a college education is often touted as the key to success. In fact, increases in educational attainment often provide additional opportunities for political, social and economic empowerment. According to the Census Bureau, individuals with a bachelor's degree now earn almost twice as much as high school graduates. While college completion rates for African-Americans between the ages of 25 and 34 have increased tremendously (130%) from 1970 to 2000; they continue to lag behind those of whites by nearly 13 percentage points[1], contributing also to a persistent earnings gap.

The Higher Education Act of 1965 defines Historically Black Colleges and Universities (HBCUs) as institutions of higher learning established before 1964 whose principal mission was then, as is now, the [higher] education of black Americans. All institutions classified as HBCUs are accredited or making reasonable progress toward accreditation by an approved accrediting body. HBCUs have played an important role in narrowing the education and earnings gaps by providing the opportunity for a college education for a significant number of African-Americans, especially during the period of segregation when African-Americans were not allowed to attend mainstream colleges and universities. Furthermore, low tuition costs have enabled many HBCUs to provide a college

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[1]Source: U.S. Census Bureau (Census of Population)

education to those who would have been unable to afford one otherwise. For example, The United Negro College Fund (UNCF), the nation's largest, oldest and most comprehensive minority higher education assistance organization, provides operating funds and technology enhancement services for 39 member HBCUs, as well as scholarships and internships for students at about 900 institutions. Through this support these institutions report tuition rates approximately 52% lower than comparable schools.

There are 105 institutions classified as HBCUs, representing three percent of all institutions of higher education in the United States. HBCUs currently enroll 15% of all black college students and produce roughly one third of all black college graduates[2]. Although most HBCUs are small, have a relatively high percentage of disadvantaged students, and lack many of the resources available at mainstream institutions, even among HBCUs there are differences in terms of financial endowment, tuition costs, fields of study offered, and academic selectivity.

Notwithstanding their limited resources, HBCUs have done a remarkable job of educating many of this country's African-American professionals. At either the graduate or undergraduate level, HBCUs have educated some 75% of all African-American Ph.D.s, 46% of all African-American business executives, 50% of African-American engineers, 80% of African-American federal judges, and 65% of African-American doctors. Despite this great legacy, HBCUs have recently garnered some negative attention with the loss of accreditation for both Morris Brown College and Barber-Scotia College, each related to some form of financial mismanagent. As state and federal budgets tighten, questions regarding the efficiency of a post-segregation "dual" university system could become increasingly

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[2]Source: Congressman James E. Clyburn. 2004. "HBCUs: Institutions for Past, Present & Future." *Capitol Column.*

important, as would empirical evidence regarding the importance of HBCUs in human capital attainment of African-Americans. Unfortunately, this is an area of research that remains largely unexplored.

In this paper I examine whether there are unique benefits to African-American students who attend HBCUs by comparing four-year persistence rates, and six-year graduation rates of African-American students at HBCUs and traditionally white institutions (TWIs). I also consider some of the channels through which these outcomes may vary. In particular, I consider differences in financial aid packages, social environment, and academic compatibility. In addition to persistence and graduation rates, I also consider the likelihood a student will re-enter college following an interuption in enrollment.

Section 2 presents a summary of the literature followed by a description of the data in Section 3. Section 4 presents a theory of persistence and explanation of the empirical model and methodology used in my analysis. I present summary statistics and the estimation results in Section 5, provide an extension of the analysis using an alternative data set in Section 6, consider the re-entry decision in Section 7, and conclude with a discussion of all the results and plans for future research in Section 8.

2. Review of the Literature

Volumes of literature have been written on the rich history of HBCUs and their role in providing educational opportunities to former slaves and their descendents during and since the era of racial segregation in America. However, in 1992 a case which began in the state courts of Mississippi made its way to the Supreme Court and ended with a decision that had implications for the future of any public HBCU. Ultimately, the Supreme Court ruled that a state's race-neutral policy was not enough to dismantle its former dual university system, and that the state of Mississippi had not done enough if it perpetuated policies and practices "that continue to have segregative effects, whether by influencing student enrollment decisions or by fostering segregation in other facets of the university system." The state was further ordered to justify or eliminate any policies that "substantially restrict a person's choice" of institution or "contribute to the racial identifiability of the eight public universities" (*United States v. Fordice*, 1992). Ironically, though the case was initially aimed at ending segregative practices at public predominantly white institutions, the continued existence of public HBCUs in Mississippi (and possibly throughout the country) as predominantly black institutions was called into question as well.

Prior to this case, there were few studies offering empirical evidence of the ways in which HBCUs have affected human capital attainment among African-American youth since the American educational system was legally desegregated. Among the empirical studies that have been done, three basic questions seem to dominate: (1) What is the value of HBCUs to American society at large? (2) Are African-American students who attend HBCUs more likely to graduate from college than their counterparts at TWIs? (3) What effect does HBCU attendance have on post baccalaureate outcomes? While this study specifically addresses persistence and graduation outcomes, because of the lack of empirical research on this particular topic, I provide a broad review of some of the literature addressing each of these three questions in order to demonstrate the unique contribution of my research.

Morse, Sakano and Price (1996) used administrative data from three schools in North Carolina -- North Carolina A&T (an HBCU), UNC-Greensboro, and UNC-Chapel Hill (both TWIs) -- to compare the value of these schools as welfare-enhancing projects. While they found that all three schools were welfare-enhancing, in terms of return per dollar of appropriation, and impact upon labor earnings in the state, North Carolina A&T, the HBCU, ranked the highest. In terms of the social welfare gain, they also found that as HBCUs close, the equilibrium stock of human capital decreases, implying that HBCUs have a social value measured by increased output that would not occur otherwise.

Ehrenberg and Rothstein (1994) compared the college completion behavior of African-American college students at HBCUs to their counterparts at TWIs using the cohort of students from the 1972 National Longitudinal Survey of High School Students (NLS-72). Unlike previous studies, Ehrenberg and Rothstein allowed the decision to attend an HBCU to be endogenous, and then controlled for this decision in their estitmation of the probability that students who entered college within three years of their high school graduation (in 1972) had graduated from college by 1979. In order to allow for this decision they estimated a reduced form probit model in which a student's choice of institutional type depended on the student's high school rank and SAT scores, characteristics of the student's family and the high school they attended, and characteristics of the HBCUs and other higher educational insitutions in the state in which the student attended high school. The college characteristics included the proportion of full-time equivalent (FTE) undergraduate students in the student's high school state that were enrolled in HBCUs, as well as the relative averages (weighted by FTE enrollments) of each of the following variables -- tuition in HBCUs in the state relative to tuition for other institutions in the state, black faculty in HBCUs in the state relative to other institutions in the state, and the average SAT score in HBCUs in the state relative to other institutions in the state. The authors concluded that the average probability of graduation by 1979 for African-American students who attended HBCUs was 21 percentage points higher than those who attended TWIs.

The findings on whether HBCU attendance improves post baccalaureate outcomes, such as future wages and graduate school enrollment, are mixed. Ehrenberg and Rothstein concluded that HBCU attendance did not increase the probability of graduate enrollment, nor did it have a significant effect on future wages. The authors' estimates of the 1979 wages of HBCU graduates were 7% to 11% lower than those of TWI graduates, but the difference in wages was not statistically different from zero.

Constantine (1995) finds evidence to the contrary. Her analysis of the effect of HBCU attendance on future wages of African-American students differs from the Ehrenberg and Rothstein study in two important ways. First, Constantine uses the multinomial logit college choice model developed by Manski and Wise (1983)[3] to model all of the choices available to high school graduates (that is, no four-year college, four-year HBCU, four-year non-HBCU) as opposed to limiting the analysis only to students who attended four-year institutions. Second, the wage observations used by Constantine were taken later in the careers of those sampled than those used by Ehrenberg and Rothstein. The respondents in Constantine's analysis were approximately 32 years old when the wage observations were taken, compared to 25 in the Ehrenberg and Rothstein analysis[4].

Constantine's results reveal an 11% increase in wages associated with attending an HBCU without controlling for B.A. attainment by 1979[5]. After including B.A. attainment in the equation, the effect of HBCU attendance is reduced to 8%, though the estimate is not significant at the 10% level. Finally, when the author interacted HBCU attendance with B.A.

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[3]Manski and Wise (1983) also use NLS-72 data to estimate their model of college choice.

[4]In order to maintain the comparability of her study to that of Rothstein and Ehrenberg, Constantine estimates a reduced form wage equation for four-year college attendees only.

[5]Constantine controls for B.A. attainment as a dummy variable equal to 1 if the respondent had a B.A. degree or more as of 1979, and 0 otherwise.

attainment, the estimated effect of HBCU attendance is reduced to 6%, and the effect of B.A. attainment from an HBCU is 3%. Neither of the latter estimates was statistically significant.

The existing literature provides a good basis for empirical research about college attendance decisions, educational attainment and post graduation outcomes of African-Americans, and more specifically those who attend HBCUs. However, issues related to persistence behavior, which involves student decisions made between enrollment and graduation, remain largely unexplored. A major shortcoming of the existing literature is its relevance for today. The majority of studies are based upon data collected from older cohorts of students, such as those from NLS72. Therefore, there is a lack of information on patterns of higher education attainment for African-Americans who have graduated from high school and attended HBCUs since the seventies.

Another facet of the persistence and HBCU literature that has received limited attention is the role of financial aid in the educational decisions and attainment of African-American college students. Given that over two-thirds of African-American college students receive some type of financial aid it seems apparent that aid is a major factor in the college decisions of this group, and is a topic worthy of further examination. The numbers of studies that examine the relationship between financial aid and persistence outcomes have begun to increase in recent years, and the following is a review of some of the results.

Bettinger (2004) examines the effect of Pell grants on student persistence after the first year for students in Ohio public colleges using a multi-stage investment model that accounts for the effects of the level of aid, as well as the students' personal and academic characteristics on the decision to persist. Using both panel and cross sectional identification strategies he concludes that student dropout behavior is inversely related to the amount of Pell grant dollars received.

Wetzel, O'Toole and Peterson (1999) examine the effect of changes in financial aid for freshman and sophomore students at Virginia Commonwealth University from 1989-1992[6]. They conclude that increases in real net cost (tuition minus grants) and real tuition reduce the likelihood of retention. After estimating the effect of financial aid on persistence separately for African-American and White students at VCU, they report that both groups respond negatively to increases in real net costs and real tuition. For VCU students of all races, the impact of financial variables pale in comparison to that of academic and social integration variables.

Singell (2004) employs University of Oregon data on fall term freshmen applicants for the 1997-98 and 1998-99 academic years to jointly estimate enrollment and retention decisions using a bivariate probit model with sample selection. In addition to personal and high school attributes of the students, Singell also controls for the amount of financial aid students receive in the form of grants, subsidized and unsubsidized loans, and scholarships. He finds that the more need-based financial aid students receive, the more likely they are to graduate.

DesJardins, Ahlburg and McCall (1999) use a discrete time hazard model, fitted to institutional data from the University of Minnesota for 1986 to 1993 to examine three forms of student departure – stopout, dropout, and graduation. In a second paper, DesJardins, et al (2001) use the empirical results of their hazard model to simulate the effects of different aid

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[6]VCU is a large (22,000) urban public university with a high proportion of working and part-time students, as well as substantial numbers of older and minority students.

packages[7] on student attrition over time. They conclude that different types of aid do in fact have different effects on student departure behavior. Grant aid was the only form that did not significantly affect stopout or dropout behavior, despite being the second largest source of federal aid for college.

3. Data

This analysis is based on data for three cohorts of students. The first cohort consists of those who began their postsecondary education in the fall of 1995, the second consists of those who began in the fall of 1982, and the third consists of those who began in the fall of 1980.

Data for the 1995 cohort are taken from the restricted use files of the Beginning Postsecondary Students (BPS) Longitudinal Study which was implemented by the National Center of Educational Statistics (NCES) to complement its other longitudinal studies of high school cohorts and improve nationally representative data on participants in postsecondary education. BPS cohorts are drawn from the National Postsecondary Student Aid Study (NPSAS), a program that collects financial aid and other data on nationally representative cross-sectional samples of all students in postsecondary institutions in the 50 states, the District of Columbia, and Puerto Rico. NPSAS provides the baseline data for first-time beginning postsecondary students, and BPS follows these students at 2-3 year intervals for at least six years.

Data for both the 1982 and 1980 cohorts are taken from the High School and Beyond (HSB) Survey, also implemented by NCES. HSB tracks students from the time they were sophomores or seniors in high school gathering information on behavior and experiences in

[7]The aid variables (loans, scholarships, grants, work study earnings, and earnings as a non-work study student employee on campus) represent aid offered versus aid received in order to minimize the problem of endogeneity that arises because receipt of aid is conditional upon reenrollment.

high school, transitions through postsecondary education, employment, and family formation. The cohort that began college in 1982 consists primarily of students from the sophomore cohort of HSB, as well as those from the senior cohort of HSB who didn't enter college until 1982. The cohort that began college in 1980 consists entirely of students from the senior cohort of HSB. Both cohorts of students were initially interviewed in 1980, and three follow-up surveys were conducted at two year intervals up to 1986.

From the 1995-96 BPS cohort I draw a sample of 469 African-American students between the ages of 17 and 21 who enrolled for the first time at a four-year postsecondary institution at the start of the 1995 fall semester, and participated in all three waves of the survey (NPSAS 95/96, BPS 98, and BPS 2001). Within this sample, 146 of the students attended one of fifteen HBCUs[8].

Combining both the sophomore and senior cohorts from HSB I obtain a sample of 816 African-American students, also between the ages of 17 and 21, who began their postsecondary education at a four-year institution in the fall of 1982 or the fall of 1980, and participated in all four waves of the HSB survey. In this sample, 244 of the students attended one of sixty-six HBCUs.

The bulk of my analysis will be based upon data from the BPS cohort because the level of detail available in this data set allows me to estimate more specifications of the model. For instance, data on financial aid, SAT scores, term by term enrollment history, and home state identifiers are not available in the public-use HSB data. Therefore, data from the HSB cohorts, which offer a larger sample size, will serve primarily to test the robustness of the base model estimates obtained from the smaller BPS sample. I will be using these data to

[8] While this is a small sample size, the nature of the population and question being analyzed automatically limits the number of observations available from nationally representative samples. Ehrenberg & Rothstein (1994) only had a sample size of 638, with 298 coming from HBCUs.

address four basic questions about HBCU attendance and college outcomes of African-American students.

1) Compared to their counterparts at TWIs, are African-American students who attend HBCUs more likely to experience an interruption in enrollment before the completion of a degree?
2) How do individual and institutional characteristics affect the persistence behavior of African-American students?
3) Are African-American students at HBCUs more likely to graduate within six years than those at TWIs?
4) Are African-American students who initially enroll at HBCUs more likely to return to the college they withdrew from than those at TWIs?

The next section describes the model of persistence used to investigate these questions.

4. Empirical Model and Methodology

Unlike previous studies of HBCU attendance, the model of persistence used in this study incorporates duration dependence. Human capital theory proposes that the decision to enroll in college is similar to an investment decision in which one chooses to make the investment only if the present discounted value (PDV) of the benefits outweigh the PDV of the costs. As an extension of this idea, the decision to persist or continue enrollment represents a multi-period investment in which the decision to continue enrollment in each subsequent semester is affected by the cumulative investment in time and resources, or duration of previous enrollment. In order to model such a multi-period investment decision I adopt Cox's popular proportional hazard model. The hazard function, h(t), is defined as

$$\mathbf{H(t) = h_0(t)e^{\beta' X(t)}} \tag{1}$$

where t is the duration variable, $h_0(t)$ is the baseline hazard at time t, X is the vector of explanatory variables, both constant and time-varying, and β is the vector of coefficients to be estimated. Though the underlying persistence process is defined in continuous time (a student may decide to leave at any point in time), durations in the data are measured by academic terms or semesters. Therefore, it is necessary to implement the discrete time equivalent of Cox's model, called the complementary log-log (cloglog) model[9]. Since enrollment is determined at the beginning of the term, when t terms are observed, the actual duration interval is [t, t + 1) terms. Failure to enroll in term t, given enrollment in all previous terms will be called a stopout. In a single event framework such as this one, I will be estimating, more specifically, the probability of a *first* stopout[10] in any given fall or spring term. The probability of a first stopout in interval [t, t+1) is defined as

$$\mathbf{P(t \le T < t + 1 | T \ge t) = 1 - \exp[-\exp(\beta' X(t) + \gamma(t))]} \tag{2}$$

where the γ(t) are the logarithm of the integrated baseline hazard pieces, $\log(\int_t^{t+1} h(u)du)$, summarizing the pattern of duration dependence in the interval hazard. The probability of enrollment for exactly t terms is then given by

$$\mathbf{P(t \le T < t + 1) = P(t \le T < t + 1 | T \ge t) \times P(T \ge t)} \tag{3}$$

where

[9]Discrete time hazard models can also be estimated using logistic regression analysis. The clolog and logit links are extremely similar for event probabilities less that 50 percent. For comparison, logit estimates are presented in Appendix E.

[10]A stopout is not synonymous with a dropout. However, only twenty-one percent of students in the sample later return to the school where they began their postsecondary education (within the four years being observed) after experiencing the first stopout.

$$\mathbf{P(T \geq t) = \prod_{s=0}^{t-1} [1 - P(s \leq T < s + 1 | T \geq s)]} \tag{4}$$

is the probability of enrollment in all terms prior to term t. For a sample of N individuals labelled i = 1,…, N, each with an observed duration of t_i terms and censoring indicator c_i, with $c_i = 1$ for a stopout and $c_i = 0$ for a censored observation (no stopout), the sample likelihood is given by

$$\mathbf{L = \prod_{i=1}^{N} \{[P(t_i \leq T \leq t_i + 1 | T \geq t_i)]^{c_i} \times [P(T \geq t_i)]\}} \tag{5}$$

$$\mathbf{L = \prod_{i=1}^{N} \{ [1 - \exp[-\exp(\beta' X_i(t_i) + \gamma(t_i))]]^{c_i} \times \prod_{s=0}^{t_i-1} [\exp[-\exp(\beta' X_i(s) + \gamma(s))]]\}.} \tag{6}$$

The baseline hazard is left unspecified and the likelihood function is estimated using a semi-parametric estimation procedure similar to that used by Meyer (1986). By doing so, I am able to simultaneously estimate β and the γ( )'s. This approach prevents inconsistent estimation of β due to a misspecified baseline hazard and provides a flexible (nonparametric) estimate of the baseline hazard.

In addition to the proportional hazard model described above, I also specify the decision to leave college in each term using linear and nonlinear (probit) discrete time, discrete choice panel data models. For the panel data linear probability and probit models, the probability of first stopout is specified by equations (7) and (8) respectively.

$$\mathbf{P(t \leq T < t + 1 | T \geq t) = \beta' X_i(t) + \gamma(t)} \tag{7}$$

$$\mathbf{P(t \leq T < t + 1 | T \geq t) = \Phi(\beta' X_i(t) + \gamma(t))} \tag{8}$$

The corresponding likelihood function is

$$\mathbf{L} = \prod_{i=1}^{N} \prod_{s=0}^{ti} \{ [1 - P(s \le T < s+1|T \geq s)]^{1-dis} \times P(s \le T < s+1|T \geq s)^{dis}\}, \tag{9}$$

where $d_{is} = 0$ if s<t, and $d_{is} = c_i$ if s=t. These alternative specifications are estimated in order to test the robustness of the proportional hazard estimates.

In order to estimate each of these models, the data set was converted from its original format, containing one row of data per person, into one in which each person contributes t_i rows, where t_i is the number of time periods (e.g. terms) person *i* was at risk of stopout. Term t = 0 corresponds to the fall 1995 semester. Each subsequent term, t = 1, 2,…,7, represents the first, second,…, and seventh semester (excluding summer terms) after fall 1995, up to the spring 1999 semester, at which point the data is right-censored[11]. If person *i* never experiences a stopout within the observed period of analysis, the binary dependent variable d_{is}=0 for all of person *i*'s spell terms (s=1,…,t_i). If a stopout is observed for person *i*, the binary dependent variable d_{is}=0 for all but the last of person *i*'s spell terms (s=1,..., t_i–1) and d_{it}=1 for the last term (s=t_i). Expanding the data set in this way results in as many as 2,590 observed person-term records for the 469 individuals in the sample. Dummy variables for each term of enrollment are included in the equation for non-parametric estimation of the baseline hazard in each interval.

The choice of variables used to explain the stopout process is motivated by the two dominant theories of college persistence within the higher education literature -- the Student Integration Model (Spady, 1970, 1971; Tinto, 1975, 1982, 1988, 1993), and the Student Attrition Model (Bean, 1980, 1982, 1983; Price, 1977). The Student Integration Model proposes that a student's academic and institutional commitments are a reflection of how

[11]Although data for this cohort of BPS are actually collected through the 2001 spring semester, the tuition data are missing for fall 1999 and spring 2000 (terms 9 and 10). Therefore, I am only able to estimate the full model using pre- fall 1999 observations.

well individual motivations and academic ability match the institution's academic and social characteristics. The Student Attrition Model, on the other hand, places more emphasis on a student's intention to remain enrolled or depart from college, as influenced largely by factors external to the institution, such as family background as well as peer and parental influences. While each theory proposes a different set of variables through which the persistence decision is influenced, Cabrera et al (1992) have found that there is considerable overlap in the two models and that a more complete model would incorporate features from both (Cabrera et al, 1993). Such an approach is used in this analysis.

The decision about whether to stopout in any given term is modelled as a function of individual characteristics, family background, high school academic performance, the opportunity cost of continued college enrollment as measured by local labor market conditions, and a binary variable indicating HBCU status (1 = HBCU, 0 = TWI). Individual and family background variables include gender (1 = male, 0 = female), family income, whether the student is from a single parent or broken home[12], a series of dummy variables representing parent's highest level of education. Family income and parental education have been found to have significant effects on college attedance decisions. They are included in this model to test whether they also have significant effects in the decision to persist.

High school academic performance is measured using SAT scores and cumulative high school grade point average. High school academic performance provides a measure of academic preparation for college. High school grades are coded as categorical variables in the data set and will be included in the persistence equation as dummy variables.

[12]These are students whose parents reported on their financial aid application that they were either divorced, separated or never married.

Average weekly earnings for the manufacturing industry and unemployment rates for the student's home state are included as measures of the opportunity cost of college enrollment in each term. One of the benefits of the proportional hazard model is that it allows for the use of time-varying variables. While the pre-college variables are fixed for the duration of the analysis at their 1995-96 values, unemployment rates, and average weekly earnings are allowed to vary with time and are updated each year.

The baseline specification of this model assumes that there are no unobserved factors (whether unobservable or unavailable in the data) that affect persistence, and that HBCU attendance is exogenous. There are two potential problems with this specification of the model. First, ignoring the presence of unobserved heterogeneity will generally lead to biased coefficient estimates. Second, HBCU attendance is likely to be endogenous with respect to subsequent college going behavior. I will address the former by modeling individual time-invariant random effects, and I control for the potential endogeneity of HBCU attendance by using an instrumental variable approach.

I begin by estimating each of the specifications described above, controlling only for exogenous pre-college characteristics. This allows me to estimate overall differences in persistence between HBCU and TWI students based upon individual background characteristics at the time of initial enrollment. I then seek to decompose the effect of attending an HBCU by controlling for differences in various institutional characteristics, financial aid, and social and academic factors at the individual and institutional level.

The variables used to control for institutional characteristics include a binary variable indicating whether the school is public or private (1 = public, 0 = private), along with variables for the amount of annual tuition, student-teacher ratios[13], and financial aid received by the student in the form of grants during their first year in college. Tuition and student-teacher ratios are allowed to vary annually. Student-teacher ratios are used as a proxy for access to faculty, or opportunity to establish relationships with faculty. I measure the effect of financial aid by controlling specifically for grants because they represent an unconditional discount to the cost of education as the only form of financial aid that neither has to be repaid (like loans), nor earned in exchange for some service (like work-study or an assistantship). This is why much of the financial aid literature refers to the difference between tuition and grants as net cost of education.

One way in which I attempt to control for the social environment of the campus is by including the student's freshman year place of residence. I use this variable because students who live on campus may have more opportunities to develop social networks and support systems. However, since individual decisions, such as where to live while attending school, could be potentially endogenous with respect to future enrollment decisions, the campus level variable, percentage of the student body living on campus, is used as an alternative measure. The racial composition of the student and faculty bodies are also used as measures of how socially "friendly" the campus environment is for African-American students, especially on predominantly white campuses.

I control for the academic environment of the campus using two alternative measures of the academic competitiveness of the institution. The first variable is a dummy variable indicating whether the institution is in the lowest test score tier as determined by the 25th percentile of SAT I scores for the freshman class. This corresponds to a score of less than

[13]The student-teacher ratio was estimated by dividing the 12-month undergraduate unduplicated head count by the number of full-time faculty, as reported in IPEDS.

1000. The other measure is a rating of the level of selectivity in the school's admissions process. To control for this I use a single dummy variable indicating whether the school was rated in the range of "very" to "most" selective"[14]. The percentage of on campus students, and the admissions process rating were obtained from *Barron's Profiles of American Colleges* (1997). Information used to compose the racial composition variables was obtained from the IPEDS database[15], and the test score tier variable was available in the BPS data set.

5. Results for BPS Cohort

Summary Statistics

Sample means are presented in Table 1.1. While the focus of this study is African-American college students, sample means for white college students are reported in column 1 in order to provide a broader context for comparison and perhaps offer some insight into what factors may contribute to college completion gaps between white and African-American students. Variable means for the total African-American student sample are presented in column 2, and for the subsamples of TWI and HBCU students in columns 3 and 4 respectively.

Over 65 percent of the sample is female, reflecting higher college attendance rates for African-American females than for males. On average, TWI students came from families with higher income, and were more likely to live in a household with both parents.

In terms of academic preparation , students who opted to attend a TWI scored an average of seventy points higher on the SAT than their HBCU counterparts[16]. TWI students

[14]This corresponds to schools who admit students in the top 50% of their high school class or higher, have no less than a B- high school grade average, admit fewer than half of all applicants, and colleges whose median freshman SAT score is above 525.

[15]The racial composition variables were derived by dividing the number of full-time black faculty (or students) by the total number of full-time faculty (or students).

were also about twice as likely to report high school grades in the A to A- (100 to 90) range than were their HBCU counterparts[17]. These statistics seem to support the idea that HBCUs provide opportunities for a college education to African-American students whose academic background may limit their access to mainstream institutions, as HBCUs in general tend to have more flexible admission policies.

Overall, African-American students at both types of institutions appear very similar demographically; however, differences between white and African-American college students are more distinct. For example, the average family income of white college students was $25,000 higher than that of the African-American college students. This is reflected in the fact that white students were also more likely to come from two-parent households and to have college educated parents. In terms of pre-college academic indicators, the average SAT scores of white students were about 200 points higher than those of African-American students, and they were twice as likely to report an A to A- high school grade average than their African-American counterparts. However, despite family background and pre-college academic differences between white and African-American students, the differences in reported college GPA are not as great as one might expect.

Regarding institutional characteristics, first year living arrangements for all students, regardless of race or institution type, were very similar as were student-teacher ratios;

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[16]I assume students without a reported SAT score did not take the exam. For estimation purposes, the missing values are recoded as zeros, and a dummy variable is created to indicate whether the student took the SAT. The means reported in Table 1; however, are based on the non-zero values only.

[17]Both the high school and college GPA are self-reported by the student. The high school GPA is based on the student's reported GPA on his or her most recent SAT questionnaire. Those with a missing SAT score were also missing high school GPA, so I created a "missing" dummy variable for those individuals. The college GPA for the first year was based on institutional records when available, but was supplemented by self-reported grades for year one as well as for each subsequent follow-up interview.

however, African-American students at TWIs were more likely to be attending in-state public institutions as those at HBCUs.

The data also reveal that on average HBCU students paid the lowest tuition rates (both in- and out-of-state), and that over two-thirds of all African-American students in the sample were recipients of some type of need-based scholarship or grant aid, compared to only half of all white students.

Figure 1.1 provides a graphical comparison of raw persistence rates by semester for white students and African-American students at HBCUs and TWIs, as represented by the survivor function. The survivor function measures the joint probability that stopout did not occur in any of the previous terms. Though differences in persistence between the three groups of students are small, on average white students had the highest rate of persistence, meaning they were the least likely to stopout, followed by African-American students at TWIs, and those at HBCUs. For all students, persistence declines most sharply between term 1 and term 2. After term 3 however, the rate of change in persistence between any two terms is similar for all groups.

Table 1.2 shows that the average probability of stopout for African-American students attending HBCUs is 1.2 – 1.4 percentage points higher than for African-American students attending TWIs. This difference however is not statistically different from zero. The estimates in Table 1.2, as well as all subsequent tables represent marginal effects calculated at the means of the independent variables.

Persistence Model with Exogenous School Type

Table 1.3 presents marginal effects for the semiparametric proportional hazard (SPH), panel data linear probability (PDLP) and probit models (PDP) under the assumption of exogenous school type, with controls for pre-college covariates only. The marginal effect of HBCU attendance on the probability of a stopout indicates that holding family background and high school academic performance constant, those who attend an HBCU have only a 0.3 to 0.5 higher probability of stopping out. Though not statistically different from zero, the estimated effect is robust across each specification of the model, suggesting that the estimates are not merely the result of a particular distributional assumption[18].

The estimated marginal effects for the semester dummies suggest that students are most likely to stop out between the spring of the current academic year and the fall of the next academic year. Relative to all students who entered college for the fall of 1995, the probability of a stopout for those who were enrolled for the spring 1996 semester was 7.4 to 9.2 percentage points higher. This implies that most students who stop out are deciding not to reenroll for a new academic year (which begins in the fall). Though not very pronounced, there is some evidence of a negative pattern of duration dependence. In other words, the probability of a stopout at any point in time decreases the longer a student has been enrolled.

Family background also has significant effects on persistence. Students from single parent or broken homes were 2.6 to 3.5 percentage points more likely to stopout. The estimates further suggest that controlling for the presence of both parents in the home, the father's level of education has significant effects on persistence in the SPH and PDP models.

[18]Estimating OLS in a binary dependent variable framework is sometimes problematic because the predicted probabilities are not restricted to the [0, 1] interval. Probit solves this problem, but follows a distribution that is still symmetric about zero. The cloglog model is derived from the assumption that the error distribution follows a standard extreme value distribution, which is skewed to the right (Powers and Xie, 2000).

The probability of stopout for those whose fathers had at least a bachelor's degree was 3.6 to 4.9 percentage points lower than for children of high school dropouts, implying that college educated African-American fathers significantly influence the decisions of their children to remain enrolled. This estimate was statistically significant at the 5% level. There was no statiscial difference in the effect of mothers's education regardless of the level of attainment. Holding all other characteristics constant, students in the lowest income category (less than $16,100) were 2.5 to 2.9 percentage points less likely to stop out in any given term than those with family income above $53,750.

By far, the probability of stopout is most strongly affected by academic preparation. Compared to students with a cumulative high school grade average of 85 – 100 (A to B), the probability of stopout for students with a 75 – 84 (B- to C) high school grade average is 4.3 to 5.7 percentage points higher. The difference is nearly twice that for students with less than a C high school grade average (10.9 to 12.0). Higher SAT scores are also inversely related to the likelihood of stopping out. A 200 point difference in the SAT scores of otherwise similar students is associated with as much as a 2.2 percentage point difference in the probability of stopout. Overall, the estimates from the three models are qualatatively very similar.

Persistence Model With Tests for Unobserved Heterogeneity, and Endogenous HBCU Attendance

In order to test whether the estimates are biased by unobserved heterogeneity, I model individual time-invariant random effects for each specification as well. The baseline model of persistence implicitly assumes that the persistence decision is fully explained by the explanatory variables included in the model. Consider the existence of some unobserved, individual specific factors (whether unobservable or unavailable in the data) affecting persistence that can be summarized by the random variable, v, with density function f(v).

Assuming v is normally distributed independently of X and t, the likelihood function for the semi-parametric PH model is

$$\mathbf{L} = \prod_{i=1}^{N} \int \{[1 - \exp[-\exp(\beta'X(t_i) + \gamma(t_i) + v)]]^{c}\mathbf{i} \times \prod_{s=0}^{ti-1} [\exp[-\exp(\beta'X(s) + \gamma(s) + v)]]\}df(v). \qquad \mathbf{(9)}$$

Similarly, the likelihood functions for the panel data probit and linear probability models respectively are shown in equations (12) and (13).

$$\mathbf{L} = \prod_{i=1}^{N} \int \prod_{s=0}^{t} \{[1 - \Phi(\beta'X(s) + \gamma(s) + v)]^{1\text{-}dis} \times [\Phi(\beta'X(s) + \gamma(s) + v)]^{dis}\}df(v) \qquad \mathbf{(10)}$$

$$\mathbf{L} = \prod_{i=1}^{N} \int \prod_{s=0}^{t} \{ [1 - (\beta'X(s) + \gamma(s) + v)]^{1\text{-}dia} \times (\beta'X(s) + \gamma(s) + v)^{dis}\}df(v) \qquad \mathbf{(11)}$$

Integrating the likelihood function with respect to v allows me to "integrate out" the unobserved effect by estimating the parameters that characterize the assumed distribution. If v is normally distributed, the integrals in (12) and (13) can be evaluated using Gaussian-quadrature methods.

The estimates in Table 1.4 were obtained after re-estimating the persistence model using these random effects to control for unobserved differences between observations. Comparison of these marginal effects with those in Table 1.3 (without random effects) reveals some difference in the estimated marginal effects of some of the explanatory variables and in the log likelihood. In particular, the estimates of the term dummies under the random effects specification indicate that the average probability of stopping out actually increases through the third year. This result is consistent with Wooldridge (2001), who argues that in practice, duration dependence and unobserved heterogeneity cannot be separately identified in single spell hazard models. Despite changes in the magnitude of other estimates, the estimated effect of HBCU attendance remains relatively unchanged and statistically insignificant. Though the general implications of changes in variables such as home environment, SAT scores and high school grades remain the same, the random effects model provides consistent (unbiased) estimates. The random error variances for the SPH and PDP models are 3.18 and 0.78, respectively. The PDLP model estimated a zero random error variance[19].

Alternatively, I also considered the case where v in the proportional hazard model had either a gamma distribution or a discrete multinomial distribution[20]. The corresponding coefficient estimates and likelihood functions for the gamma and discrete multinomial distributions are found in appendix B.

Next, I address the possible endogeneity of HBCU attendance by using an IV approach. The decision to attend (or not to attend) an HBCU is likely to be determined by some of the same factors that also affect subsequent persistence behavior. The purpose of using an IV approach is to isolate the effect of the exogenous component of attending an HBCU from other variables affecting both HBCU attendance and persistence. I first estimate a two-stage model in which I estimate the probability of HBCU attendance using appropriate instruments and exogenous variables, and then use this predicted probability in my SPH, PDLP and PDP equations[21]. The instruments used to predict HBCU attendance were the

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[19]The **xtreg** command used to estimate the random effects linear model typically reports zero heterogeneity standard deviations when there is limited variation in the values of the dependent variables (in this case they're just 0 or 1). Therefore, the nonlinear models are more likely to detect unobserved heterogeneity with a binary dependent variable.

[20]In the case of a gamma distribution, the integral in equation (11) has a closed form solution (Lancaster, 1979). For the discrete multinomial distribution, the integral is replaced by a simple sum over the discrete mass points of the distribution of v.

[21]I also tested the exogenous HBCU attendance assumption using the two-stage IV approach developed by Blundell and Smith (1986) and Blundell and Powell (2003). This approach involves including the residuals

number of HBCUs in the student's home state[22] (as well as the quadratic and cubic forms of this variable).

The results of the stage one regression, found in Table 1.5.A, show that students who come from states with more HBCUs, as well as students from single parent or broken homes, those whose mothers are more highly educated, and those with lower SAT scores are more likely to attend HBCUs. While the existence of one more HBCU in a student's home state increases the probability that a student will attend an HBCU by 22 percentage points, this probability does not increase linearly. I also suspect that the large positive effect of mothers who attended college (24.7 to 34.8) is somewhat of a "legacy effect" as the parents of those attending college in the nineties would have been college students in the 1960s before integration became widespread. As a result, many of these mothers could have attended HBCUs and may encourage their children to do so as well.

Table 1.5.B presents the probability of first stopout results using the predicted probability of HBCU attendance from stage one. After controlling for the endogeneity of HBCU attendance in this manner, the sign of the HBCU coefficient becomes negative. While the magnitude of the effect of HBCU attendance is different from that estimated under the assumption of exogenous HBCU attendance, the estimate is still statistically insignificant. The marginal effects of other significant factors including, parent's marital status, father's education, high school grades and SAT score, are qualitatively similar to those presented in Tables 1.3 and 1.4.

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from the stage one regression in the second stage regression as an additional control variable. The marginal effects obtained using this approach are essentially identical to those from the modified IV approach described above and can be found in Appendix C.

[22]I also attempted to use distance to the nearest HBCU as an instrument. Distance can be calculated using zip codes; however, this data was missing for more than one-third of the sample.

By using this two-stage approach I am able to “manually” control for the potential endogeneity of HBCU attendance in each of the model specifications (SPH, PDLP and PDP); however, even if the estimated coefficients are consistent, the standard errors may be incorrect. The easiest way to do this is to estimate the traditional linear IV model in which a small correction is made to the sum of squared residuals in the second stage in order to correctly compute the standard errors. I also estimate a nonlinear IV probit model[23]. The estimates of this model in column (1) of Table 1.6.A indicate that the difference in the marginal effects and standard errors are negligible. Column (2) presents the linear IV estimates with “corrected” standard errors. In this case the estimated marginal effects and standard errors are the same as those computed in Table 1.5.B. Given the similarity in estimates, for the remainder of the analysis I will use the linear IV model to further explore channels through which African-American persistence rates at HBCUs may differ from those at TWIs. The linear IV model is preferred to the probit IV model because it is computationally more efficient at estimating interactions of HBCU attendance with other covariates[24]. Heckman and Macurdy (1985) present a linear two-stage least squares model as a computationally tractable, easily interpretable linear simultaneous equations model for dummy endogenous variables.

The absence of any significant overall HBCU effect thus far led me to further test for significant differences in the effect of HBCU attendance by test scores, gender and family income. According to the estimates in columns (3) -- (6), I conclude that the effect of

[23]The **ivprobit** command is used in STATA to estimate a probit model with endogenous regressors. However, only the second stage is estimated using a probit model. The first stage is still estimated by a linear probability model.

[24]Attempts to estimate the probit IV model with interaction terms were unsuccessful as the maximization process failed to converge.

attending an HBCU does not differ statistically for students with below average SAT scores (less than 700), nor by gender or socioeconomic status.

Based upon the previously reported sample means, the individual and background characteristics of African-American college students in this sample are quite similar, even across intitution type (i.e. HBCU or TWI). Therefore, differences in their individual and background characteristics may not be large enough to drive large differences in persistence rates. In the next section I test whether differences in institutional characteristics, financial aid, and college social and academic environments contribute to differences in persistence between HBCU and TWI students.

Persistence Model with Institutional Characteristics & Financial Aid

Even with additional controls for institutional characteristics and financial aid, the overall effect of attending an HBCU remains small and relatively stable. As shown in column (1) of Table 1.6.B, adding controls for tuition, whether the institution is public or private, and the student-faculty ratio has a very negligible effect on the relative effect of HBCU attendance in the stopout equation. However, the inclusion of these additional variables also reveals that increasing the student-faculty ratio by a factor of ten increases the likelihood that a student stops out in any given term by 2.6 percentage points, suggesting that students with more opportunities for access to faculty are less likely to withdraw from school.

Next, knowing that all HBCUs are not created equally, I test alternative classifications of HBCUs to determine whether students attending particular types of HBCUs are more or less likely to stopout than others. In column (2) I distinguish between public and private HBCUs, in column (3) I add a dummy variable for United Negro College Fund

(UNCF) member schools[25], and in column (4) I distinguish between competitive and non-competitive HBCUs. "Competitive" HBCUs are those institutions classified as Research I and II, Baccalaureate I, and private not-for-profit Doctoral I and II universities[26].

When the distinction between public and private HBCUs is made in column (2) African-American students who attend private HBCUs have a 1.2 lower probability of stopping out than those at private TWIs, those at public HBCUs are 0.4 percentage points more likely to stopout, and students at public TWIs are 3.6 percentage points less likely to stopout. However, there is still no statiscal difference in persistence for those at HBCUs and TWIs, public or private. Including a dummy variable indicating which private HBCUs are UNCF member institutions reveals that students at UNCF institutions are less likely to stopout than those at other private institutions; however, this difference also fails to be statistically different from zero. Finally, the likelihood of stopping out is roughly five percentage points higher for students attending a competitive HBCU compared to those attending non-competitive HBCUs, yet this difference also is not statistically significant.

In columns (5) and (6) I examine the role of racial composition of the student and faculty bodies in the decision to stopout. The inclusion of these variables results in little change in the overall effect of attending an HBCU, and the estimated marginal effect of a one

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[25]There are seven UNCF member schools in the sample.

[26]The selectivity index included in the BPS database classifies institutions as "very selective" if the 25th percentile of SAT scores of incoming freshman exceeded 1000. "Selective institutions are Research I and II, Baccalaureate I, and private not-for-profit Doctoral I and II universities that did not meet the "very selective" criteria. Since none of the HBCUs in the database met the criteria for "very selective", I combined the "very selective" and "selective" categories into a single category labeled competitive for the purpose of my analysis. I opted to label them as competitive and non-competitive because these labels seemed more intuitive in light of the fact that the criteria used to classify institutions identifies them more in terms of their ability to compete for similar types of students. Three HBCUs in the sample met the competitive criteria.

percentage point increase in the share of black faculty or students on the chance that a student will stop out in any term is statistically zero.

In Table 1.6.C, the effects of various individual- and institution-level controls for financial aid and social and academic environment are presented. The inclusion of these additional variables has little effect on the estimated effect of HBCU attendance. The effect of financial aid on African-American college student persistence is measured using the amount of grant dollars a student received their freshman year. As indicated in column(1), the likelihood of a stopout decreases 0.8 and 1.6 percentage points per $2,000 increase in need-based and non-need-based grants respectively. After testing for the joint significance and equivalence of the estimated effects of need- and non-need- based grants, I conclude that the marginal effects are jointly significant and statistically equivalent. In column (2), I tested whether the source of the grant (ie. from the institution or an outside source) made a difference in it's effect on stopout behavior. The results indicate that students were also indifferent regarding the source of the grant.

Recognizing the endogeneity inherent in using individual grant dollars received as a measure of the effect of financial aid, I also use the institution-level variable, average freshman grant dollars awarded, as an alternative measure. In column (5) the marginal effect of an additional $1,000 in average grant funds had no effect on the probability of stopping out. The loss of observations due to missing values for several institutions may have some effect on the magnitude and reliability of this estimate. The effect of attending an HBCU attendance remained unchanged.

In column (3) I add individual-level controls for the student's first year place of residence as a measure of their potential to bond with other students and become socially integrated into the campus during the critical first year. Again, this variable is likely to be endogenous, so the percentage of students residing on campus is used in column (5) as an alternative institution-level control. Neither variable had a significant effect on stopout behavior.

Finally, in columns (6) and (7) I use SAT score tier and admissions selectivity to control for the academic environment of the institution, and conclude that neither of these characteristics statistically changed the likelihood that a student would stop out before the fourth year in college. Again the use of these aggregate variables further limits the sample size, and the ability to estimate significant effects relative to these institutional characteristics. None of these additional characteristics changed the estimated effect of attending an HBCU.

<u>Six-Year Graduation Rates</u>

Finally, after observing no significant differences between HBCU and TWI students in the likelihood of experiencing a stopout in each semester within the first four years of college, I tested whether there were significant differences in the probability of attaining a bachelor's degree within six years. Assuming exogenous HBCU attendance and controlling only for pre-college characteristics I estimated both a probit and linear probability model. Under this specification of the model, the probability that a student who entered college in the fall of 1995 would obtain a bachelor's degree within six years was 2.5 percentage points lower for HBCU students. As controlling for the endogeneity of HBCU attendance was shown to change the sign of the marginal effect in the peristence model, I re-estimated the probability of degree attainment model using the IV approach. Again the sign on HBCU attendance was reversed, and those at HBCUs were found to have a 16.7 higher probability of graduating in six years, but the effect was imprecisely estimated. These estimates are presented in columns (1) – (3) of Table 1.7.A.

In columns (4) -- (7) I repeat the exercise of interacting HBCU attendance with SAT score, gender and family income. Just as there were no gender differences in stopout behavior, there are also no differences in the likelihood of graduating within six years between males and females at HBCUs and TWIs. Students who scored 700 or lower on the SAT were no more likely to complete a degree within six years at an HBCU than at a TWI. However, the estimates in column (6) suggest that graduation outcomes do vary by income for African-American students at TWIs. Students in the lowest income quartile, as well as those in the second highest income quartile are more likely to graduate than those in the highest income quartile by at least 35 percentage points.

Academic performance seems to be the strongest determinant of college completion. For example, the probability of graduating within six years increases by 6.5 – 6.8 percentage points per 100 point difference in SAT score. Similarly, students who had a B to C (75 to 84) high school grade average were as much as 23.6 percentage points less likely to graduate within six years than those with an A or B (85 to 100) high school grade average.

When the distinctions between public and private HBCUs, UNCF member schools and competitive HBCUs are made in columns (2) – (4) of Table 1.7.B, none of the marginal effects for these various classifications of HBCUs have statistically significant effects on the probability of attaining a bachelor's degree within six years.

In Table 1.7.C I control for financial aid, social and academic environment in the graduation equation using individual- and institution-level variables, and obtain results similar to those obtained from the stopout equation.

6. Extension of Analysis with High School and Beyond Data

The BPS sample includes a total of 165 four-year institutions with only 15 (7 private and 8 public) of the total 105 HBCUs represented. Therefore, I sought to extend the analysis by also testing the model on a larger sample of students, as the estimates from the BPS sample could say more about the particular students and schools represented than about the broader HBCU population as a whole. While any sample of African-American college students taken from a nationally representative data set will naturally be of limited size, by combining data from the sophomore and senior cohorts of High School and Beyond (HSB) I was able to obtain a sample of 816 students who began college in 1980 or 1982. This sample includes a total of 364 four-year institutions, and 66 HBCUs are represented.

While HSB does not provide the detailed information on enrollment history, college characteristics, SAT scores, state identifiers, and financial aid (at least in the public use files), that would enable me to replicate the full analysis with this data set, I am able to estimate the total effect of HBCU attendance (assumed exogenous) on persistence and graduation probabilities using the pre-college variables available in both data sets. This means estimating the equations without SAT scores, recoding the family income variable from the BPS data to match the seven income categories used in the HSB data[27], and using labor market indicators for the state where the student attends school as opposed to the student's home state. In order to make the variables from the two data sets as similar as possible, I also had to create a term by term enrollment history for each of the students in the HSB sample. Enrollment data in HSB includes the month and year when a student began and ended their enrollment at each school attended. Beginning with all students who first

[27] In order to create corresponding income categories in the BPS sample I converted the lower and upper values for each income category in the HSB data into 1995 dollars, and created seven income categories based upon the corresponding parameters.

enrolled in a four-year postsecondary institution in either August or September (beginning of fall semester) of 1980 or 1982, I created a dichotomous enrollment variable which was coded as a 0 for each term up until the date they reported ending enrollment at that school, at which point the variable was assigned a value of 1 indicating a stopout.

Since information on the student's home state was not provided in the HSB data, the IV model, which uses the number of HBCUs in a student's home state as an instrument, could not be estimated. Therefore, the estimates reported in this portion of the analysis represent the overall effect of HBCU attendance (assumed exogenous) on stopout and graduation behavior for the two cohorts of students.

Table 1.8.A presents a comparison of estimates from the BPS and HSB samples for the probability of a first stopout. Columns (1) - (3) include estimates from the BPS cohort alone, columns (4) - (6) are from the HSB cohort alone, and columns (7) - (9) are from the pooled sample of both the BPS and HSB cohorts. Assuming exogenous HBCU attendance, and controlling for family background and high school grades, HBCU students in the BPS cohort were 1.2– 1.4 percentage points more likely to stop out than their counterparts at TWIs, compared to HBCU students in the HSB cohorts who acutally have a 0.5 to 0.8 low*er* probability of stopping out each term than their counterparts at TWIs. The effect of HBCU attendance is statistically insignificant for each sample individually, as well as for the pooled sample.

Family background, and high school grades are significant factors in determining the probability of a stop out for both the BPS and HSB cohorts. Estimates from the pooled sample suggest that students from single parent or broken homes were on average 2.1 to 2.8 percentage points more likely to stopout than those from two parent households, and the effect of having less than a C average made a student 4.8 to 5.5 percentage points more likely to stopout. While the magnitude of these effects are larger for the BPS cohort, these differences are not statistically significant.

On the other hand, there are differences between the BPS and HSB samples when it comes to the effect of family income, father's education, and the timing of stopout behavior. In the HSB sample, students from families with an annual income of $20,000 or more were 3.2 to 5.0 percentage points less likely to stopout than students from families earning less than $7,000 per year. The corresponding income effects were much smaller and statistically insignificant in the BPS sample.

Table 1.8.B presents a similar comparison of estimates from the BPS and HSB samples for the probability of completing a bachelor's degree within six years, assuming exogenous HBCU attendance. Since state identifiers were not available in the HSB data, I was unable to estimate the IV model for the probability of completing a degree within six years. Also, because of the length of panels available from each cohort in the HSB data, I was only able to estimate six-year graduation equations for those who began college in 1980. For the cohort of students who began college in 1980, the probability of attaining a bachelor's degree in six years was 13.0 to 14.5 percentage points *higher* for HBCU students. These estimates are significant at the 5% and 1% levels, respectively. For those beginning college in 1995, the probability of completing a bachelor's degree within six years was 7.2 to 7.7 percentage points *lower* for HBCU students than for TWI students, but these estimates were not statistically significant. Estimates from the pooled sample reveal that compared to students who attended HBCUs during the 1980s, those who attended during the 1990s were about 21 percentage points less likely to complete a degree within six years, indicating that

the average time to degree completion has increased over time. This difference was statistically significant also at the 1% level. However, while the estimates for the BPS and HSB differ for the graduation outcome, the HSB estimates are qualitatively similar to the IV estimates for the BPS sample in Table 1.7.

High school grades and father's education also had significant effects on the likelihood of graduating within six years that were consistent with the effects these variables had on stopout behavior. According to estimates from the pooled sample, having less than a C average (grade average of 74 to 60) in high school resulted in a 23.3 to 25.3 lower probability of graduating within six years. Having a father with a bachelor's degree or more also increased one's likelihood of graduating within six years by 16.1 to 18.5 percentage points. Sample means for the HSB sample are in Appendix D.

7. Analysis of Re-entry Decision

Thus far, event history analysis has been used to estimate the risk of experiencing a single event – stopping out of college. The results of this analysis reveal that African-American students who attended HBCUs were no more likely than their counterparts at TWIs to experience an interuption in their college enrollment. In this section, I use a multiple-spell event history model to simultaneously describe stopout and re-entry behavior. Specifically, I examine the probability of returning to the same institution for students who stop out of college.

Two spells are observed: (1) in college and (2) out of college. In spell one I estimate the probability of a stopout, while in spell two I estimate the probability of re-entry. The second spell (out of college) begins the semester the student fails to enroll, or immediately upon the occurrence of a stopout. Therefore, students who stop out of college experience both spells while only one spell (in college) is observed for those who never stopout. Since these spells represent two mutually exclusive events, the total sample of N individuals can be divided into two mutually exclusive subsamples. Subsample 1 includes the n_1 individuals who experience the first spell only, and subsample 2 consists of the n_2 individuals who experience both spells 1 and 2.

For the n_1 individuals in subsample 1, each with an observed duration of t_{i1} terms in spell 1 and censoring indicator c_{i1}, with $c_{i1} = 1$ for a stopout and $c_{i1} = 0$ for a censored observation (no stopout), the likelihood function in equation (6) can simply be rewritten as

$$\mathbf{L_1} = \prod_{i=1}^{n1} \left\{ [1 - \exp[-\exp(\beta' X_i(t_{i1}) + \gamma(t_{i1}))]]^{c_{i1}} \times \prod_{s1=0}^{t_{i1}-1} [\exp[-\exp(\beta' X_i(s_1) + \gamma(s_1))]] \right\}. \qquad (12)$$

Since entering the second spell is contingent upon experiencing a stopout in spell 1, the likelihood function for subsample 2 must account for the probability of experiencing this qualifying event, as well as the probability of re-entering college in spell 2. For the n_2 individuals in subsample 2, each with an observed duration of t_{i2} terms in spell 2 and censoring indicator c_{i2}, with $c_{i2} = 1$ for a re-entry and $c_{i2} = 0$ for a censored observation (no re-entry), the likelihood function can be written as

$$\mathbf{L_2} = \prod_{i=1}^{n2} \Bigg(\left\{ [1 - \exp[-\exp(\beta' X_i(t_{i1}) + \gamma(t_{i1}))]]^{ci1} \times \prod_{s1=0}^{t_{i1}-1} [\exp[-\exp(\beta' X_i(s_1) + \gamma(s_1))]] \right\} \times \left\{ [1 - \exp[-\exp(\beta' X_i(t_2) + \gamma(t_{i2}))]]^{ci2} \times \prod_{s2=0}^{t_{i2}-1} [\exp[-\exp(\beta' X_{i2}(s_2) + \gamma(s_2))]] \right\} \Bigg) \qquad (13)$$

where the value of c_{i1} must be one (indicating a stopout in spell 1) for all members of subsample 2. The total sample likelihood is the product, $\mathbf{L_1} \times \mathbf{L_2}$, representing the contributions of all individuals in both subsamples. Using J_i to represent the spell number of the last spell for which individual *i* was observed, the sample likelihood function for the two-spell model is

$$\mathbf{L} = \prod_{i=1}^{N} \prod_{j=1}^{J_i} \{ [1 - \exp[-\exp(\beta' X_i(t_{ij}) + \gamma(t_{ij}))]]^{c_{ij}} \times \prod_{s_j=0}^{t_{ij}-1} [\exp[-\exp(\beta' X_i(s_j) + \gamma(s_j))]] \}. \tag{14}$$

Analogously, equation (9) can be amended to represent the likelihood function for the panel data linear probability and probit specifications of the multiple-spell model yielding

$$\mathbf{L} = \prod_{i=1}^{N} \prod_{j=1}^{J_i} \prod_{s_j=0}^{t_{ij}} \{ [1-P(s_j \le T < s_j+1 | T \ge s_j)]^{1-d_{ijs}} \times P(s_j \le T < s_j+1 | T \ge s_j)^{d_{ijs}} \}, \tag{15}$$

where $d_{ijs} = 0$ if $s < t$, and $d_{ijs} = c_i$ if $s = t$. Again the probability of stopout (re-entry) for the linear probability and probit specificatons are given by equations (7) and (8).

Estimation of these models requires that the data be organized in such a way that each individual contributes one row of data for each term *in each spell* they are at risk of experiencing the event of interest. As many as seven terms of data are available to observe a first stopout during the first spell, and a maximum of six terms of data available in the second spell to observe a re-entry. Expanding the data set in this way results in as many as 3,325 person-spell-term records for the 469 individuals in the sample. Two-hundred twenty-eight of these individuals experienced both spells.

A spell indicator, *j*, distinguishes between terms spent in college (first spell, $j = 1$) and a terms spent out of college (second spell, $j = 2$). If person *i* never experiences a stopout (re-entry) within the observed period, *j*, the binary dependent variable $d_{ijs}=0$ for all of person *i*'s terms in that spell ($s_j=1,\ldots,t_i$). If a stopout (re-entry) is observed for person *i*, the binary dependent variable $d_{ijs}=0$ for all but the last of person *i*'s spell terms ($s_j=1,\ldots, t_i-1$) and $d_{ijt}=c_i$ for the last term ($s_j=t_i$) in that spell.

A technique similar to that used by Willet and Singer (1995) is used to estimate the multiple-spell discrete time hazard function. Term dummies are retained for non-parametric estimation of the baseline hazard in the first spell (in college), but the logarithmic functional form is used to estimate the second spell (out of college) baseline hazard. A smooth baseline hazard functional form is used for the second spell to compensate for nonoccurences of the event of interest in later periods in the data, and to minimize the number of parameters being estimated for a steadily diminishing risk set. Spell dummies are also included to account for differences in hazard profiles across spells.

Estimated marginal effects for the dummy and dummy-logarithmic paramaterizations are presented for the three models in columns (1) – (3) and (4) – (6), respectively, of Table 1.9. Due to the fact that there are no occurences of re-entries in the sample after Spring 1997, the dummy paramaterization could only be estimated for two terms in the second spell. Comparison of the deviance statistics (-2log L) for these two alternative parameterizations suggests that the dummy-logarithmic parameterization is preferred to the dummy parameterization. The estimates indicate that the longer a student is out of college the less likely he or she is to return, and that overall, HBCU students are 2.6 to 3.0 percentage points less likely to return than their TWI counterparts.

In Table 1.10, personal characteristics, family background and pre-college academic ability variables are added while allowing for endogenous HBCU attendance using an IV approach. In addition to the fact that the likelihood of returning to college decreases with time, the results also suggest that HBCU students are 2.5 – 6.7 percentage points less likely to return to the school from which they stopped out than TWI students. However, these estimates are imprecisely estimated. Based on estimates from the PDP model, males are 2.5 percentage points less likely to return than females.

The potential dependence between prior and subsequent events is a common issue in multiple-spell analysis. I use two alternative approaches to control for the possibility of dependence between the events in the first and second spells. The first approach involves including a variable indicating the number of terms the student was enrolled during the first spell before experiencing a stopout, as well as the square of that variable. The estimated marginal effects of the first spell enrollment duration variables were statistically insignificant.

The estimates in columns (5) – (8) represent endogenous HBCU attendance specifications of the model, with random effects. Again assuming that the decisions to stopout or re-enter are determined only by the variables included in the model creates biased duration dependence estimates for the SPH and PDP models. The presence of unobserved heterogeneity also creates some bias in the estimates, but like in the single event model, the signs and statistical significance of the variables remain unchanged.

8. Conclusion

The results of this analysis suggest that African-American students who attend HBCUs are statistically no more likely to experience an interuption in their college enrollment (a stopout) than their counterparts at TWIs. This result was robust across various specifications of the model and across different cohorts of students, as all marginal effects of this variable were found to be small and statistically insignificant. Rather, the major factors influencing college persistence in fact seem to come from academic performance and family background. Not surprisingly, those who performed well academically, as reflected by their high school grades and SAT scores, were consistently less likely to stopout than other students. For example, there was a 5 to 6 percentage point difference in the likelihood of stopping out between those with an A or B (100-85) high school grade average and those with a B or C average (84-75), and the difference was twice than for students with a C average or less (74-60). High school grades were found to be significant determinants of a six-year degree attainment as well with about a 20 percentage point difference between A/B and B/C students, and as much as a 25 percentage point difference between A/B and less than C students. These results suggest that success in college begins long before students ever enroll. In fact, a student's performance in the higher education arena is intricately linked to his or her ability to develop the skills necessary to compete and meet the demands of college before they arrive. While this paper focuses on college outcomes for African-American students who have already been admitted, lack of academic preparation is also a major barrier to initial college enrollment and a large part of the debate surrounding quality public education. issue faced by any number of African-American high school students in public schools as they anticipate attending college.

A more unanticipated result of this analysis however was the fact that students from single parent or broken home backgrounds – meaning parents were either divorced, separated or never married -- were 3 to 4 percentage points more likely to stopout than students from two parent homes. The result suggests there is a significant relationship between college outcomes and sociological factors, such as the students' home environment.

Furthermore, the results suggest that students are most likely to stop out between the second and third year of college. Therefore, the earlier administrators can identify problems and offer appropriate interventions the more likely students are to persist. In general the results of my analysis also imply that the best model to describe persistence behavior of African-American students is one that in fact includes factors from both the Student Attrition (family background) and Student Integration (academic performance, social integration) Models.

In comparing the 1980s cohort of students with the 1990s cohort of students I found that there were neither within- nor between-cohort differences in the stopout behavior of HBCU and TWI students. However, there were between-cohort differences in graduation outcomes. The overall effect of attending an HBCU on the probability of completing a bachelor's degree within six years was lower for those who began college in 1995 compared to those who began college in 1980. In fact, the 1980 cohort of HBCU students were as much as 16 percentage points more likely to receive a bachelor's degree within six years than those attending TWIs. This was the only case where the estimated effect of HBCU attendance was statiscally different from zero. For the cohort of students who entered college in 1995, I find no significant difference in graduation outcomes between HBCU and TWI students.

The differences in estimates from the two samples could indicate changes in the two types of institutions from the 1980s to the 1990s. TWIs have made more of an effort to attract, retain, and successfully graduate African-American students since the 1980s, and these efforts could be reflected in the fact that differences in college outcomes are beginning to disappear for African-American students at the two types of institutions. At the same time, many HBCUs are making efforts to become more competitive with TWIs in terms of attracting top students, improving resources, and offering a broader range of majors and curriculum.

An analysis of the decision to re-enter the college from which a student stops out indicates that while overall, students who stopped out of HBCUs were less likely to return to the same school, once the endogeneity of the decision to attend an HBCU is controlled for, this difference too is not statistically different from zero.

Ultimately, the question is what, if anything, does the absence of a distinct HBCU effect really mean? The answer to that question is determined by the basis upon which we evaluate what matters. On one hand, if a student is just as likely to persist and complete a degree at an HBCU as a TWI, then it makes more sense economically to attend an HBCU at a fraction of the cost of an education at a comparable TWI. On the other hand, although degree attainment is the primary reason why colleges and universities exist, the observation of this outcome alone gives no consideration to the quality of education, or the personal satisfaction and pride derived from the educational experience. These experiences are likely to play some role in shaping future aspirations and affecting post-undergraduate outcomes. It is also difficult to identify the specific underlying reasons why students choose to leave college, which may vary from discontentment with the institution, to disciplinary sanctions, academic incompatibility or change of interest. I would argue that each of these factors are relevant to varying degrees with respect to whether you are an African-American student at an HBCU or a TWI, although they may not be reflected in overall differences in persistence or graduation rates. Also, the summary statistics of the data reveal that the students in this particular sample are very similar. Therefore, perhaps it should be expected that we would not observe large differences in college outcomes.

Finally, I would like to conclude with some thoughts about the direction in which I would like to go with this research. The difficulty in obtaining a large enough sample size to produce reliable estimates seems to point first of all toward the need for a broader, nationally representative data set focused on capturing trends and determinants of college attendance, persistence, completion, and post-graduation behavior of African-American students. Second, though the model in this paper simplified school choice to a decision between an HBCU or TWI, given the vast array of institutional characteristics even within these two groups, the choice of a college goes far beyond this broad characterization. A logical next step in this line of research would be to control for the choice of a specific college in the persistence and graduation equations. Finally, in future research I would also like to further examine the effect of HBCU attendance on post-baccalaureate outcomes during the 1980s and 1990s.

Table 1.1
Sample Means for Fall 1995
Standard Errors in Parentheses

	Whites	Blacks		
	Total	***Total***	***TWI***	***HBCU***
	(N = 2192)	***(N = 469)***	***(N = 323)***	***(N = 146)***
Male	0.45	0.35	0.37	0.29
Family Income	$66,832	$41,495	$43,552	$36,943
	(56,453)	(51,477)	(58,144)	(31,859)
Father's Education				
less than high school	0.02	0.04	0.04	0.04
high school graduate	0.29	0.40	0.40	0.40
some college (less than bachelor's degree)	0.13	0.15	0.14	0.16
bachelor's degree or beyond	0.52	0.33	0.34	0.33
Single Parent/Broken Home	0.29	0.45	0.41	0.51
Mother's Education				
less than high school	0.01	0.03	0.03	0.02
high school graduate	0.36	0.41	0.43	0.38
some college (less than bachelor's degree)	0.16	0.20	0.20	0.21
bachelor's degree or beyond	0.43	0.34	0.32	0.39
Took the SAT	0.99	0.97	0.98	0.94
SAT score	996	792	813	741
	(198)	(187)	(186)	(181)
High School Grades Available	0.91	0.90	0.92	0.87
High School Grades				
A to A- (100 - 90)	0.43	0.20	0.24	0.12
A- to B (89 - 85)	0.31	0.36	0.35	0.40
B to B- (84 - 80)	0.10	0.16	0.18	0.11
B- to C (79 -75)	0.05	0.14	0.11	0.21
C to C- (74 - 70)	0.01	0.03	0.03	0.03
C- to D- (69 -60)	0.00	0.01	0.01	
College GPA Available	0.01	0.004		0.01
Cumulative 1995-96 College GPA				
3.75 and above	0.08	0.03	0.03	0.03
3.25 - 3.74	0.22	0.11	0.09	0.14
2.75 - 3.24	0.26	0.22	0.23	0.20
2.25 - 2.74	0.20	0.22	0.21	0.25
1.75 - 2.24	0.12	0.18	0.18	0.17
1.25 - 1.74	0.06	0.12	0.11	0.12
below 1.24	0.05	0.12	0.15	0.08
Residence while enrolled 1995-96				
on campus	0.73	0.77	0.77	0.77
with parents	0.18	0.19	0.19	0.21
off campus	0.10	0.04	0.05	0.01
Public Institution	0.71	0.63	0.75	0.38
Student/Full-time Faculty Ratio	0.21	0.21	0.22	0.21
	(0.28)	(0.10)	(0.11)	(0.06)
Percentage of Black Faculty	0.03	0.21	0.04	0.60
	(0.03)	(0.27)	(0.03)	(0.10)
Percentage of Black Students	0.08	0.36	0.12	0.90
	(0.07)	(0.38)	(0.10)	(0.12)

Table 1.1 (continued)
Sample Means for Fall 1995
Standard Errors in Parentheses

	Whites	Blacks		
	Total ***(N = 2192)***	***Total*** ***(N = 469)***	***TWI*** ***(N = 323)***	***HBCU*** ***(N = 146)***
In State Student	0.75	0.72	0.80	0.53
In State Tuition (1995)	$6,144	$5,185	$5,390	$4,736
	(5,674)	(4,504)	(5,103)	(2,733)
Out of State Tuition (1995)	$9,711	$8,343	$9,052	$6,789
	(4,292)	(3,589)	(4,008)	(1,562)
Share Receiving Need-Based Grants	0.5	0.68	0.67	0.68
Amount of Need-Based Grants Awarded	$4,338	$4,081	$4,541	$3,081
	(4,155)	(3,697)	(4,048)	(2,529)
Share Receiving Non-Need-Based Grants	0.27	0.23	0.28	0.14
Amount of Non-Need-Based Grants Awarded	$3,427	$3,759	$3,768	$3,715
	(3,237)	(3,710)	(3,760)	(3,571)
State Labor Market				
State Unemployment Rate (1995)	5.43	5.53	5.58	5.43
	(1.02)	(1.02)	(0.98)	(1.10)
State Weekly Earnings in Mfg. Sector (1995)	$526	$503	$510	$493
	(79)	(73)	(76)	(64)

Note: Means for financial variables are based on non-zero values only

Figure 1.1
Persistence Rate (Survivor Function) by Race & School Type

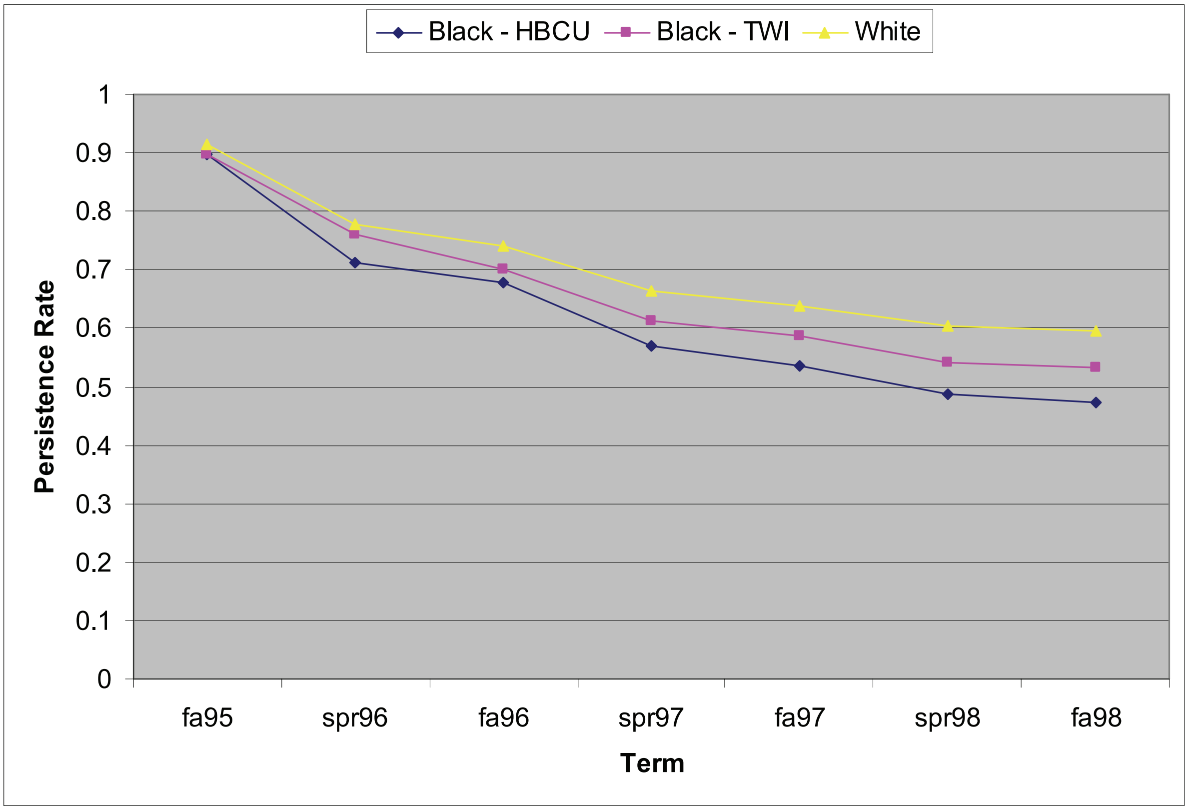

Table 1.2
Probability of First Stopout - Exogenous HBCU Attendance Only
(Marginal Effects)

	(1) Semiparametric PH Model	(2) Panel LP Model	(3) Panel Probit Model
HBCU	0.013	0.014	0.013
	(0.011)	(0.013)	(0.012)
Spring 1996	0.097	0.100	0.099
	(0.024)**	(0.020)**	(0.023)**
Fall 1996	0.004	0.003	0.004
	(0.018)	(0.017)	(0.019)
Spring 1997	0.069	0.067	0.069
	(0.024)**	(0.021)**	(0.023)**
Fall 1997	-0.025	-0.022	-0.026
	(0.017)	(0.016)	(0.017)
Spring 1998	0.015	0.014	0.015
	(0.021)	(0.019)	(0.021)
Fall 1998	-0.059	-0.047	-0.059
	(0.014)**	(0.013)**	(0.014)**
Person-term records	2,590	2,590	2,590
N	469	469	469
-2 log L	1,474.89		1,475.08
R-squared		0.03	

Robust standard errors in parentheses
* significant at 5%; ** significant at 1%

Full regression includes a constant term

Table 1.3
Probability of First Stopout - Exogenous HBCU Attendance and Pre-College Covariates
(Marginal Effects)

	(1) Semiparametric PH Model	(2) Panel LP Model	(3) Panel Probit Model
HBCU	0.005	0.005	0.003
	(0.010)	(0.014)	(0.012)
Spring 1996	0.074	0.092	0.083
	(0.020)**	(0.020)**	(0.021)**
Fall 1996	0.006	0.004	0.005
	(0.016)	(0.016)	(0.017)
Spring 1997	0.069	0.072	0.076
	(0.023)**	(0.021)**	(0.024)**
Fall 1997	-0.011	-0.008	-0.012
	(0.017)	(0.015)	(0.017)
Spring 1998	0.032	0.029	0.035
	(0.022)	(0.019)	(0.023)
Fall 1998	-0.040	-0.025	-0.042
	(0.015)**	(0.013)	(0.016)**
Male	0.006	0.005	0.007
	(0.010)	(0.013)	(0.011)
Family Income < $16,100	-0.025	-0.037	-0.029
	(0.012)*	(0.019)	(0.014)*
Family Income $16,100 - $31,500	-0.009	-0.012	-0.013
	(0.012)	(0.018)	(0.014)
Family Income $31,500 - $53,750	-0.021	-0.031	-0.024
	(0.012)	(0.016)	(0.014)
Father high school grad	-0.013	-0.028	-0.022
	(0.018)	(0.037)	(0.022)
Father has some college (no bachelor's degree)	-0.024	-0.052	-0.034
	(0.016)	(0.040)	(0.019)
Father has bachelor's degree or higher	-0.036	-0.064	-0.049
	(0.018)*	(0.039)	(0.022)*
Single Parent/Broken Home	0.026	0.035	0.032
	(0.011)*	(0.013)**	(0.012)**
Mother high school grad	-0.030	-0.048	-0.034
	(0.024)	(0.053)	(0.031)
Mom has some college (no bachelor's degree)	-0.004	-0.007	-0.002
	(0.026)	(0.054)	(0.033)
Mother has bachelor's degree or higher	-0.035	-0.049	-0.037
	(0.025)	(0.054)	(0.031)

Table 1.3 (continued)
Probability of First Stopout - Exogenous HBCU Attendance and Pre-College Covariates
(Marginal Effects)

	(1) Semiparametric PH Model	(2) Panel LP Model	(3) Panel Probit Model
SAT score/100	-0.010	-0.010	-0.011
	(0.003)**	(0.003)**	(0.003)**
Didn't take SAT or ACT	-0.008	0.023	0.003
	(0.035)	(0.070)	(0.047)
High School GPA: 84 to 75	0.043	0.057	0.047
	(0.014)**	(0.017)**	(0.016)**
High School GPA: 74 to 60	0.109	0.120	0.115
	(0.043)*	(0.047)*	(0.046)*
State weekly earnings in mfg. sector/1,000	-0.072	-0.076	-0.089
	(0.067)	(0.076)	(0.073)
State unemployment rate	0.008	0.010	0.009
	(0.005)	(0.006)	(0.005)
Person-term records	2,590	2,590	2,590
N	469	469	469
-2 log L	1,386.02		1,387.50
R-squared		0.06	

Robust standard errors in parentheses
* significant at 5%; ** significant at 1%

Full regression includes a constant term, and dummy variables for missing parental education, and missing high school GPA

Table 1.4
Probability of First Stopout - Exogenous HBCU Attendance and Pre-College Covariates with Random Effects
(Marginal Effects)

	(1) Semiparametric PH Model	(2) Panel LP Model	(3) Panel Probit Model
HBCU	0.000	0.005	0.002
	(0.011)	(0.013)	(0.015)
Spring 1996	0.094	0.092	0.107
	(0.025)**	(0.017)**	(0.028)**
Fall 1996	0.056	0.004	0.041
	(0.026)*	(0.018)	(0.025)
Spring 1997	0.179	0.072	0.163
	(0.051)**	(0.019)**	(0.041)**
Fall 1997	0.073	-0.008	0.051
	(0.041)	(0.020)	(0.034)
Spring 1998	0.171	0.029	0.141
	(0.064)**	(0.020)	(0.048)**
Fall 1998	0.031	-0.025	0.018
	(0.040)	(0.021)	(0.035)
Male	0.004	0.005	0.006
	(0.011)	(0.012)	(0.014)
Family Income < $16,100	-0.029	-0.037	-0.034
	(0.012)*	(0.019)*	(0.016)*
Family Income $16,100 - $31,500	-0.014	-0.012	-0.016
	(0.013)	(0.017)	(0.018)
Family Income $31,500 - $53,750	-0.021	-0.031	-0.027
	(0.012)	(0.016)	(0.016)
Father high school grad	-0.013	-0.028	-0.016
	(0.023)	(0.033)	(0.032)
Father has some college (no bachelor's degree)	-0.025	-0.052	-0.032
	(0.018)	(0.035)	(0.024)
Father has bachelor's degree or higher	-0.037	-0.064	-0.048
	(0.023)	(0.034)	(0.031)
Single Parent/Broken Home	0.031	0.035	0.039
	(0.014)*	(0.012)**	(0.017)*
Mother high school grad	-0.046	-0.048	-0.050
	(0.027)	(0.038)	(0.035)
Mom has some college (no bachelor's degree)	-0.020	-0.007	-0.016
	(0.023)	(0.039)	(0.034)
Mother has bachelor's degree or higher	-0.045	-0.049	-0.050
	(0.027)	(0.039)	(0.035)

Table 1.4 (continued)

Probability of First Stopout - Exogenous HBCU Attendance and Pre-College Covariates with Random Effects

(Marginal Effects)

	(1) Semiparametric PH Model	(2) Panel LP Model	(3) Panel Probit Model
SAT score/100	-0.013	-0.010	-0.015
	(0.003)**	(0.004)**	(0.004)**
Didn't take SAT or ACT	0.008	0.023	0.019
	(0.048)	(0.049)	(0.069)
High School GPA: 84 to 75	0.049	0.057	0.064
	(0.019)*	(0.014)**	(0.023)**
High School GPA: 74 to 60	0.114	0.120	0.152
	(0.083)	(0.035)**	(0.089)
State weekly earnings in mfg. sector/1,000	-0.050	-0.076	-0.048
	(0.062)	(0.077)	(0.094)
State unemployment rate	0.003	0.010	0.006
	(0.005)	(0.006)	(0.007)
Heterogeneity Std. Dev. (σ_u)	1.782	0.000	0.882
	(0.236)		(0.102)
Person-term records	2,590	2,590	2,590
N	469	469	469
-2 log L	1,340.80		1,357.36
R-squared		0.06	

Robust standard errors in parentheses

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

Full regression includes a constant term, and dummy variables for missing parental education, and missing high school GPA

Table 1.5.A
Probability of HBCU Attendance - Stage 1 of IV Approach
(Marginal Effects)

	Linear Probability
Male	-0.043
	(0.046)
Family Income: 25th Percentile (<$16,100)	0.004
	(0.075)
Family Income: 50th Percentile ($16,100 - $31,500)	-0.099
	(0.069)
Family Income: 75th Percentile ($31,500 - $53,750)	-0.043
	(0.064)
Father high school grad	-0.136
	(0.112)
Father has some college (no bachelor's degree)	-0.102
	(0.123)
Father has bachelor's degree or higher	-0.131
	(0.118)
Single Parent/Broken Home	0.116
	(0.046)*
Mother high school grad	0.156
	(0.084)
Mother has some college (no bachelor's degree)	0.247
	(0.091)**
Mother has bachelor's degree or higher	0.348
	(0.094)**
SAT score/100	-0.043
	(0.014)**
Didn't take SAT or ACT	0.043
	(0.191)
High School GPA: 84 to 75	0.020
	(0.060)
High School GPA: 74 to 60	-0.220
	(0.127)
State weekly earnings in mfg. sector/1,000	0.320
	(0.361)
State unemployment rate	0.027
	(0.023)
Number of HBCUs in home state	0.222
	(0.055)**
(Number of HBCUs in home state)^2	-0.052
	(0.015)**
(Number of HBCUs in home state)^3	0.003
	(0.001)**
Person-spell records	2590
R-squared	0.18
P-value for test of joint significance of instruments	0.00

Robust standard errors in parentheses
* significant at 5%; ** significant at 1%

Full regression includes a constant term and dummy variables for missing parental education, and missing high school GPA

Table 1.5.B
Probability of First Stopout - Stage 2 of IV Approach
(Marginal Effects)

	(1) Semiparametric PH Model	(2) Panel LP Model	(3) Panel Probit Model
Pr (HBCU Attendance)	-0.019	-0.025	-0.020
	(0.046)	(0.061)	(0.052)
Spring 1996	0.075	0.092	0.083
	(0.020)**	(0.020)**	(0.021)**
Fall 1996	0.006	0.005	0.005
	(0.016)	(0.016)	(0.017)
Spring 1997	0.070	0.072	0.077
	(0.023)**	(0.021)**	(0.024)**
Fall 1997	-0.011	-0.008	-0.012
	(0.017)	(0.015)	(0.017)
Spring 1998	0.031	0.029	0.035
	(0.022)	(0.019)	(0.023)
Fall 1998	-0.041	-0.026	-0.042
	(0.015)**	(0.013)	(0.016)**
Male	0.004	0.003	0.005
	(0.010)	(0.013)	(0.011)
Family Income < $16,100	-0.024	-0.037	-0.029
	(0.012)*	(0.019)	(0.014)*
Family Income $16,100 - $31,500	-0.011	-0.015	-0.015
	(0.013)	(0.018)	(0.015)
Family Income $31,500 - $53,750	-0.022	-0.033	-0.025
	(0.012)	(0.017)*	(0.014)
Father high school grad	-0.018	-0.034	-0.026
	(0.021)	(0.040)	(0.024)
Father has some college (no bachelor's degree)	-0.027	-0.057	-0.037
	(0.017)	(0.042)	(0.019)
Father has bachelor's degree or higher	-0.040	-0.069	-0.053
	(0.020)*	(0.041)	(0.024)*
Single Parent/Broken Home	0.029	0.038	0.034
	(0.012)*	(0.014)**	(0.013)*
Mother high school grad	-0.023	-0.039	-0.029
	(0.028)	(0.056)	(0.034)
Mother has some college (no bachelor's degree)	0.006	0.005	0.006
	(0.035)	(0.060)	(0.041)
Mother has bachelor's degree	-0.023	-0.034	-0.026
	(0.035)	(0.063)	(0.040)

Table 1.5.B (continued)
Probability of First Stopout - Stage 2 of IV Approach
(Marginal Effects)

	(1) Semiparametric PH Model	(2) Panel LP Model	(3) Panel Probit Model
SAT score/100	-0.011	-0.012	-0.012
	(0.004)**	(0.005)*	(0.004)**
Didn't take SAT or ACT	-0.009	0.023	0.002
	(0.035)	(0.070)	(0.047)
High School GPA: 84 to 75	0.044	0.058	0.048
	(0.014)**	(0.017)**	(0.016)**
High School GPA: 74 to 60	0.095	0.113	0.105
	(0.046)*	(0.049)*	(0.049)*
State weekly earnings in mfg. sector/1,000	-0.083	-0.089	-0.100
	(0.069)	(0.079)	(0.076)
State unemployment rate	0.008	0.009	0.008
	(0.005)	(0.006)	(0.005)
Person-term records	2,590	2,590	2,590
N	469	469	469
-2 log L	1,356.30		1,356.98
R-squared		0.06	

Robust standard errors in parentheses
* significant at 5%; ** significant at 1%

Full regression includes a constant term, and dummy variables for missing parental education, and missing high school GPA

Table 1.6.A

Probability of First Stopout - IV Approach with Interaction of HBCU with Gender and Income

(Marginal Effects)

	(1) Probit	(2) Linear Probability	(3) Linear Probability	(4) Linear Probability	(5) Linear Probability	(6) Linear Probability
HBCU	-0.020	-0.025	0.027	-0.093	-0.289	-0.265
	(0.050)	(0.061)	(0.087)	(0.078)	(0.172)	(0.181)
Spring 1996	0.083	0.092	0.092	0.093	0.093	0.092
	(0.021)**	(0.020)**	(0.020)**	(0.020)**	(0.020)**	(0.020)**
Fall 1996	0.005	0.004	0.003	0.005	0.006	0.006
	(0.017)	(0.016)	(0.017)	(0.016)	(0.016)	(0.017)
Spring 1997	0.077	0.072	0.071	0.073	0.073	0.073
	(0.024)**	(0.021)**	(0.021)**	(0.021)**	(0.021)**	(0.021)**
Fall 1997	-0.012	-0.008	-0.010	-0.009	-0.007	-0.009
	(0.018)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)
Spring 1998	0.035	0.029	0.027	0.029	0.031	0.029
	(0.023)	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)
Fall 1998	-0.042	-0.026	-0.028	-0.026	-0.023	-0.025
	(0.016)**	(0.013)	(0.013)*	(0.013)*	(0.014)	(0.014)
Male	0.006	0.003	0.003	-0.034	-0.039	-0.042
	(0.011)	(0.013)	(0.013)	(0.031)	(0.032)	(0.033)
HBCU * Male				0.129	0.142	0.169
				(0.097)	(0.097)	(0.105)
Family Income < $16,100	-0.029	-0.037	-0.032	-0.044	-0.111	-0.071
	(0.014)*	(0.019)	(0.020)	(0.021)*	(0.059)	(0.051)
Family Income $16,100 - $31,500	-0.016	-0.015	-0.010	-0.023	-0.084	-0.060
	(0.015)	(0.018)	(0.018)	(0.020)	(0.061)	(0.053)
Family Income $31,500 - $53,750	-0.026	-0.033	-0.027	-0.036	-0.130	-0.115
	(0.014)	(0.017)*	(0.016)	(0.018)*	(0.057)*	(0.054)*
HBCU * Family Income <$16,100					0.226	0.116
					(0.171)	(0.144)
HBCU * Family Income $16,100 - $31,500					0.217	0.160
					(0.188)	(0.170)

Table 1.6.A (continued)

Probability of First Stopout - IV Approach with Interaction of HBCU with Gender and Income

(Marginal Effects)

	(1) Probit	(2) Linear Probability	(3) Linear Probability	(4) Linear Probability	(5) Linear Probability	(6) Linear Probability
HBCU * Family Income $31,500 - $53,750					0.340	0.304
					(0.186)	(0.178)
Father high school grad	-0.027	-0.034	-0.019	-0.038	-0.034	-0.034
	(0.025)	(0.040)	(0.041)	(0.041)	(0.039)	(0.042)
Father has some college (no bachelor's degree)	-0.037	-0.057	-0.042	-0.064	-0.065	-0.067
	(0.020)	(0.042)	(0.043)	(0.044)	(0.043)	(0.047)
Father has bachelor's degree or higher	-0.053	-0.069	-0.053	-0.072	-0.067	-0.068
	(0.025)*	(0.042)	(0.042)	(0.043)	(0.042)	(0.045)
Single Parent/Broken Home	0.035	0.038	0.033	0.045	0.036	0.038
	(0.014)*	(0.014)**	(0.014)*	(0.016)**	(0.016)*	(0.016)*
Mother high school grad	-0.028	-0.039	-0.043	-0.035	-0.047	-0.045
	(0.035)	(0.057)	(0.056)	(0.060)	(0.059)	(0.060)
Mother has some college (no bachelor's degree)	0.007	0.005	-0.008	0.015	0.007	0.001
	(0.042)	(0.060)	(0.058)	(0.063)	(0.062)	(0.062)
Mother has bachelor's degree or higher	-0.026	-0.035	-0.055	-0.024	-0.031	-0.040
	(0.042)	(0.064)	(0.060)	(0.066)	(0.063)	(0.062)
SAT score/100	-0.012	-0.012		-0.015	-0.016	
	(0.004)**	(0.005)*		(0.005)**	(0.006)*	
SAT score < 700			-0.030			0.023
			(0.098)			(0.037)
HBCU * SAT score <700			0.038			0.084
			(0.035)			(0.109)
Didn't take SAT or ACT	0.003	0.023		0.013	-0.018	
	(0.048)	(0.070)		(0.073)	(0.082)	
High School GPA: 84 to 75	0.048	0.058	0.062	0.056	0.056	0.066
	(0.016)**	(0.017)**	(0.018)**	(0.018)**	(0.019)**	(0.019)**
High School GPA: 74 to 60	0.105	0.113	0.123	0.107	0.096	0.114
	(0.049)*	(0.049)*	(0.050)*	(0.048)*	(0.051)	(0.049)*

Table 1.6.A (continued)
Probability of First Stopout - IV Approach with Interaction of HBCU with Gender and Income
(Marginal Effects)

	(1) Probit	(2) Linear Probability	(3) Linear Probability	(4) Linear Probability	(5) Linear Probability	(6) Linear Probability
State weekly earnings in mfg. sector/1,000	-0.100	-0.089	-0.077	-0.079	-0.051	-0.040
	(0.079)	(0.080)	(0.077)	(0.080)	(0.093)	(0.091)
State unemployment rate	0.008	0.009	0.008	0.009	0.013	0.012
	(0.005)	(0.006)	(0.006)	(0.006)	(0.007)	(0.007)
Person-term records	2,590	2,590	2,590	2,590	2,590	2,590
N	469	469	469	469	469	469
-2 log L	4,192.72					
R-squared		0.06	0.06	0.05	0.02	0.02

Robust standard errors in parentheses
* significant at 5%; ** significant at 1%

Full regression includes a constant term, and dummy variables for missing parental education, and missing high school GPA.
The number of observed spell terms decreases across columns due to missing values for certain institutional characteristics.

Table 1.6.B
Probability of First Stopout - IV Approach with Institutional Characteristics
(Marginal Effects)

	(1)	(2)	(3)	(4)	(5)	(6)
	Basic Model	Various classifications of HBCUs			Racial composition of student & faculty body	
HBCU	-0.014	-0.012	0.098	-0.026	-0.006	0.207
	(0.061)	(0.077)	(0.284)	(0.078)	(0.212)	(0.317)
Public HBCU		0.052	-0.058	0.049		
		(0.074)	(0.267)	(0.074)		
UNCF Member School			-0.116			
			(0.222)			
HBCU * Competitive				0.051		
				(0.139)		
HBCU * Share of Black Full-Time Faculty						-1.099
						(1.912)
HBCU * Share of Black Students						0.010
						(0.695)
Spring 1996	0.094	0.094	0.094	0.094	0.094	0.093
	(0.020)**	(0.020)**	(0.020)**	(0.020)**	(0.020)**	(0.020)**
Fall 1996	0.005	0.006	0.006	0.006	0.005	0.006
	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.017)
Spring 1997	0.074	0.075	0.075	0.075	0.073	0.074
	(0.021)**	(0.021)**	(0.021)**	(0.021)**	(0.021)**	(0.021)**
Fall 1997	-0.006	-0.005	-0.005	-0.005	-0.006	-0.005
	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)
Spring 1998	0.032	0.033	0.033	0.033	0.032	0.033
	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)
Fall 1998	-0.023	-0.023	-0.022	-0.023	-0.023	-0.023
	(0.013)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)
Male	0.005	0.002	0.001	0.005	0.005	0.004
	(0.013)	(0.013)	(0.014)	(0.014)	(0.013)	(0.013)
Family Income < $16,100	-0.036	-0.040	-0.041	-0.038	-0.036	-0.037
	(0.020)	(0.020)*	(0.020)*	(0.020)	(0.020)	(0.020)
Family Income $16,100 - $31,500	-0.012	-0.012	-0.012	-0.010	-0.010	-0.009
	(0.019)	(0.020)	(0.020)	(0.020)	(0.018)	(0.018)

Table 1.6.B (continued)
Probability of First Stopout - IV Approach with Institutional Characteristics
(Marginal Effects)

	(1)	(2)	(3)	(4)	(5)	(6)
	Basic Model	Various classifications of HBCUs			Racial composition of student & faculty body	
Family Income $31,500 - $53,750	-0.032	-0.031	-0.033	-0.030	-0.030	-0.034
	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)*
Father high school grad	-0.033	-0.030	-0.032	-0.033	-0.032	-0.029
	(0.041)	(0.040)	(0.039)	(0.040)	(0.039)	(0.040)
Father has some college (no bachelor's degree)	-0.056	-0.053	-0.057	-0.057	-0.056	-0.053
	(0.042)	(0.041)	(0.041)	(0.042)	(0.042)	(0.042)
Father has bachelor's degree or higher	-0.065	-0.060	-0.061	-0.065	-0.064	-0.059
	(0.042)	(0.041)	(0.040)	(0.042)	(0.041)	(0.042)
Single Parent/Broken Home	0.034	0.034	0.031	0.034	0.034	0.034
	(0.013)**	(0.013)**	(0.016)	(0.013)*	(0.013)**	(0.013)*
Mother high school grad	-0.039	-0.046	-0.040	-0.042	-0.043	-0.044
	(0.058)	(0.056)	(0.054)	(0.057)	(0.055)	(0.055)
Mother has some college (no bachelor's degree)	0.002	-0.007	-0.001	0.000	-0.002	-0.008
	(0.060)	(0.058)	(0.056)	(0.060)	(0.056)	(0.058)
Mother has bachelor's degree or higher	-0.041	-0.057	-0.053	-0.051	-0.047	-0.054
	(0.064)	(0.060)	(0.058)	(0.060)	(0.056)	(0.057)
SAT score/100	-0.006	-0.004	-0.005	-0.006	-0.005	-0.004
	(0.005)	(0.004)	(0.005)	(0.005)	(0.004)	(0.004)
Didn't take SAT or ACT	0.050	0.057	0.049	0.048	0.053	0.029
	(0.071)	(0.073)	(0.077)	(0.072)	(0.073)	(0.075)
High School GPA: 84 to 75	0.052	0.052	0.050	0.053	0.052	0.052
	(0.018)**	(0.018)**	(0.019)**	(0.018)**	(0.018)**	(0.019)**
High School GPA: 74 to 60	0.109	0.117	0.116	0.115	0.111	0.116
	(0.048)*	(0.048)*	(0.047)*	(0.047)*	(0.048)*	(0.049)*
State weekly earnings in mfg. sector/1,000	-0.064	-0.040	-0.040	-0.053	-0.055	-0.069
	(0.083)	(0.085)	(0.086)	(0.097)	(0.085)	(0.094)
State unemployment rate	0.008	0.009	0.010	0.009	0.009	0.008
	(0.006)	(0.006)	(0.006)	(0.007)	(0.006)	(0.007)

Table 1.6.B (continued)
Probability of First Stopout - IV Approach with Institutional Characteristics
(Marginal Effects)

	(1)	(2)	(3)	(4)	(5)	(6)
	Basic Model	Various classifications of HBCUs			Racial composition of student & faculty body	
Public	-0.028	-0.036	-0.029	-0.029	-0.020	-0.049
	(0.047)	(0.072)	(0.087)	(0.082)	(0.033)	(0.039)
Tuition/1,000	-0.003	-0.005	0.002	-0.001	0.003	-0.016
	(0.034)	(0.046)	(0.060)	(0.055)	(0.025)	(0.028)
Student-Faculty Ratio/10	0.026	0.027	0.030	0.029	0.026	0.022
	(0.012)*	(0.012)*	(0.016)	(0.013)*	(0.010)*	(0.012)
Competitive				0.005		
				(0.038)		
Share of Black Full-Time Faculty					-0.070	0.892
					(0.316)	(1.613)
Share of Black Undergrads					0.055	-0.084
					(0.118)	(0.298)
Person-term records	2,562	2,562	2,562	2,562	2562	2,562
N	467	467	467	467	467	467
R-squared	0.07	0.07	0.07	0.06	0.07	0.06

Robust standard errors in parentheses
* significant at 5%; ** significant at 1%

Full regression includes a constant term, and dummy variables for missing parental education, and missing high school GPA.
The number of observed spell terms decreases across columns due to missing values for certain institutional characteristics.

Table 1.6.C
Probability of First Stopout - IV Approach with Financial Aid, Social Integration and Academic Selectivity
(Marginal Effects)

	Individual-Level Controls		
	(1)	(2)	(3)
HBCU	-0.017	-0.019	-0.022
	(0.061)	(0.061)	(0.060)
Spring 1996	0.094	0.094	0.099
	(0.020)**	(0.020)**	(0.021)**
Fall 1996	0.005	0.005	0.006
	(0.016)	(0.016)	(0.017)
Spring 1997	0.074	0.074	0.070
	(0.021)**	(0.021)**	(0.022)**
Fall 1997	-0.004	-0.005	-0.004
	(0.015)	(0.015)	(0.016)
Spring 1998	0.034	0.034	0.034
	(0.019)	(0.019)	(0.020)
Fall 1998	-0.022	-0.022	-0.026
	(0.014)	(0.014)	(0.014)
Male	0.010	0.009	0.011
	(0.013)	(0.013)	(0.014)
Family Income < $16,100	-0.024	-0.013	-0.017
	(0.021)	(0.021)	(0.022)
Family Income $16,100 - $31,500	-0.000	0.009	0.011
	(0.019)	(0.019)	(0.020)
Family Income $31,500 - $53,750	-0.028	-0.022	-0.022
	(0.018)	(0.017)	(0.018)
Father high school grad	-0.026	-0.024	-0.016
	(0.040)	(0.041)	(0.040)
Father has some college (no bachelor's degree)	-0.053	-0.051	-0.047
	(0.042)	(0.043)	(0.042)
Father has bachelor's degree or higher	-0.063	-0.059	-0.058
	(0.042)	(0.042)	(0.041)
Single Parent/Broken Home	0.035	0.035	0.043
	(0.013)**	(0.013)**	(0.014)**
Mother high school grad	-0.034	-0.033	-0.029
	(0.058)	(0.058)	(0.057)
Mother has some college (no bachelor's degree)	0.010	0.010	0.014
	(0.060)	(0.061)	(0.060)
Mother has bachelor's degree or higher	-0.038	-0.037	-0.027
	(0.063)	(0.064)	(0.063)
SAT score/100	-0.003	-0.003	-0.003
	(0.005)	(0.005)	(0.005)
Didn't take SAT or ACT	0.067	0.070	0.101
	(0.072)	(0.071)	(0.082)
High School GPA: 84 to 75	0.050	0.051	0.050
	(0.018)**	(0.018)**	(0.018)**
High School GPA: 74 to 60	0.108	0.104	0.106
	(0.048)*	(0.049)*	(0.049)*

Table 1.6.C (continued)
Probability of First Stopout - IV Approach with Financial Aid, Social Integration and Academic Selectivity
(Marginal Effects)

	Institution-Level Controls [a]		
	(1)	(2)	(3)
State weekly earnings in mfg. sector/1,000	-0.101	-0.098	-0.093
	(0.083)	(0.084)	(0.092)
State unemployment rate	0.007	0.007	0.008
	(0.006)	(0.006)	(0.007)
Public	-0.028	-0.029	-0.027
	(0.047)	(0.047)	(0.047)
Tuition/1,000	0.021	0.024	0.023
	(0.032)	(0.031)	(0.032)
Student-Faculty Ratio/10	0.026	0.025	0.020
	(0.012)*	(0.012)*	(0.013)
Non-Need-Based Grant Dollars/1,000	-0.008		
	(0.002)**		
Need-Based Grant Dollars/1,000	-0.004		
	(0.002)*		
Institutional Grant Dollars/1,000		-0.006	
		(0.002)**	
Non-Institutional Grant Dollars/1,000		-0.007	
		(0.002)**	
Total Grant Dollars (First Year)/1,000			-0.006
			(0.002)**
Lives on campus			-0.024
			(0.026)
Lives off campus(other than w/parents)			-0.021
			(0.049)
Person-term records	2,562	2,562	2,427
N	467	467	447
R-squared	0.07	0.07	0.08
Test for equivalence of financial aid marginal effects:			
F(1,466)	2.99	0.11	
p-value	0.08	0.74	

Robust standard errors in parentheses
* significant at 5%; ** significant at 1%

Full regression includes a constant term, and dummy variables for missing parental education, and missing high school GPA.

The number of observed spell terms decreases across columns due to missing values for certain institutional characteristics.

Table 1.6.C (continued)
Probability of First Stopout - IV Approach with Financial Aid, Social Integration and Academic Selectivity
(Marginal Effects)

	Institution-Level Controls [a]			
	(4)	(5)	(6)	(7)
HBCU	-0.035	0.065	-0.038	-0.024
	(0.077)	(0.065)	(0.078)	(0.073)
Spring 1996	0.083	0.070	0.083	0.083
	(0.023)**	(0.022)**	(0.023)**	(0.023)**
Fall 1996	-0.010	-0.006	-0.010	-0.010
	(0.018)	(0.017)	(0.018)	(0.018)
Spring 1997	0.071	0.067	0.072	0.071
	(0.024)**	(0.023)**	(0.024)**	(0.024)**
Fall 1997	0.002	-0.009	0.002	0.002
	(0.019)	(0.017)	(0.019)	(0.019)
Spring 1998	0.028	0.028	0.028	0.027
	(0.022)	(0.021)	(0.022)	(0.022)
Fall 1998	-0.022	-0.025	-0.022	-0.022
	(0.017)	(0.015)	(0.017)	(0.017)
Male	-0.008	-0.003	-0.007	-0.008
	(0.016)	(0.014)	(0.016)	(0.016)
Family Income < $16,100	-0.030	-0.028	-0.029	-0.031
	(0.024)	(0.023)	(0.024)	(0.024)
Family Income $16,100 - $31,500	0.002	-0.005	0.002	0.004
	(0.022)	(0.019)	(0.022)	(0.022)
Family Income $31,500 - $53,750	-0.019	-0.021	-0.019	-0.018
	(0.020)	(0.019)	(0.020)	(0.020)
Father high school grad	-0.005	0.011	-0.005	-0.004
	(0.041)	(0.041)	(0.041)	(0.041)
Father has some college (no bachelor's degree)	-0.042	-0.020	-0.042	-0.041
	(0.044)	(0.043)	(0.044)	(0.044)
Father has bachelor's degree or higher	-0.059	-0.037	-0.059	-0.058
	(0.043)	(0.041)	(0.044)	(0.043)
Single Parent/Broken Home	0.037	0.031	0.037	0.036
	(0.016)*	(0.014)*	(0.016)*	(0.016)*
Mother high school grad	-0.014	-0.035	-0.013	-0.017
	(0.055)	(0.051)	(0.055)	(0.055)
Mother has some college (no bachelor's degree)	0.031	0.003	0.032	0.027
	(0.059)	(0.053)	(0.059)	(0.058)
Mother has bachelor's degree or higher	-0.005	-0.039	-0.004	-0.010
	(0.066)	(0.059)	(0.067)	(0.065)
SAT score/100	-0.005	-0.004	-0.005	-0.005
	(0.005)	(0.005)	(0.005)	(0.005)
Didn't take SAT or ACT	0.128	0.091	0.124	0.128
	(0.096)	(0.084)	(0.097)	(0.097)
High School GPA: 84 to 75	0.057	0.049	0.058	0.056
	(0.020)**	(0.019)*	(0.020)**	(0.020)**
High School GPA: 74 to 60	0.046	0.095	0.047	0.048
	(0.050)	(0.087)	(0.050)	(0.050)

Table 1.6.C (continued)
Probability of First Stopout - IV Approach with Financial Aid, Social Integration and Academic Selectivity
(Marginal Effects)

	Institution-Level Controls [a]			
	(4)	(5)	(6)	(7)
State weekly earnings in mfg. sector/1,000	-0.004	-0.049	0.006	-0.003
	(0.100)	(0.096)	(0.108)	(0.103)
State unemployment rate	0.008	0.008	0.007	0.008
	(0.008)	(0.007)	(0.008)	(0.008)
Public	-0.051	0.018	-0.060	-0.041
	(0.068)	(0.053)	(0.062)	(0.062)
Tuition/1,000	-0.021	0.029	-0.029	-0.014
	(0.046)	(0.038)	(0.041)	(0.043)
Student-Faculty Ratio/10	0.021	0.028	0.022	0.022
	(0.013)	(0.013)*	(0.014)	(0.013)
Average Freshman Grant Dollars/1,000	-0.000		-0.001	-0.000
	(0.002)		(0.002)	(0.002)
Percentage of students living on campus		0.054		
		(0.032)		
25th Percentile of SAT I scores: less than 1000			-0.014	
			(0.027)	
Admissions Process rated as "Very" to "Most" Selective				-0.003
				(0.019)
Person-term records	1,972	2,025	1,972	1,972
N	358	356	358	358
R-squared	0.06	0.05	0.06	0.06

Robust standard errors in parentheses
* significant at 5%; ** significant at 1%

[a] Average freshman grant dollars and the percentage of students living on campus were obtained from Barron's Profiles of American Colleges. The test score tier variable was available in the BPS data.

Full regression includes a constant term, and dummy variables for missing parental education, and missing high school GPA.

The number of observed spell terms decreases across columns due to missing values for certain institutional characteristics.

Table 1.7.A

Probability of Degree Completion Within Six Years - Probit, Linear Probability and IV Approach with Interaction of HBCU with Gender and Income

(Marginal Effects)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Probit	LP Model	IV Model	IV Model with HBCU Interactions			
HBCU	-0.025	-0.025	0.167	-0.069	0.220	0.883	0.472
	(0.055)	(0.049)	(0.175)	(0.340)	(0.220)	(0.543)	(0.590)
Male	-0.054	-0.048	-0.037	-0.039	0.012	0.016	-0.005
	(0.052)	(0.047)	(0.048)	(0.048)	(0.097)	(0.102)	(0.098)
Male * HBCU					-0.170	-0.165	-0.115
					(0.279)	(0.276)	(0.283)
Family Income < $16,100	0.151	0.117	0.111	0.091	0.118	0.351	0.211
	(0.083)	(0.073)	(0.074)	(0.075)	(0.075)	(0.174)*	(0.150)
Family Income $16,100 - $31,500	0.073	0.051	0.068	0.050	0.072	0.236	0.137
	(0.080)	(0.069)	(0.072)	(0.073)	(0.073)	(0.173)	(0.152)
Family Income $31,500 - $53,750	0.076	0.059	0.064	0.052	0.065	0.383	0.274
	(0.072)	(0.063)	(0.065)	(0.065)	(0.065)	(0.174)*	(0.169)
HBCU * Family Income < $16,100						-0.833	-0.426
						(0.547)	(0.445)
HBCU * Family Income $16,100 - $31,500						-0.639	-0.337
						(0.595)	(0.516)
HBCU * Family Income $31,500 - $53,750						-1.137	-0.786
						(0.589)	(0.555)
Father high school grad	0.105	0.075	0.095	0.054	0.096	0.098	0.075
	(0.144)	(0.119)	(0.122)	(0.126)	(0.123)	(0.111)	(0.131)
Father has some college (no bachelor's degree)	0.213	0.169	0.185	0.138	0.184	0.198	0.172
	(0.149)	(0.130)	(0.133)	(0.139)	(0.133)	(0.127)	(0.145)
Father has bachelor's degree or higher	0.226	0.182	0.203	0.168	0.205	0.188	0.185
	(0.146)	(0.124)	(0.128)	(0.132)	(0.129)	(0.127)	(0.142)
Single Parent/Broken Home	-0.072	-0.061	-0.080	-0.060	-0.085	-0.051	-0.054
	(0.055)	(0.049)	(0.053)	(0.053)	(0.055)	(0.059)	(0.058)
Mother high school grad	0.120	0.103	0.079	0.082	0.086	0.087	0.086
	(0.155)	(0.134)	(0.138)	(0.138)	(0.138)	(0.135)	(0.144)

Table 1.7.A (continued)
Probability of Degree Completion Within Six Years - Probit, Linear Probability and IV Approach with Interaction of HBCU with Gender and Income
(Marginal Effects)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Probit	LP Model	IV Model	IV Model with HBCU Interactions			
Mother has some college (no bachelor's degree)	-0.015	-0.012	-0.050	-0.010	-0.045	-0.055	-0.021
	(0.161)	(0.140)	(0.146)	(0.144)	(0.146)	(0.144)	(0.149)
Mother has bachelor's degree or higher	0.180	0.156	0.099	0.164	0.103	0.090	0.141
	(0.160)	(0.140)	(0.151)	(0.148)	(0.151)	(0.149)	(0.153)
SAT score/100	0.062	0.053	0.064		0.065	0.068	
	(0.017)**	(0.014)**	(0.017)**		(0.018)**	(0.020)**	
SAT score < 700				-0.197			-0.176
				(0.122)			(0.115)
HBCU * SAT < 700				0.180			0.042
				(0.377)			(0.361)
Didn't take SAT or ACT	0.149	0.116	0.127		0.139	0.216	
	(0.208)	(0.180)	(0.184)		(0.186)	(0.195)	
High School GPA: 84 to 75	-0.211	-0.197	-0.193	-0.228	-0.193	-0.200	-0.236
	(0.055)**	(0.054)**	(0.055)**	(0.055)**	(0.055)**	(0.058)**	(0.056)**
High School GPA: 74 to 60	-0.258	-0.250	-0.216	-0.258	-0.207	-0.167	-0.221
	(0.104)*	(0.120)*	(0.125)	(0.125)*	(0.128)	(0.116)	(0.132)
State weekly earnings in mfg. sector/1,000	0.341	0.269	0.409	0.316	0.388	0.305	0.283
	(0.360)	(0.317)	(0.344)	(0.338)	(0.342)	(0.350)	(0.351)
State unemployment rate	-0.015	-0.013	-0.010	0.000	-0.011	-0.015	-0.005
	(0.026)	(0.022)	(0.023)	(0.024)	(0.023)	(0.024)	(0.025)
N	469	469	469	469	469	469	469
R-squared		0.17	0.14	0.14	0.13	0.04	0.09
-2 log L	561.75						

Robust standard errors in parentheses
* significant at 5%; ** significant at 1%

Full regression includes a constant term, and dummy variables for missing parental education, and missing high school GPA.

Table 1.7.B

Probability of Degree Completion Within Six Years - IV Approach with Institutional Characteristics

(Marginal Effects)

	(1)	(2)	(3)	(4)	(5)	(6)
	Basic Model	*Various classifications of HBCUs*			*Racial composition of student & faculty body*	
HBCU	0.214	-0.243	-0.792	-0.112	1.457	0.850
	(0.181)	(0.278)	(0.853)	(0.271)	(0.745)	(0.909)
HBCU*Public		0.336	0.890	0.266		
		(0.284)	(0.828)	(0.278)		
UNCF Member School			0.643			
			(0.660)			
HBCU * Competitive				-0.343		
				(0.524)		
HBCU * Share of Black Full-Time Faculty						-6.310
						(7.329)
HBCU * Share of Black Students						1.178
						(2.093)
Male	-0.056	-0.073	-0.073	-0.081	-0.055	-0.044
	(0.048)	(0.049)	(0.050)	(0.055)	(0.049)	(0.051)
Family Income < $16,100	0.104	0.087	0.079	0.088	0.119	0.107
	(0.074)	(0.075)	(0.078)	(0.077)	(0.077)	(0.074)
Family Income $16,100 - $31,500	0.071	0.019	0.013	0.020	0.045	0.048
	(0.073)	(0.076)	(0.082)	(0.080)	(0.073)	(0.071)
Family Income $31,500 - $53,750	0.069	0.046	0.056	0.041	0.043	0.044
	(0.066)	(0.066)	(0.065)	(0.067)	(0.067)	(0.065)
Father high school grad	0.103	0.067	0.084	0.065	0.038	0.048
	(0.122)	(0.121)	(0.122)	(0.123)	(0.127)	(0.122)
Father has some college (no bachelor's degree)	0.193	0.162	0.185	0.148	0.121	0.133
	(0.133)	(0.132)	(0.133)	(0.134)	(0.139)	(0.134)
Father has bachelor's degree or higher	0.206	0.181	0.189	0.169	0.153	0.162
	(0.127)	(0.126)	(0.127)	(0.127)	(0.132)	(0.127)

Table 1.7.B (continued)

Probability of Degree Completion Within Six Years - IV Approach with Institutional Characteristics

(Marginal Effects)

	(1)	(2)	(3)	(4)	(5)	(6)
	Basic Model	*Various classifications of HBCUs*			*Racial composition of student &*	
Single Parent/Broken Home	-0.078	-0.054	-0.039	-0.060	-0.080	-0.060
	(0.051)	(0.051)	(0.058)	(0.052)	(0.052)	(0.053)
Mother high school grad	0.101	0.131	0.067	0.089	0.127	0.137
	(0.138)	(0.136)	(0.146)	(0.146)	(0.141)	(0.137)
Mother has some college (no bachelor's degree)	-0.019	0.030	-0.037	-0.020	0.016	0.001
	(0.145)	(0.144)	(0.149)	(0.155)	(0.147)	(0.144)
Mother has bachelor's degree or higher	0.116	0.176	0.130	0.135	0.174	0.179
	(0.149)	(0.145)	(0.146)	(0.151)	(0.148)	(0.142)
SAT score/100	0.044	0.042	0.046	0.038	0.045	0.037
	(0.018)*	(0.017)*	(0.018)*	(0.019)*	(0.018)*	(0.018)*
Didn't take SAT or ACT	0.039	0.075	0.084	0.049	0.164	-0.024
	(0.191)	(0.194)	(0.199)	(0.197)	(0.213)	(0.227)
High School GPA: 84 to 75	-0.182	-0.176	-0.169	-0.167	-0.198	-0.195
	(0.055)**	(0.054)**	(0.056)**	(0.055)**	(0.057)**	(0.056)**
High School GPA: 74 to 60	-0.207	-0.198	-0.192	-0.189	-0.177	-0.188
	(0.123)	(0.122)	(0.124)	(0.124)	(0.128)	(0.125)
State weekly earnings in mfg. sector/1,000	0.199	0.220	0.200	0.345	0.346	0.052
	(0.343)	(0.344)	(0.347)	(0.381)	(0.370)	(0.396)
State unemployment rate	-0.003	-0.001	0.001	-0.004	-0.001	-0.006
	(0.023)	(0.023)	(0.024)	(0.023)	(0.024)	(0.024)
Public	0.213	-0.181	-0.167	-0.204	-0.130	-0.134
	(0.144)	(0.258)	(0.279)	(0.290)	(0.124)	(0.158)
Competitive				0.172		
				(0.129)		

Table 1.7.B (continued)

Probability of Degree Completion Within Six Years - IV Approach with Institutional Characteristics

(Marginal Effects)

	(1)	(2)	(3)	(4)	(5)	(6)
	Basic Model	*Various classifications of HBCUs*			*Racial composition of student &*	
Tuition/1,000	0.020	-0.009	-0.009	-0.014	-0.009	-0.007
	(0.013)	(0.020)	(0.021)	(0.023)	(0.012)	(0.012)
Student-Faculty Ratio/10	-0.040	-0.075	-0.084	-0.056	-0.068	-0.077
	(0.033)	(0.033)*	(0.041)*	(0.035)	(0.029)*	(0.032)*
Share of Black Full-Time Faculty					-1.949	4.815
					(1.177)	(6.347)
Share of Black Undergrads					-0.494	-1.160
					(0.337)	(1.100)
N	466	466	466	466	466	466
R-squared	0.15	0.16	0.15	0.15	0.09	0.16

Robust standard errors in parentheses
* significant at 5%; ** significant at 1%

Full regression includes a constant term, and dummy variables for missing parental education, and missing high school GPA.

Table 1.7.C
Probability of Degree Completion Within Six Years - IV Approach with Financial Aid, Social Integration and Academic Selectivity
(Marginal Effects)

	Individual-Level Controls		
	(1)	**(2)**	**(3)**
HBCU	0.252	0.249	0.263
	(0.182)	(0.182)	(0.183)
Male	-0.075	-0.074	-0.068
	(0.047)	(0.047)	(0.048)
Family Income < $16,100	0.029	-0.000	0.018
	(0.082)	(0.081)	(0.079)
Family Income $16,100 - $31,500	0.006	-0.024	-0.018
	(0.078)	(0.078)	(0.075)
Family Income $31,500 - $53,750	0.048	0.031	0.033
	(0.067)	(0.066)	(0.066)
Father high school grad	0.075	0.070	0.031
	(0.121)	(0.121)	(0.122)
Father has some college (no bachelor's degree)	0.174	0.170	0.140
	(0.132)	(0.132)	(0.132)
Father has bachelor's degree or higher	0.188	0.179	0.156
	(0.126)	(0.126)	(0.126)
Single Parent/Broken Home	-0.078	-0.078	-0.083
	(0.050)	(0.051)	(0.051)
Mother high school grad	0.059	0.055	0.042
	(0.138)	(0.138)	(0.138)
Mother has some college (no bachelor's degree)	-0.063	-0.064	-0.089
	(0.145)	(0.145)	(0.145)
Mother has bachelor's degree or higher	0.090	0.086	0.053
	(0.148)	(0.148)	(0.149)
SAT score/100	0.035	0.035	0.035
	(0.017)*	(0.018)*	(0.017)*
Didn't take SAT or ACT	-0.027	-0.028	-0.024
	(0.189)	(0.189)	(0.190)
High School GPA: 84 to 75	-0.173	-0.174	-0.169
	(0.054)**	(0.054)**	(0.054)**
High School GPA: 74 to 60	-0.190	-0.183	-0.205
	(0.122)	(0.122)	(0.123)
State weekly earnings in mfg. sector/1,000	0.372	0.356	0.411
	(0.345)	(0.345)	(0.345)
State unemployment rate	0.001	-0.001	-0.006
	(0.023)	(0.023)	(0.023)
Public	0.223	0.220	0.207
	(0.143)	(0.143)	(0.143)
Tuition/1,000	0.008	0.006	0.008
	(0.013)	(0.013)	(0.013)
Student-Faculty Ratio/10	-0.036	-0.035	-0.015
	(0.033)	(0.033)	(0.034)

Table 1.7.C (continued)
Probability of Degree Completion Within Six Years - IV Approach with Financial Aid, Social Integration and Academic Selectivity
(Marginal Effects)

	Individual-Level Controls		
	(1)	**(2)**	**(3)**
First Year Non-Need-Based Grant Dollars/1,000	0.035		
	(0.010)**		
First Year Need-Based Grant Dollars/1,000	0.022		
	(0.009)*		
First Year Institutional Grant Dollars/1,000		0.027	
		(0.008)**	
First Year Non-Institutional Grant Dollars/1,000		0.029	
		(0.013)*	
Total First Year Grant Dollars/1,000			0.026
			(0.008)**
Lives on campus			0.131
			(0.064)*
Lives off campus(other than w/parents)			0.235
			(0.118)*
N	466	466	465
R-squared	0.17	0.17	0.17

Robust standard errors in parentheses
* significant at 5%; ** significant at 1%

Full regression includes a constant term, and dummy variables for missing parental education, and missing high school GPA.

The number of observed spell terms decreases across columns due to missing values for certain institutional characteristics.

Table 1.7.C (continued)
Probability of Degree Completion Within Six Years - IV Approach with Financial Aid, Social Integration and Academic Selectivity
(Marginal Effects)

	Institution-Level Controls [a]			
	(4)	**(5)**	**(6)**	**(7)**
HBCU	0.222	0.010	0.218	0.239
	(0.214)	(0.205)	(0.212)	(0.209)
Male	-0.005	-0.044	-0.004	-0.004
	(0.057)	(0.055)	(0.056)	(0.057)
Family Income < $16,100	0.010	0.045	0.022	0.011
	(0.086)	(0.084)	(0.086)	(0.086)
Family Income $16,100 - $31,500	0.010	0.023	0.018	0.006
	(0.082)	(0.081)	(0.082)	(0.082)
Family Income $31,500 - $53,750	-0.007	0.030	-0.000	-0.007
	(0.075)	(0.075)	(0.075)	(0.075)
Father high school grad	-0.018	-0.010	-0.022	-0.012
	(0.133)	(0.140)	(0.133)	(0.134)
Father has some college (no bachelor's degree)	0.149	0.116	0.134	0.156
	(0.147)	(0.156)	(0.146)	(0.148)
Father has bachelor's degree or higher	0.177	0.168	0.171	0.180
	(0.141)	(0.146)	(0.140)	(0.141)
Single Parent/Broken Home	-0.082	-0.057	-0.083	-0.080
	(0.058)	(0.057)	(0.058)	(0.058)
Mother high school grad	0.020	0.053	0.016	0.008
	(0.150)	(0.156)	(0.150)	(0.152)
Mother has some college (no bachelor's degree)	-0.129	-0.042	-0.136	-0.139
	(0.160)	(0.163)	(0.160)	(0.161)
Mother has bachelor's degree or higher	0.033	0.064	0.024	0.022
	(0.169)	(0.170)	(0.169)	(0.169)
SAT score/100	0.017	0.022	0.012	0.018
	(0.019)	(0.020)	(0.019)	(0.019)
Didn't take SAT or ACT	-0.139	-0.096	-0.176	-0.134
	(0.218)	(0.232)	(0.218)	(0.218)
High School GPA: 84 to 75	-0.195	-0.213	-0.189	-0.197
	(0.062)**	(0.063)**	(0.062)**	(0.062)**
High School GPA: 74 to 60	-0.051	-0.135	-0.041	-0.051
	(0.161)	(0.189)	(0.161)	(0.162)
State weekly earnings in mfg. sector/1,000	-0.146	0.342	-0.033	-0.078
	(0.388)	(0.398)	(0.396)	(0.400)
State unemployment rate	0.005	-0.006	0.002	0.005
	(0.026)	(0.026)	(0.026)	(0.026)
Public	0.278	0.126	0.218	0.277
	(0.203)	(0.174)	(0.190)	(0.192)
Tuition/1,000	0.024	0.010	0.016	0.024
	(0.018)	(0.016)	(0.016)	(0.017)
Student-Faculty Ratio/10	-0.048	-0.086	-0.036	-0.051
	(0.038)	(0.039)*	(0.041)	(0.037)

Table 1.7.C (continued)
Probability of Degree Completion Within Six Years - IV Approach with Financial Aid, Social Integration and Academic Selectivity
(Marginal Effects)

	Institution-Level Controls [a]			
	(4)	**(5)**	**(6)**	**(7)**
Average Freshman Grant Dollars/1,000	0.010		0.009	0.008
	(0.008)		(0.008)	(0.008)
Percentage of Student Body Residing on Campus		-0.109		
		(0.118)		
25th Percentile of SAT I scores: less than 1000			-0.152	
			(0.093)	
Admissions Process rated as "Very" to "Most" Selective				0.055
				(0.066)
N	357	355	357	357
R-squared	0.17	0.18	0.18	0.17

Robust standard errors in parentheses
* significant at 5%; ** significant at 1%

[a] Institution level controls were obtained from Barron's Profiles of American Colleges

Full regression includes a constant term, and dummy variables for missing parental education, and missing high school GPA.

The number of observed spell terms decreases across columns due to missing values for certain institutional characteristics.

Table 1.8.A
Comparison of Probability of First Stopout for BPS and HSB Cohorts
(Marginal Effects)

	BPS: 1995		
	(1)	(2)	(3)
	Semiparametric PH Model	Linear Probability Model	Probit Model
HBCU	0.012	0.014	0.013
	(0.011)	(0.014)	(0.012)
Spring Year 1	0.079	0.093	0.085
	(0.021)**	(0.020)**	(0.022)**
Fall Year 2	0.005	0.004	0.002
	(0.017)	(0.017)	(0.017)
Spring Year 2	0.069	0.071	0.073
	(0.023)**	(0.021)**	(0.023)**
Fall Year 3	-0.014	-0.012	-0.017
	(0.017)	(0.015)	(0.017)
Spring Year 3	0.028	0.026	0.028
	(0.022)	(0.019)	(0.022)
Fall Year 4	-0.045	-0.031	-0.047
	(0.015)**	(0.013)*	(0.015)**
Male	0.008	0.006	0.008
	(0.010)	(0.013)	(0.011)
Family Income: $7,000 - $11,999	0.009	0.015	0.014
	(0.016)	(0.023)	(0.019)
Family Income: $12,000 - $15,999	0.024	0.031	0.023
	(0.022)	(0.026)	(0.024)
Family Income: $16,000 - $19,999	-0.010	-0.009	-0.013
	(0.017)	(0.022)	(0.019)
Family Income: $20,000 - $24,999	-0.010	-0.011	-0.006
	(0.017)	(0.025)	(0.021)
Family Income: $25,000 - $37,999	0.003	0.008	0.005
	(0.016)	(0.020)	(0.019)
Family Income: $38,000 +	0.015	0.024	0.019
	(0.020)	(0.023)	(0.023)
Father high school grad	-0.010	-0.023	-0.019
	(0.020)	(0.040)	(0.024)
Father has some college (no bachelor's degree)	-0.023	-0.046	-0.032
	(0.018)	(0.042)	(0.021)
Father has bachelor's degree or higher	-0.037	-0.059	-0.050
	(0.020)	(0.041)	(0.024)*
Single Parent/Broken Home	0.021	0.029	0.025
	(0.011)*	(0.013)*	(0.012)*

Table 1.8.A (continued)
Comparison of Probability of First Stopout for BPS and HSB Cohorts
(Marginal Effects)

	BPS: 1995		
	(1)	(2)	(3)
	Semiparametric PH Model	Linear Probability Model	Probit Model
Mother high school grad	-0.031	-0.048	-0.036
	(0.025)	(0.054)	(0.032)
Mom has some college (no bachelor's degree)	-0.011	-0.020	-0.014
	(0.025)	(0.055)	(0.032)
Mother has bachelor's degree or higher	-0.044	-0.064	-0.048
	(0.026)	(0.055)	(0.032)
High School GPA: 84 to 75	0.065	0.073	0.067
	(0.015)**	(0.016)**	(0.016)**
High School GPA: 74 to 60	0.146	0.136	0.148
	(0.052)**	(0.047)**	(0.051)**
State weekly earnings in mfg. sector/1,000	-0.032	-0.059	-0.049
	(0.131)	(0.152)	(0.143)
State unemployment rate	0.007	0.007	0.007
	(0.005)	(0.006)	(0.005)
Senior Cohort			
Person-term records	2,590	2,590	2,590
N	469	469	469
-2 log L	1,400.84		1,403.23
R-squared		0.06	

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

Full regression includes a constant term, and dummy variables for missing parental education, and missing high school GPA

Table 1.8.A (continued)
Comparison of Probability of First Stopout for BPS and HSB Cohorts
(Marginal Effects)

	HSB: 1980, 1982		
	(4)	(5)	(6)
	Semiparametric PH Model	Linear Probability Model	Probit Model
HBCU	-0.006	-0.008	-0.005
	(0.009)	(0.011)	(0.010)
Spring Year 1	0.234	0.194	0.226
	(0.029)**	(0.016)**	(0.022)**
Fall Year 2	0.096	0.065	0.091
	(0.024)**	(0.013)**	(0.020)**
Spring Year 2	0.038	0.024	0.037
	(0.020)	(0.012)*	(0.019)*
Fall Year 3	0.013	0.010	0.015
	(0.019)	(0.011)	(0.018)
Spring Year 3	0.093	0.061	0.090
	(0.026)**	(0.015)**	(0.023)**
Fall Year 4	0.004	0.004	0.005
	(0.019)	(0.011)	(0.018)
Male	-0.005	-0.007	-0.005
	(0.007)	(0.009)	(0.008)
Family Income: $7,000 - $11,999	-0.016	-0.027	-0.022
	(0.011)	(0.021)	(0.013)
Family Income: $12,000 - $15,999	-0.016	-0.026	-0.021
	(0.011)	(0.021)	(0.014)
Family Income: $16,000 - $19,999	-0.019	-0.033	-0.027
	(0.012)	(0.023)	(0.014)
Family Income: $20,000 - $24,999	-0.032	-0.050	-0.038
	(0.010)**	(0.021)*	(0.012)**
Family Income: $25,000 - $37,999	-0.030	-0.048	-0.037
	(0.011)**	(0.023)*	(0.013)**
Family Income: $38,000 +	-0.019	-0.032	-0.024
	(0.015)	(0.027)	(0.017)
Father high school grad	0.013	0.014	0.015
	(0.011)	(0.013)	(0.013)
Father has some college (no bachelor's degree)	0.002	0.002	0.001
	(0.012)	(0.015)	(0.014)
Father has bachelor's degree or higher	0.004	0.003	0.001
	(0.013)	(0.015)	(0.014)
Single Parent/Broken Home	0.022	0.028	0.025
	(0.008)**	(0.011)**	(0.009)**

Table 1.8.A (continued)
Comparison of Probability of First Stopout for BPS and HSB Cohorts
(Marginal Effects)

	HSB: 1980, 1982		
	(4)	(5)	(6)
	Semiparametric PH Model	Linear Probability Model	Probit Model
Mother high school grad	-0.002	-0.004	-0.003
	(0.009)	(0.013)	(0.011)
Mom has some college (no bachelor's degree)	-0.007	-0.011	-0.011
	(0.009)	(0.013)	(0.011)
Mother has bachelor's degree or higher	-0.023	-0.029	-0.024
	(0.010)*	(0.014)*	(0.011)*
High School GPA: 84 to 75	0.031	0.038	0.038
	(0.008)**	(0.010)**	(0.009)**
High School GPA: 74 to 60	0.047	0.050	0.054
	(0.018)**	(0.017)**	(0.019)**
State weekly earnings in mfg. sector/1,000	0.235	0.281	0.268
	(0.097)*	(0.125)*	(0.109)*
State unemployment rate	-0.001	-0.000	-0.001
	(0.002)	(0.002)	(0.002)
Senior Cohort	-0.011	-0.012	-0.014
	(0.008)	(0.009)	(0.009)
Person-term records	4,502	4,502	4,502
N	816	816	816
-2 log L	2,424.95		2,423.40
R-squared		0.08	

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

Full regression includes a constant term, and dummy variables for missing parental education, and missing high school GPA

Table 1.8.A (continued)
Comparison of Probability of First Stopout for BPS and HSB Cohorts
(Marginal Effects)

	Pooled Sample		
	(7)	(8)	(9)
	Semiparametric PH Model	Linear Probability Model	Probit Model
HBCU	-0.006	-0.008	-0.005
	(0.009)	(0.011)	(0.010)
Spring Year 1	0.236	0.194	0.227
	(0.031)**	(0.016)**	(0.023)**
Fall Year 2	0.096	0.065	0.091
	(0.024)**	(0.013)**	(0.021)**
Spring Year 2	0.038	0.024	0.037
	(0.020)	(0.012)*	(0.019)*
Fall Year 3	0.013	0.010	0.015
	(0.019)	(0.011)	(0.018)
Spring Year 3	0.093	0.061	0.090
	(0.027)**	(0.015)**	(0.023)**
Fall Year 4	0.004	0.004	0.005
	(0.019)	(0.011)	(0.018)
Male	-0.005	-0.007	-0.005
	(0.007)	(0.009)	(0.008)
Family Income: $7,000 - $11,999	-0.016	-0.027	-0.022
	(0.011)	(0.021)	(0.013)
Family Income: $12,000 - $15,999	-0.016	-0.026	-0.021
	(0.011)	(0.021)	(0.013)
Family Income: $16,000 - $19,999	-0.019	-0.033	-0.027
	(0.012)	(0.023)	(0.014)*
Family Income: $20,000 - $24,999	-0.032	-0.050	-0.037
	(0.010)**	(0.021)*	(0.012)**
Family Income: $25,000 - $37,999	-0.031	-0.048	-0.038
	(0.012)**	(0.023)*	(0.014)**
Family Income: $38,000 +	-0.019	-0.032	-0.025
	(0.016)	(0.027)	(0.018)
Father high school grad	0.012	0.014	0.015
	(0.010)	(0.013)	(0.012)
Father has some college (no bachelor's degree)	0.002	0.002	0.001
	(0.012)	(0.015)	(0.014)
Father has bachelor's degree or higher	0.004	0.003	0.001
	(0.013)	(0.015)	(0.014)
Single Parent/Broken Home	0.021	0.028	0.025
	(0.008)**	(0.011)**	(0.009)**

Table 1.8.A (continued)
Comparison of Probability of First Stopout for BPS and HSB Cohorts
(Marginal Effects)

	Pooled Sample		
	(7)	(8)	(9)
	Semiparametric PH Model	Linear Probability Model	Probit Model
Mother high school grad	-0.002	-0.004	-0.003
	(0.009)	(0.013)	(0.011)
Mom has some college (no bachelor's degree)	-0.007	-0.011	-0.011
	(0.009)	(0.013)	(0.011)
Mother has bachelor's degree or higher	-0.024	-0.029	-0.025
	(0.010)*	(0.014)*	(0.012)*
High School GPA: 84 to 75	0.033	0.038	0.039
	(0.009)**	(0.010)**	(0.010)**
High School GPA: 74 to 60	0.048	0.050	0.055
	(0.018)**	(0.017)**	(0.019)**
State weekly earnings in mfg. sector/1,000	0.235	0.281	0.269
	(0.097)*	(0.125)*	(0.110)*
State unemployment rate	-0.001	-0.000	-0.001
	(0.002)	(0.002)	(0.002)
Senior Cohort	-0.011	-0.012	-0.013
	(0.007)	(0.009)	(0.008)
BPS	0.085	0.101	0.112
	(0.087)	(0.089)	(0.094)
BPS * HBCU	0.020	0.022	0.019
	(0.017)	(0.018)	(0.018)
BPS * Fall Year 2	-0.044	-0.101	-0.052
	(0.007)**	(0.026)**	(0.008)**
BPS * Spring Year 2	-0.042	-0.062	-0.048
	(0.009)**	(0.021)**	(0.010)**
BPS * Fall Year 3	0.023	0.046	0.029
	(0.026)	(0.024)	(0.027)
BPS * Spring Year 3	-0.023	-0.022	-0.028
	(0.018)	(0.019)	(0.018)
BPS * Fall Year 4	-0.030	-0.035	-0.034
	(0.013)*	(0.024)	(0.014)*
BPS * Spring Year 4	-0.044	-0.035	-0.047
	(0.014)**	(0.017)*	(0.015)**
BPS * Male	0.013	0.013	0.014
	(0.014)	(0.016)	(0.015)

Table 1.8.A (continued)
Comparison of Probability of First Stopout for BPS and HSB Cohorts
(Marginal Effects)

	Pooled Sample		
	(7)	(8)	(9)
	Semiparametric PH Model	Linear Probability Model	Probit Model
BPS * Family Income: $7,000 - $11,999	0.030	0.042	0.045
	(0.027)	(0.031)	(0.032)
BPS * Family Income: $12,000 - $15,999	0.050	0.057	0.055
	(0.036)	(0.034)	(0.039)
BPS * Family Income: $16,000 - $19,999	0.011	0.024	0.018
	(0.028)	(0.032)	(0.033)
BPS * Family Income: $20,000 - $24,999	0.034	0.039	0.047
	(0.036)	(0.032)	(0.040)
BPS * Family Income: $25,000 - $37,999	0.052	0.056	0.064
	(0.038)	(0.031)	(0.041)
BPS * Family Income: $38,000 +	0.045	0.056	0.056
	(0.042)	(0.035)	(0.045)
BPS * Father high school grad	-0.019	-0.037	-0.029
	(0.018)	(0.042)	(0.021)
BPS * Father has some college (no bachelor's degr	-0.024	-0.048	-0.032
	(0.018)	(0.044)	(0.021)
BPS * Father has bachelor's degree or higher	-0.035	-0.063	-0.044
	(0.017)*	(0.044)	(0.019)*
BPS * Single Parent/Broken Home	-0.000	0.001	-0.000
	(0.013)	(0.017)	(0.014)
BPS * Mother high school grad	-0.026	-0.044	-0.031
	(0.021)	(0.055)	(0.027)
BPS * Mom has some college (no bachelor's degre	-0.004	-0.009	-0.004
	(0.028)	(0.056)	(0.035)
BPS * Mother has bachelor's degree or higher	-0.019	-0.035	-0.022
	(0.025)	(0.056)	(0.031)
BPS * High School GPA: 84 to 75	0.025	0.035	0.022
	(0.017)	(0.019)	(0.018)
BPS * High School GPA: 74 to 60	0.059	0.086	0.064
	(0.040)	(0.050)	(0.044)
BPS * State weekly earnings in mfg. sector/1,000	-0.267	-0.340	-0.318
	(0.162)	(0.196)	(0.180)
BPS * State unemployment rate	0.008	0.008	0.007
	(0.005)	(0.006)	(0.006)
Person-term records	7,092	7,092	7,092
N	1,285	1,285	1,285
-2 log L	3,825.80		3,826.63
R-squared		0.07	

Table 1.8.B
Comparison of Probability of Graduation Within Six Years for BPS and HSB Cohorts
(Marginal Effects)

	BPS: 1995		HSB: 1980		Pooled Sample	
	(1) Probit Model	(2) LP Model	(3) Probit Model	(4) LP Model	(5) Probit Model	(6) LP Model
HBCU	-0.077	-0.072	0.145	0.130	0.164	0.130
	(0.053)	(0.050)	(0.055)**	(0.051)*	(0.061)**	(0.052)*
Male	-0.061	-0.055	-0.045	-0.050	-0.067	-0.050
	(0.051)	(0.048)	(0.043)	(0.041)	(0.052)	(0.045)
Family Income: $7,000 - $11,999	0.012	0.007	0.047	0.060	0.078	0.060
	(0.082)	(0.075)	(0.082)	(0.069)	(0.094)	(0.076)
Family Income: $12,000 - $15,999	-0.091	-0.076	0.031	0.045	0.056	0.045
	(0.091)	(0.084)	(0.083)	(0.070)	(0.097)	(0.077)
Family Income: $16,000 - $19,999	0.009	0.015	0.113	0.113	0.150	0.113
	(0.098)	(0.092)	(0.105)	(0.083)	(0.114)	(0.089)
Family Income: $20,000 - $24,999	0.025	0.020	0.051	0.064	0.080	0.064
	(0.100)	(0.094)	(0.090)	(0.076)	(0.105)	(0.084)
Family Income: $25,000 - $37,999	-0.068	-0.056	0.143	0.126	0.149	0.126
	(0.082)	(0.078)	(0.121)	(0.096)	(0.134)	(0.107)
Family Income: $38,000 +	-0.039	-0.028	0.081	0.078	0.110	0.078
	(0.095)	(0.086)	(0.121)	(0.103)	(0.141)	(0.114)
Father high school grad	0.102	0.079	-0.020	-0.041	-0.043	-0.041
	(0.132)	(0.109)	(0.063)	(0.062)	(0.073)	(0.064)
Father has some college (no bachelor's degree)	0.216	0.181	-0.027	-0.039	-0.038	-0.039
	(0.139)	(0.122)	(0.074)	(0.073)	(0.088)	(0.078)
Father has bachelor's degree or higher	0.238	0.205	0.169	0.161	0.185	0.161
	(0.135)	(0.116)	(0.090)	(0.081)*	(0.092)*	(0.079)*
Single Parent/Broken Home	-0.055	-0.048	-0.074	-0.056	-0.086	-0.056
	(0.055)	(0.051)	(0.048)	(0.047)	(0.056)	(0.049)
Mother high school grad	0.135	0.118	0.114	0.113	0.154	0.113
	(0.148)	(0.123)	(0.065)	(0.055)*	(0.071)*	(0.059)
Mom has some college (no bachelor's degree)	0.051	0.042	0.106	0.094	0.132	0.094
	(0.157)	(0.130)	(0.073)	(0.063)	(0.082)	(0.067)
Mother has bachelor's degree or higher	0.244	0.216	0.089	0.094	0.119	0.094
	(0.151)	(0.131)	(0.078)	(0.069)	(0.087)	(0.072)
High School GPA: 84 to 75	-0.285	-0.274	-0.172	-0.155	-0.184	-0.155
	(0.048)**	(0.050)**	(0.044)**	(0.045)**	(0.050)**	(0.047)**
High School GPA: 74 to 60	-0.325	-0.343	-0.215	-0.233	-0.253	-0.233
	(0.073)**	(0.097)**	(0.041)**	(0.061)**	(0.053)**	(0.071)**
State weekly earnings in mfg. sector/1,000	0.337	0.277	-1.273	-1.270	-1.578	-1.270
	(0.641)	(0.588)	(0.604)*	(0.584)*	(0.725)*	(0.623)*
State unemployment rate	-0.003	-0.003	0.013	0.012	0.016	0.012
	(0.024)	(0.022)	(0.018)	(0.016)	(0.023)	(0.019)

Table 1.8.B (continued)
Comparison of Probability of Graduation Within Six Years for BPS and HSB Cohorts
(Marginal Effects)

	BPS: 1995		HSB: 1980		Pooled Sample	
	(1)	(2)	(3)	(4)	(5)	(6)
	Probit Model	LP Model	Probit Model	LP Model	Probit Model	LP Model
BPS					-0.234	-0.178
					(0.325)	(0.298)
BPS * HBCU					-0.207	-0.202
					(0.058)**	(0.070)**
BPS * Male					0.010	-0.005
					(0.073)	(0.064)
BPS * Family Income: $7,000 - $11,999					-0.063	-0.053
					(0.110)	(0.104)
BPS * Family Income: $12,000 - $15,999					-0.130	-0.121
					(0.108)	(0.114)
BPS * Family Income: $16,000 - $19,999					-0.125	-0.098
					(0.116)	(0.123)
BPS * Family Income: $20,000 - $24,999					-0.053	-0.044
					(0.126)	(0.119)
BPS * Family Income: $25,000 - $37,999					-0.184	-0.182
					(0.111)	(0.130)
BPS * Family Income: $38,000 +					-0.132	-0.106
					(0.132)	(0.140)
BPS * Father high school grad					0.143	0.121
					(0.159)	(0.132)
BPS * Father has some college (no bachelor's degree)					0.254	0.220
					(0.176)	(0.148)
BPS * Father has bachelor's degree or higher					0.045	0.044
					(0.167)	(0.144)
BPS * Single Parent/Broken Home					0.036	0.007
					(0.078)	(0.068)
BPS * Mother high school grad					-0.025	0.004
					(0.159)	(0.143)
BPS * Mom has some college (no bachelor's degree)					-0.077	-0.051
					(0.156)	(0.150)
BPS * Mother has bachelor's degree or higher					0.117	0.122
					(0.182)	(0.153)

Table 1.8.B (continued)
Comparison of Probability of Graduation Within Six Years for BPS and HSB Cohorts
(Marginal Effects)

	BPS: 1995		HSB: 1980		Pooled Sample	
	(1) Probit Model	(2) LP Model	(3) Probit Model	(4) LP Model	(5) Probit Model	(6) LP Model
BPS * High School GPA: 84 to 75					-0.088	-0.119
					(0.069)	(0.067)
BPS * High School GPA: 74 to 60					-0.056	-0.110
					(0.151)	(0.134)
BPS * State weekly earnings in mfg. sector/1,000					1.892	1.547
					(0.947)*	(0.842)
BPS * State unemployment rate					-0.018	-0.015
					(0.033)	(0.029)
N	469	469	468	468	937	937
-2 log L	577.62		493.52		1062.78	
R-squared		0.14		0.13		0.16

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

Full regression includes a constant term, and dummy variables for missing parental education, and missing high school GPA

Table 1.9
Alternative Parameterizations of Baseline Hazard in Two-Spell Event History Model
Spell 1 - Probability of Stopout, Spell 2 - Probability of Re-Entry
(Marginal Effects)

	Dummy Parameterization of Baseline Hazard			*Dummy-Logarithmic Parameterization of Baseline*		
	(1)	(2)	(3)	(4)	(5)	(6)
	SPH Model	Panel LP Model	Panel Probit Model	SPH Model	Panel LP Model	Panel Probit Model
HBCU	0.011	0.014	0.012	0.008	0.015	0.009
	(0.010)	(0.013)	(0.011)	(0.007)	(0.013)	(0.009)
HBCU * Spell 2	-0.034	-0.036	-0.034	-0.024	-0.035	-0.028
	(0.015)*	(0.019)	(0.016)*	(0.010)*	(0.019)	(0.013)*
Spring 1996	0.047	0.075	0.053	0.059	0.056	0.065
	(0.014)**	(0.020)**	(0.016)**	(0.015)**	(0.017)**	(0.016)**
Fall 1996	-0.017	-0.022	-0.019	0.007	-0.007	0.010
	(0.012)	(0.016)	(0.013)	(0.011)	(0.014)	(0.013)
Spring 1997	0.005	0.006	0.003	0.042	0.037	0.047
	(0.012)	(0.016)	(0.012)	(0.016)**	(0.017)*	(0.017)**
Fall 1997	-0.045	-0.055	-0.049	-0.017	-0.021	-0.019
	(0.010)**	(0.013)**	(0.010)**	(0.011)	(0.014)	(0.012)
Spring 1998	-0.021	-0.028	-0.024	0.009	0.009	0.010
	(0.012)	(0.016)	(0.012)*	(0.013)	(0.017)	(0.015)
Fall 1998	-0.059	-0.073	-0.062	-0.037	-0.047	-0.040
	(0.008)**	(0.013)**	(0.008)**	(0.009)**	(0.012)**	(0.009)**
Spell 2 (out of college)	-0.006	-0.008	-0.009	0.063	0.045	0.069
	(0.014)	(0.014)	(0.014)	(0.018)**	(0.024)	(0.020)**
Spring 1996 * Spell 2	-0.044	-0.102	-0.049			
	(0.010)**	(0.024)**	(0.011)**			
Fall 1996 * Spell 2	-0.035	-0.027	-0.034			
	(0.019)	(0.022)	(0.021)			
Log(terms out of college in spell 2)				-0.132	-0.080	-0.142
				(0.013)**	(0.016)**	(0.016)**
Person-spell-term records	3,560	3,560	3,560	3,560	3,560	3,560
N	469	469	469	469	469	469
-2 log L	1,847.70		1,847.39	1,784.80		1,786.86
R-squared		0.03			0.03	

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

Full regression includes a constant term

Table 1.10
Two-Spell Event History Model with Endogenous HBCU Attendance and Controls for Interspell Dependence
Spell 1 - Probability of Stopout, Spell 2 - Probability of Re-Entry
(Marginal Effects)

	IV Approach			
	(1)	(2)	(3)	(4)
	SPH Model	Panel LP Model	Panel Probit Model	2SLS
HBCU	-0.011	-0.015	-0.013	-0.018
	(0.025)	(0.052)	(0.031)	(0.062)
HBCU * Spell 2	-0.048	-0.047	-0.067	-0.025
	(0.057)	(0.079)	(0.068)	(0.078)
Spring 1996	0.048	0.052	0.054	0.053
	(0.013)**	(0.017)**	(0.014)**	(0.017)**
Fall 1996	0.008	-0.003	0.011	-0.003
	(0.011)	(0.014)	(0.012)	(0.014)
Spring 1997	0.044	0.044	0.052	0.044
	(0.015)**	(0.017)*	(0.017)**	(0.017)*
Fall 1997	-0.007	-0.005	-0.009	-0.005
	(0.011)	(0.014)	(0.012)	(0.013)
Spring 1998	0.020	0.026	0.024	0.026
	(0.014)	(0.017)	(0.017)	(0.017)
Fall 1998	-0.026	-0.020	-0.028	-0.020
	(0.010)**	(0.012)	(0.010)**	(0.012)
Spell 2 (out of college)	0.050	0.029	0.114	0.023
	(0.169)	(0.172)	(0.251)	(0.174)
Log(terms out of college in spell 2)	-0.115	-0.095	-0.132	-0.095
	(0.012)**	(0.017)**	(0.014)**	(0.017)**
Terms enrolled in spell 1	0.020	0.009	0.021	0.007
	(0.019)	(0.022)	(0.022)	(0.022)
(Terms enrolled in spell 1) ^{2}	-0.004	-0.003	-0.004	-0.003
	(0.003)	(0.003)	(0.003)	(0.003)
Male	0.003	0.004	0.004	0.004
	(0.006)	(0.013)	(0.008)	(0.013)
Male * Spell 2	-0.019	-0.028	-0.025	-0.029
	(0.010)	(0.020)	(0.012)*	(0.020)
Family Income < $16,100	-0.016	-0.039	-0.020	-0.039
	(0.008)*	(0.020)	(0.010)*	(0.020)
Family Income < $16,100 * Spell 2	0.035	0.048	0.042	0.048
	(0.038)	(0.031)	(0.044)	(0.032)
Family Income $16,100 - $31,500	-0.007	-0.014	-0.010	-0.015
	(0.008)	(0.018)	(0.010)	(0.019)
Family Income $16,100 - $31,500 * Spell 2	0.021	0.024	0.023	0.027
	(0.032)	(0.031)	(0.036)	(0.031)
Family Income $31,500 - $53,750	-0.014	-0.032	-0.017	-0.033
	(0.008)	(0.016)	(0.009)	(0.017)
Family Income $31,500 - $53,750 * Spell 2	0.030	0.041	0.034	0.047
	(0.036)	(0.028)	(0.039)	(0.028)

Table 1.10 (continued)
Two-Spell Event History Model with Endogenous HBCU Attendance and Controls for Interspell Dependence
Spell 1 - Probability of Stopout, Spell 2 - Probability of Re-Entry
(Marginal Effects)

	IV Approach			
	(1)	(2)	(3)	(4)
	SPH Model	Panel LP Model	Panel Probit Model	2SLS
	(0.013)	(0.039)	(0.016)	(0.041)
Father high school grad * Spell 2	-0.009	-0.006	-0.018	-0.000
	(0.021)	(0.058)	(0.025)	(0.058)
Father has some college (no bachelor's degree)	-0.017	-0.055	-0.025	-0.056
	(0.011)	(0.041)	(0.013)	(0.043)
Father has some college (no bachelor's degree) * Spell 2	-0.005	0.015	-0.010	0.024
	(0.028)	(0.062)	(0.032)	(0.062)
Father has bachelor's degree or higher	-0.025	-0.068	-0.035	-0.069
	(0.013)*	(0.041)	(0.015)*	(0.042)
Father has bachelor's degree or higher * Spell 2	0.015	0.042	0.008	0.047
	(0.036)	(0.060)	(0.040)	(0.061)
Single Parent/Broken Home	0.019	0.038	0.024	0.038
	(0.008)*	(0.014)**	(0.009)*	(0.014)**
Single Parent * Spell 2	0.000	-0.017	0.002	-0.019
	(0.016)	(0.023)	(0.021)	(0.023)
Mother high school grad	-0.017	-0.045	-0.022	-0.042
	(0.017)	(0.054)	(0.022)	(0.057)
Mother high school grad * Spell 2	-0.011	0.004	-0.015	-0.007
	(0.026)	(0.074)	(0.034)	(0.076)
Mother has some college (no bachelor's degree)	0.002	-0.001	0.002	0.003
	(0.019)	(0.056)	(0.025)	(0.060)
Mother has some college (no bachelor's degree) * Spell 2	-0.012	-0.018	-0.017	-0.032
	(0.027)	(0.078)	(0.033)	(0.082)
Mother has bachelor's degree or higher	-0.017	-0.043	-0.021	-0.039
	(0.018)	(0.057)	(0.023)	(0.064)
Mother has bachelor's degree or higher * Spell 2	0.018	0.031	0.023	0.011
	(0.052)	(0.078)	(0.067)	(0.085)
SAT score/100	-0.007	-0.012	-0.009	-0.012
	(0.002)**	(0.004)**	(0.003)**	(0.005)*
SAT score/100 * Spell 2	0.005	0.009	0.006	0.011
	(0.006)	(0.008)	(0.007)	(0.008)
Didn't take SAT or ACT	-0.006	0.020	0.001	0.020
	(0.023)	(0.070)	(0.033)	(0.070)
Didn't take SAT or ACT * Spell 2	0.094	0.025	0.071	0.025
	(0.172)	(0.103)	(0.146)	(0.105)

Table 1.10 (continued)
Two-Spell Event History Model with Endogenous HBCU Attendance and Controls for Interspell Dependence

Spell 1 - Probability of Stopout, Spell 2 - Probability of Re-Entry
(Marginal Effects)

	IV Approach			
	(1)	(2)	(3)	(4)
	SPH Model	Panel LP Model	Panel Probit Model	2SLS
	(0.009)**	(0.018)**	(0.011)**	(0.018)**
High School GPA: B to C * Spell 2	-0.021	-0.059	-0.026	-0.063
	(0.010)*	(0.024)*	(0.012)*	(0.024)*
High School GPA: C- to D-	0.065	0.119	0.079	0.118
	(0.029)*	(0.048)*	(0.037)*	(0.049)*
High School GPA: C- to D- * Spell 2	-0.027	-0.122	-0.035	-0.115
	(0.014)*	(0.062)	(0.012)**	(0.062)
State weekly earnings in mfg. sector/1,000	-0.056	-0.123	-0.075	-0.121
	(0.046)	(0.082)	(0.055)	(0.081)
State weekly earnings in mfg. sector/1,000 * Spell 2	0.101	0.178	0.122	0.167
	(0.107)	(0.154)	(0.131)	(0.162)
State unemployment rate	0.005	0.013	0.006	0.013
	(0.003)	(0.006)*	(0.004)	(0.006)*
State unemployment rate * Spell 2	-0.018	-0.028	-0.023	-0.027
	(0.007)*	(0.010)**	(0.009)*	(0.010)**
Person-spell-term records	3,560	3,560	3,560	3,560
N	469	469	469	469
-2 log L	1,684.33		1,685.82	
R-squared		0.06		0.06

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

Full regression includes a constant term, and dummy variables for missing parental education, and missing high school GPA

Table 1.10 (continued)
Two-Spell Event History Model with Endogenous HBCU Attendance and Controls for Interspell Dependence
Spell 1 - Probability of Stopout, Spell 2 - Probability of Re-Entry
(Marginal Effects)

	IV Approach with Random Effects			
	(5)	(6)	(7)	(8)
	SPH Model	Panel LP Model	Panel Probit Model	2SLS
HBCU	-0.014	-0.015	-0.019	-0.018
	(0.023)	(0.042)	(0.027)	(0.051)
HBCU * Spell 2	-0.042	-0.047	-0.056	-0.025
	(0.049)	(0.079)	(0.053)	(0.073)
Spring 1996	0.045	0.052	0.052	0.053
	(0.012)**	(0.014)**	(0.014)**	(0.014)**
Fall 1996	0.012	-0.003	0.021	-0.003
	(0.011)	(0.015)	(0.013)	(0.015)
Spring 1997	0.049	0.044	0.072	0.044
	(0.016)**	(0.016)**	(0.021)**	(0.016)**
Fall 1997	-0.000	-0.005	0.012	-0.005
	(0.012)	(0.017)	(0.015)	(0.017)
Spring 1998	0.030	0.026	0.056	0.026
	(0.016)	(0.018)	(0.023)*	(0.018)
Fall 1998	-0.019	-0.020	-0.005	-0.020
	(0.010)	(0.019)	(0.014)	(0.019)
Spell 2 (out of college)	0.024	0.029	0.030	0.023
	(0.126)	(0.167)	(0.150)	(0.170)
Log(terms out of college in spell 2)	-0.103	-0.095	-0.103	-0.095
	(0.012)**	(0.016)**	(0.014)**	(0.016)**
Terms enrolled in spell 1	0.022	0.009	0.033	0.007
	(0.017)	(0.025)	(0.019)	(0.025)
$(\text{Terms enrolled in spell 1})^2$	-0.003	-0.003	-0.005	-0.003
	(0.003)	(0.004)	(0.003)	(0.004)
Male	0.002	0.004	0.002	0.004
	(0.006)	(0.011)	(0.007)	(0.012)
Male * Spell 2	-0.017	-0.028	-0.018	-0.029
	(0.009)	(0.022)	(0.009)*	(0.022)
Family Income < $16,100	-0.015	-0.039	-0.018	-0.039
	(0.008)	(0.018)*	(0.009)*	(0.018)*
Family Income < $16,100 * Spell 2	0.028	0.048	0.027	0.048
	(0.034)	(0.034)	(0.036)	(0.034)
Family Income $16,100 - $31,500	-0.006	-0.014	-0.009	-0.015
	(0.008)	(0.017)	(0.010)	(0.017)
Family Income $16,100 - $31,500 * Spell 2	0.017	0.024	0.014	0.027
	(0.028)	(0.033)	(0.029)	(0.033)
Family Income $31,500 - $53,750	-0.013	-0.032	-0.015	-0.033
	(0.007)	(0.015)*	(0.008)	(0.015)*
Family Income $31,500 - $53,750 * Spell 2	0.026	0.041	0.025	0.047
	(0.031)	(0.030)	(0.033)	(0.031)

Table 1.10 (continued)
Two-Spell Event History Model with Endogenous HBCU Attendance and Controls for Interspell Dependence
Spell 1 - Probability of Stopout, Spell 2 - Probability of Re-Entry
(Marginal Effects)

	IV Approach with Random Effects			
	(5)	(6)	(7)	(8)
	SPH Model	Panel LP Model	Panel Probit Model	2SLS
	(0.013)	(0.032)	(0.017)	(0.032)
Father high school grad * Spell 2	-0.008	-0.006	-0.015	-0.000
	(0.022)	(0.055)	(0.019)	(0.055)
Father has some college (no bachelor's degree)	-0.017	-0.055	-0.021	-0.056
	(0.011)	(0.034)	(0.011)	(0.034)
Father has some college (no bachelor's degree) * Spell 2	-0.004	0.015	-0.010	0.024
	(0.028)	(0.060)	(0.024)	(0.060)
Father has bachelor's degree or higher	-0.025	-0.068	-0.031	-0.069
	(0.013)*	(0.033)*	(0.015)*	(0.034)*
Father has bachelor's degree or higher * Spell 2	0.013	0.042	0.001	0.047
	(0.036)	(0.058)	(0.032)	(0.058)
Single Parent/Broken Home	0.019	0.038	0.023	0.038
	(0.007)*	(0.012)**	(0.009)*	(0.013)**
Single Parent * Spell 2	0.002	-0.017	0.009	-0.019
	(0.016)	(0.024)	(0.019)	(0.024)
Mother high school grad	-0.016	-0.045	-0.022	-0.042
	(0.015)	(0.036)	(0.019)	(0.038)
Mother high school grad * Spell 2	-0.011	0.004	-0.015	-0.007
	(0.024)	(0.059)	(0.023)	(0.060)
Mother has some college (no bachelor's degree)	0.002	-0.001	-0.001	0.003
	(0.018)	(0.038)	(0.021)	(0.042)
Mother has some college (no bachelor's degree) * Spell 2	-0.011	-0.018	-0.012	-0.032
	(0.024)	(0.062)	(0.024)	(0.065)
Mother has bachelor's degree or higher	-0.015	-0.043	-0.018	-0.039
	(0.016)	(0.039)	(0.019)	(0.045)
Mother has bachelor's degree or higher * Spell 2	0.012	0.031	0.011	0.011
	(0.044)	(0.065)	(0.049)	(0.067)
SAT score/100	-0.007	-0.012	-0.009	-0.012
	(0.002)**	(0.004)**	(0.003)**	(0.004)**
SAT score/100 * Spell 2	0.005	0.009	0.003	0.011
	(0.005)	(0.009)	(0.006)	(0.008)
Didn't take SAT or ACT	-0.001	0.020	0.005	0.020
	(0.022)	(0.046)	(0.032)	(0.046)
Didn't take SAT or ACT * Spell 2	0.076	0.025	0.057	0.025
	(0.144)	(0.089)	(0.133)	(0.090)

Table 1.10 (continued)
Two-Spell Event History Model with Endogenous HBCU Attendance and Controls for Interspell Dependence
Spell 1 - Probability of Stopout, Spell 2 - Probability of Re-Entry
(Marginal Effects)

	IV Approach with Random Effects			
	(5)	(6)	(7)	(8)
	SPH Model	Panel LP Model	Panel Probit Model	2SLS
	(0.009)**	(0.013)**	(0.012)**	(0.013)**
High School GPA: B to C * Spell 2	-0.018	-0.059	-0.016	-0.063
	(0.009)	(0.024)*	(0.010)	(0.024)**
High School GPA: C- to D-	0.057	0.119	0.071	0.118
	(0.033)	(0.034)**	(0.047)	(0.035)**
High School GPA: C- to D- * Spell 2	-0.021	-0.122	-0.020	-0.115
	(0.013)	(0.053)*	(0.012)	(0.052)*
State weekly earnings in mfg. sector/1,000	-0.050	-0.123	-0.052	-0.121
	(0.044)	(0.077)	(0.052)	(0.075)
State weekly earnings in mfg. sector/1,000 * Spell 2	0.084	0.178	0.064	0.167
	(0.095)	(0.159)	(0.103)	(0.166)
State unemployment rate	0.005	0.013	0.004	0.013
	(0.003)	(0.006)*	(0.004)	(0.006)*
State unemployment rate * Spell 2	-0.016	-0.028	-0.017	-0.027
	(0.007)*	(0.010)**	(0.007)*	(0.010)*
Heterogeneity Std. Dev. (s_u)	0.619	0.000	0.645	0.000
	(0.090)		(0.072)	
Person-spell-term records	3,560	3,560	3,560	3,560
N	469	469	469	469
-2 log L	1,676.43		1,668.42	
R-squared				0.06

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

Full regression includes a constant term, and dummy variables for missing parental education, and missing high school GPA

Appendix A
Gamma & Mass Points Unobserved Heterogeneity Models

The gamma and Heckman-Singer unobserved heterogeneity models are described below, and the coefficient estimates are presented in Table A1. Like the random effects specification, these estimates also support the rejection of the null hypothesis that the estimates are biased by unobserved heterogeneity.

The commands used to estimate these models in Stata (pgmhaz8 and hshaz) were programmed by Stephen P. Jenkins of the Institute for Social and Economic Research at the University of Essex. The most recent programs were written in 2004.

Gamma unobserved heterogeneity

For a sample of individuals i = 1,…,N who enter college at t=0, and are observed for t periods (semesters), the log likelihood function representing gamma unobserved heterogeneity is

$$\textbf{Log L} = \sum_{i=1}^{N} \log \{[1 + \sigma_v^2 \sum_{s=0}^{t-1} \exp(\beta' X(t_i) + \gamma(t_i))]^{\gamma-1} - c_i[1 + \sigma_v^2 \sum_{s=0}^{t-1} \exp(\beta' X(s) + \gamma(s))]^{\gamma}\} \qquad \textbf{(16)}$$

where $\gamma=(\sigma_v^2)^{-1}$ and the censoring indicator, $c_i = 1$ if stopout occurs, and is zero otherwise. The variance of the gamma mixing distribution(mean normalized to 1) is represented by σ_v^2.

Heckman-Singer (discrete mixture) unobserved heterogeneity

Consider again a sample of individuals i = 1,…,N who enter college at t=0, and are observed for t periods (semesters). Each individual belongs to one of z = 1,…Z unobserved types with probability p_z, and the hazard function for an individual belonging to type z is defined as

$$\mathbf{h_z(t) = 1 - exp[-exp(m_z + \beta'X(t) + \gamma(t)].} \qquad \textbf{(17)}$$

The m_z characterize the discrete points of support of a multinomial ("mass points") distribution, with m_1 normalized to zero and $p_1 = 1 - (p_2 + \ldots + p_z)$. The zth mass point is equal to m_z. Under this specification the corresponding sample likelihood is characterized by

$$\mathbf{L = \sum_{i=1}^{N} \sum_{z=1}^{Z} \{p_z * S_z(t) * [h_z(t)]^{c}i\}} \qquad \textbf{(18)}$$

where $S_z(t)$, the survivor function, is the probability of remaing in school *at least* t periods, and c_i is the censoring indicator described above. Only two mass points were supported by the data.

Appendix A: Table 1
Probability of First Stopout - Gamma & Discrete Multinomial Distributed Unobserved Heterogeneity
(Coefficient Estimates)

	(1) Gamma	(2) HS-2
HBCU	-0.007	0.187
	(0.258)	(0.237)
Fall 1996	1.154	1.664
	(0.237)**	(0.346)**
Spring 1997	0.666	1.227
	(0.341)	(0.427)**
Fall 1997	1.666	2.085
	(0.380)**	(0.430)**
Spring 1998	0.844	1.127
	(0.490)	(0.504)*
Fall 1998	1.615	1.750
	(0.498)**	(0.472)**
Spring 1999	0.380	0.421
	(0.663)	(0.625)
Male	0.085	0.200
	(0.245)	(0.211)
Family Income < $16,100	-0.617	-0.656
	(0.396)	(0.348)
Family Income $16,100 - $31,500	-0.234	-0.248
	(0.372)	(0.267)
Family Income $31,500 - $53,750	-0.369	-0.670
	(0.344)	(0.345)
Father high school grad	0.078	-0.259
	(0.573)	(0.464)
Father has some college (no bachelor's degree)	-0.339	-0.570
	(0.626)	(0.496)
Father has bachelor's degree or higher	-0.552	-0.866
	(0.600)	(0.465)
Father's education missing	0.047	-0.522
	(0.722)	(0.551)
Single Parent/Broken Home	0.559	0.586
	(0.259)*	(0.210)**
Mother high school grad	-1.018	-0.833
	(0.743)	(0.523)
Mom has some college (no bachelor's degree)	-0.570	-0.051
	(0.773)	(0.511)
Mother has bachelor's degree or higher	-1.010	-0.895
	(0.772)	(0.645)
Mother's education missing	1.056	0.168
	(1.142)	(0.850)

Appendix A: Table 1 (continued)

Probability of First Stopout - Gamma & Discrete Multinomial Distributed Unobserved Heterogeneity

(Coefficient Estimates)

	(1) Gamma	(2) HS-2
SAT score/100	-0.269	-0.184
	(0.086)**	(0.068)**
Didn't take SAT or ACT	0.952	-0.196
	(1.062)	(0.765)
High School GPA: 84 to 75	0.873	0.703
	(0.277)**	(0.216)**
High School GPA: 74 to 60	1.089	1.509
	(0.572)	(0.435)**
High School GPA missing	-0.545	-0.043
	(0.497)	(0.389)
State weekly earnings in mfg. sector/1,000	-0.145	-0.627
	(1.658)	(1.501)
State unemployment rate	0.089	0.131
	(0.117)	(0.116)
Constant	-0.095	-2.186
	(1.524)	(0.472)**
gamma var.	2.142	
	(0.766)	
m2		3.673
		(0.472)
Note: m1 = 0		
Person-spell records	2,590	2,590
N	469	469
log L	-685.31	-683.98

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

Appendix B
Alternative IV Approach Estimates

Appendix B: Table 1
Probability of First Stopout - Alternative IV Approach
(Marginal Effects)

	(1) Semiparametric PH Model	(2) Panel LP Model	(3) Panel Probit Model
HBCU	-0.032	-0.042	-0.034
	(0.040)	(0.065)	(0.047)
Residuals	0.042	0.049	0.043
	(0.049)	(0.065)	(0.055)
Fall 1996	0.051	0.070	0.055
	(0.019)**	(0.023)**	(0.021)**
Spring 1997	-0.015	-0.020	-0.020
	(0.015)	(0.020)	(0.016)
Fall 1997	0.042	0.049	0.045
	(0.022)	(0.024)*	(0.024)
Spring 1998	-0.033	-0.037	-0.039
	(0.015)*	(0.020)	(0.016)*
Fall 1998	0.003	0.003	0.002
	(0.021)	(0.024)	(0.023)
Spring 1999	-0.061	-0.058	-0.065
	(0.013)**	(0.020)**	(0.013)**
Male	0.005	0.003	0.005
	(0.011)	(0.014)	(0.012)
Family Income < $16,100	-0.024	-0.036	-0.027
	(0.013)	(0.020)	(0.015)
Family Income $16,100 - $31,500	-0.012	-0.017	-0.016
	(0.013)	(0.019)	(0.016)
Family Income $31,500 - $53,750	-0.024	-0.035	-0.027
	(0.013)	(0.017)*	(0.015)
Father high school grad	-0.020	-0.036	-0.030
	(0.022)	(0.040)	(0.025)
Father has some college (no bachelor's degree)	-0.030	-0.061	-0.042
	(0.018)	(0.042)	(0.020)*
Father has bachelor's degree or higher	-0.044	-0.073	-0.057
	(0.022)*	(0.042)	(0.025)*
Single Parent/Broken Home	0.033	0.041	0.038
	(0.013)**	(0.015)**	(0.014)**
Mother high school grad	-0.020	-0.036	-0.024
	(0.030)	(0.058)	(0.037)
Mother has some college (no bachelor's degree)	0.012	0.010	0.013
	(0.038)	(0.062)	(0.044)
Mother has bachelor's degree or higher	-0.018	-0.028	-0.020
	(0.037)	(0.065)	(0.043)

Appendix B: Table 1 (continued)
Probability of First Stopout - Alternative IV Approach
(Marginal Effects)

	(1) Semiparametric PH Model	(2) Panel LP Model	(3) Panel Probit Model
SAT score/100	-0.012	-0.013	-0.013
	(0.004)**	(0.005)**	(0.004)**
Didn't take SAT or ACT	-0.004	0.029	0.007
	(0.040)	(0.074)	(0.053)
High School GPA: 84 to 75	0.046	0.060	0.050
	(0.015)**	(0.018)**	(0.016)**
High School GPA: 74 to 60	0.085	0.110	0.097
	(0.043)*	(0.049)*	(0.047)*
State weekly earnings in mfg. sector/1,000	-0.033	-0.041	-0.044
	(0.072)	(0.087)	(0.081)
State unemployment rate	0.001	0.002	0.000
	(0.006)	(0.007)	(0.006)
Person-term records	2355	2355	2355
N	469	469	469
-2 log L	1355.80		1356.73
R-squared		0.06	

Robust standard errors in parentheses
* significant at 5%; ** significant at 1%

Full regression includes a constant term, and dummy variables for missing parental education, and missing high school GPA

Appendix C
HSB & BPS Sample Means

Appendix C: Table 1
Means of Explanatory Variables for HSB and BPS Cohorts

Variables	**Total (N = 816)**	*HSB* **TWI (N = 572)**	**HBCU (N = 244)**	**Total (N = 469)**	*BPS* **TWI (N = 323)**	**HBCU (N = 146)**
Male	0.43	0.43	0.42	0.35	0.37	0.29
Senior Cohort	0.61	0.59	0.67			
Family Income						
$6,999 or less	0.11	0.09	0.15	0.20	0.17	0.26
$7,000 to $11,999	0.17	0.17	0.16	0.17	0.16	0.17
$12,000 to $15,999	0.17	0.17	0.17	0.10	0.11	0.07
$16,000 to $19,999	0.12	0.12	0.12	0.10	0.10	0.09
$20,000 to $24,999	0.14	0.15	0.10	0.10	0.11	0.10
$25,000 to $37,999	0.10	0.10	0.08	0.19	0.20	0.16
$38,000 or more	0.06	0.07	0.06	0.15	0.14	0.16
Father's Education						
less than high school	0.19	0.16	0.26	0.04	0.04	0.04
high school graduate	0.22	0.22	0.23	0.40	0.40	0.40
some college (no bachelor's degree)	0.12	0.13	0.09	0.15	0.14	0.16
bachelor's degree or beyond	0.15	0.16	0.12	0.33	0.34	0.33
Single Parent/Broken Home	0.41	0.41	0.39	0.45	0.41	0.51
Mother's Education						
less than high school	0.15	0.14	0.18	0.03	0.03	0.02
high school graduate	0.29	0.30	0.27	0.41	0.43	0.38
some college (no bachelor's degree)	0.20	0.19	0.25	0.20	0.20	0.21
bachelor's degree or beyond	0.18	0.19	0.16	0.34	0.32	0.39
High School Grades						
100 to 90	0.13	0.16	0.04	0.20	0.24	0.12
89 to 85	0.26	0.29	0.20	0.36	0.35	0.40
84 to 80	0.21	0.19	0.25	0.16	0.18	0.11
79 to 75	0.27	0.25	0.31	0.14	0.11	0.21
74 to 70	0.10	0.07	0.16	0.03	0.03	0.03
69 to 60	0.03	0.03	0.04	0.01	0.01	
Public Institution	0.69	0.70	0.68	0.63	0.75	0.38

Appendix D

Appendix D: Table 1
Single-Spell Logit Estimates for Probability of First Stopout - BPS Cohort
(Random Effects)

	(1) Logit Hazard Model	(2) Logit Hazard Model w/Background Characteristics	(3) Random Effects Logit Hazard Model	(4) IV Stage 2 Logit Hazard Model	(5) Alternative IV Logit Hazard Model
HBCU	0.013	0.004	0.002	-0.019	-0.019
	(0.012)	(0.011)	(0.012)	(0.047)	(0.042)
Residuals					0.026
					(0.048)
Spring 1996	0.097	0.078	0.089	0.079	0.078
	(0.024)**	(0.021)**	(0.024)**	(0.021)**	(0.021)**
Fall 1996	0.004	0.005	0.027	0.006	0.006
	(0.019)	(0.016)	(0.020)	(0.016)	(0.016)
Spring 1997	0.069	0.072	0.124	0.073	0.073
	(0.024)**	(0.023)**	(0.035)**	(0.023)**	(0.023)**
Fall 1997	-0.025	-0.011	0.027	-0.011	-0.011
	(0.017)	(0.017)	(0.026)	(0.017)	(0.017)
Spring 1998	0.015	0.033	0.097	0.033	0.033
	(0.021)	(0.023)	(0.039)*	(0.023)	(0.023)
Fall 1998	-0.059	-0.041	-0.007	-0.041	-0.041
	(0.014)**	(0.015)**	(0.025)	(0.015)**	(0.015)**
Male		0.007	0.006	0.005	0.006
		(0.010)	(0.012)	(0.010)	(0.010)
Family Income < $16,100		-0.027	-0.029	-0.026	-0.026
		(0.012)*	(0.014)*	(0.012)*	(0.012)*
Family Income $16,100 - $31,500		-0.011	-0.012	-0.013	-0.013
		(0.013)	(0.015)	(0.013)	(0.013)
Family Income $31,500 - $53,750		-0.023	-0.023	-0.024	-0.024
		(0.012)	(0.013)	(0.013)	(0.013)
Father high school grad		-0.017	-0.012	-0.021	-0.021
		(0.019)	(0.026)	(0.021)	(0.021)
Father has some college (no bachelor's degree)		-0.028	-0.026	-0.031	-0.031
		(0.016)	(0.021)	(0.017)	(0.017)

Appendix D: Table 1 (continued)
Single-Spell Logit Estimates for Probability of First Stopout - BPS Cohort
(Random Effects)

	(1) Logit Hazard Model	(2) Logit Hazard Model w/Background Characteristics	(3) Random Effects Logit Hazard Model	(4) IV Stage 2 Logit Hazard Model	(5) Alternative IV Logit Hazard Model
Father has bachelor's degree or higher		-0.041	-0.040	-0.044	-0.045
		(0.019)*	(0.025)	(0.021)*	(0.021)*
Single Parent/Broken Home		0.029	0.033	0.031	0.032
		(0.011)**	(0.014)*	(0.013)*	(0.013)*
Mother high school grad		-0.030	-0.041	-0.024	-0.024
		(0.027)	(0.029)	(0.030)	(0.030)
Mother has some college (no bachelor's degree)		-0.003	-0.012	0.006	0.007
		(0.028)	(0.029)	(0.037)	(0.037)
Mother has bachelor's degree or higher		-0.035	-0.042	-0.024	-0.023
		(0.027)	(0.029)	(0.036)	(0.036)
SAT score/100		-0.010	-0.012	-0.011	-0.011
		(0.003)**	(0.004)**	(0.004)**	(0.004)**
Didn't take SAT or ACT		-0.005	0.011	-0.005	-0.005
		(0.038)	(0.052)	(0.038)	(0.039)
High School GPA: 84 to 75		0.045	0.055	0.045	0.045
		(0.015)**	(0.019)**	(0.015)**	(0.015)**
High School GPA: 74 to 60		0.114	0.132	0.101	0.101
		(0.045)*	(0.077)	(0.048)*	(0.048)*
State weekly earnings in mfg. sector/1,000		-0.076	-0.050	-0.086	-0.086
		(0.069)	(0.077)	(0.071)	(0.072)
State unemployment rate		0.009	0.007	0.008	0.008
		(0.005)	(0.006)	(0.005)	(0.005)
Heterogeneity Std. Dev. (s_u)			1.300		
			(0.154)		
Person-term records	2,590	2,590	2,590	2,590	2,590
N	469	469	469	469	469
-2 log L	1,474.95	1,386.15	1,372.82	1,386.14	1,385.82

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

Appendix D: Table 2

Two-Spell Logit Estimates for Probability of First Stopout (spell 1) and Probability of Re-Entry (spell 2)

(Random Effects)

	(1) Logit Hazard Model	(2) Logit Hazard Model	(3) IV Stage 2 Logit Hazard Model	(4) IV Stage 2 Logit Hazard Model w/Random Effects
HBCU	0.011	0.008	-0.011	-0.013
	(0.010)	(0.008)	(0.026)	(0.024)
HBCU * Spell 2	-0.034	-0.025	-0.054	-0.051
	(0.015)*	(0.011)*	(0.058)	(0.053)
Fall 1996	0.049	0.060	0.050	0.048
	(0.015)**	(0.015)**	(0.014)**	(0.013)**
Spring 1997	-0.017	0.007	0.008	0.011
	(0.012)	(0.012)	(0.011)	(0.011)
Fall 1997	0.005	0.043	0.046	0.050
	(0.012)	(0.016)**	(0.016)**	(0.016)**
Spring 1998	-0.046	-0.017	-0.008	-0.002
	(0.010)**	(0.011)	(0.011)	(0.012)
Fall 1998	-0.022	0.009	0.021	0.029
	(0.012)	(0.014)	(0.015)	(0.016)
Spring 1999	-0.060	-0.037	-0.026	-0.020
	(0.008)**	(0.009)**	(0.010)**	(0.010)*
Spell 2 (out of college)	-0.007	0.064	0.072	0.050
	(0.014)	(0.018)**	(0.208)	(0.173)
Fall 1996 * Spell 2	-0.045			
	(0.010)**			
Spring 1997 * Spell 2	-0.035			
	(0.019)			
Log(terms out of college in spell 2)		-0.135	-0.118	-0.109
		(0.013)**	(0.012)**	(0.012)**
Terms enrolled in spell 1			0.021	0.023
			(0.019)	(0.018)
(Terms enrolled in spell 1) ^{2}			-0.004	-0.004
			(0.003)	(0.003)
Male			0.003	0.003
			(0.007)	(0.006)
Male * Spell 2			-0.021	-0.019
			(0.010)*	(0.009)*
Family Income < \$16,100			-0.017	-0.016
			(0.008)*	(0.008)*
Family Income < \$16,100 * Spell 2			0.037	0.032
			(0.041)	(0.038)
Family Income \$16,100 - \$31,500			-0.008	-0.008
			(0.009)	(0.009)
Family Income \$16,100 - \$31,500 * Spell 2			0.021	0.018
			(0.033)	(0.030)

Appendix D: Table 2 (continued)

Two-Spell Logit Estimates for Probability of First Stopout (spell 1) and Probability of Re-Entry (spell 2)

(Random Effects)

	(1) Logit Hazard Model	(2) Logit Hazard Model	(3) IV Stage 2 Logit Hazard Model	(4) IV Stage 2 Logit Hazard Model w/Random Effects
Family Income $31,500 - $53,750			-0.015	-0.014
			(0.008)	(0.008)
Family Income $31,500 - $53,750 * Spell 2			0.033	0.029
			(0.038)	(0.034)
Father high school grad			-0.013	-0.012
			(0.013)	(0.014)
Father high school grad * Spell 2			-0.012	-0.012
			(0.021)	(0.022)
Father has some college (no bachelor's degree)			-0.019	-0.019
			(0.011)	(0.011)
Father has some college (no bachelor's degree) * Spell 2			-0.006	-0.006
			(0.029)	(0.028)
Father has bachelor's degree or higher			-0.028	-0.027
			(0.013)*	(0.013)*
Father has bachelor's degree or higher * Spell 2			0.012	0.010
			(0.037)	(0.038)
Single Parent/Broken Home			0.020	0.020
			(0.008)*	(0.008)*
Single Parent * Spell 2			0.001	0.003
			(0.017)	(0.017)
Mother high school grad			-0.018	-0.018
			(0.018)	(0.016)
Mother high school grad * Spell 2			-0.012	-0.012
			(0.028)	(0.025)
Mother has some college (no bachelor's degree)			0.002	0.001
			(0.021)	(0.018)
Mother has some college (no bachelor's degree) * Spell 2			-0.012	-0.012
			(0.029)	(0.026)
Mother has bachelor's degree or higher			-0.018	-0.016
			(0.019)	(0.017)
Mother has bachelor's degree or higher * Spell 2			0.019	0.014
			(0.055)	(0.050)

Appendix D: Table 2 (continued)

Two-Spell Logit Estimates for Probability of First Stopout (spell 1) and Probability of Re-Entry (spell 2)

(Random Effects)

	(1) Logit Hazard Model	(2) Logit Hazard Model	(3) IV Stage 2 Logit Hazard Model	(4) IV Stage 2 Logit Hazard Model w/Random Effects
SAT score/100			-0.007	-0.008
			(0.003)**	(0.002)**
SAT score/100 * Spell 2			0.005	0.005
			(0.006)	(0.006)
Didn't take SAT or ACT			-0.004	-0.000
			(0.025)	(0.023)
Didn't take SAT or ACT * Spell 2			0.086	0.074
			(0.164)	(0.148)
High School GPA: B to C			0.029	0.029
			(0.010)**	(0.010)**
High School GPA: B to C * Spell 2			-0.021	-0.019
			(0.011)*	(0.010)
High School GPA: C- to D-			0.070	0.066
			(0.032)*	(0.037)
High School GPA: C- to D- * Spell 2			-0.029	-0.024
			(0.013)*	(0.012)*
State weekly earnings in mfg. sector/1,000			-0.059	-0.054
			(0.048)	(0.046)
State weekly earnings in mfg. sector/1,000 * Spell 2			0.101	0.086
			(0.113)	(0.103)
State unemployment rate			0.005	0.005
			(0.003)	(0.003)
State unemployment rate * Spell 2			-0.019	-0.018
			(0.008)*	(0.007)*
Heterogeneity Std. Dev. (s_u)				0.601
				(0.092)
Person-spell-term records	3,560	3,560	3,560	3,560
N	469	469	469	469
-2 log L	1,847.69	1,785.13	1,681.50	1,676.89

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

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CHAPTER II

THE EFFECT OF FINANCIAL AID ON COLLEGE PERSISTENCE AND GRADUATION OUTCOMES

1. Introduction

The Basic Educational Opportunity Grant (BEOG), known today as the Pell Grant, was created in 1972 as the cornerstone of federal college aid to low-income families. The intent of the program is to make the cost of a college education more affordable and hence make higher education more accessible to lower income students. A measure of ability to pay, called the Expected Family Contribution (EFC), is calculated based on information provided on the Free Application for Federal Student Aid (FAFSA) and used to determine the amount of the grant for which a student is eligible. The formula used to calculate EFC is progressive so that families with less ability to pay for college are awarded grants closer to the maximum amount legislated for the year in which they apply.

There is a significant body of literature examining the sensitivity of college attendance decisions to changes in college costs. The consensus among most of these studies suggests a negative relationship between price and enrollment behavior, especially among lower income families who consistently prove to be more sensitive to increases in the cost of college than higher income families. This relationship implies that if means-tested federal aid programs such as the Pell grant were effective policy tools for alleviating price barriers to college enrollment one might expect to find evidence of increased enrollment rates among low income students following the introduction of the Pell grant, with the greatest enrollment response being for those who were eligible for larger grants. Surprisingly however, evidence in support of this hypothesis has not been particularly strong.

The existing financial aid literature presents an intriguing question regarding the effectiveness of the Pell grant program in accomplishing its initial goal. Despite Manski and Wise's (1983) prediction that the introduction of the Pell grant program would induce a 59 percent increase in college enrollment for low-income students, both Hansen (1983) and Kane (1994) report much lower effects or none at all for the students who were eligible for the grants during the 70s and 80s.

One possible explanation for the absence of evidence that greater numbers of low-income students began enrolling in college during the years following the introduction of the Pell grant may be that high levels of unmet need continued to exist for low income students even after the Pell grant was applied to the cost of college. Over the years, increases in the maximum Pell award have not kept pace with increases in college costs. However, while the size of the grants may not be adequate enough to induce large increases in college entry among low income students, the Pell grant may instead serve as a type of transfer payment to those Pell eligible students who would have enrolled in college even without the grant, and may have effects on post entry outcomes such as persistence and graduation.

In this paper I use a discrete-time proportional hazard model to estimate the effect of the Pell grant on the persistence behavior of Pell eligible students, conditional upon initial enrollment. I adopt estimation methods to deal with the endogeneity of financial aid in order to obtain unbiased estimates of the effect of financial aid on persistence behavior. The remainder of this paper proceeds as follows. Section 2 includes a review of the literature;

Section 3 provides a description of the data, followed by a general discussion of the college financial aid landscape and an explanation of the Pell grant formula in Section 4. The empirical model and methodology are described in Section 5, and average four-year persistence outcomes of financial aid recipients and non-recipients (aid assumed exogenous) are compared in Section 6. Section 7 provides strategies for identifying the effects of increases in financial aid and presents endogeneity corrected estimates. Section 8 provides a discussion of the results and conclusion.

2. Literature Review

While there is a substantial body of literature on the responsiveness of enrollment behavior to changes in college costs and financial aid, considerably less has been written regarding the relationship between financial aid and college persistence and graduation. This section includes a summary of the two dominant theories of persistence, as well as the growing literature that has begun to incorporate the role of financial aid.

The first major advances toward understanding the process by which students decide to remain enrolled after initially entering college were made by Spady (1970, 1971), Tinto (1975, 1982, 1988, 1993), and Bean (1980, 1982, 1983). The culmination of Spady's and Tinto's work resulted in what has become known as the Student Integration Model. This theory proposes that a student's academic and institutional commitments are a reflection of how well individual motivations and academic ability match the institution's academic program (academic integration), as well as the extent to which the student fits within the social environment of the school (social integration).

Bean's Student Attrition Model, on the other hand, places more emphasis on a student's intention to remain enrolled or depart from college, as influenced largely by factors external to the institution, such as family background, peer and parental influences.

Since these theories were developed, other researchers have discovered that there is considerable overlap between the two and that fuller understanding of the persistence process could be gained by combining elements of the two (Cabrerra et al 1992, 1993). Recently, the study of college persistence has taken on another dimension as economists and policymakers have sought to have a better understanding of how financial aid affects persistence decisions.

DesJardins, Ahlburg and McCall (1999) use a discrete time hazard model, fitted to institutional data from the University of Minnesota to examine student departure and how it is affected by various types of financial aid offers. They observe a sample of nearly four-thousand students who entered the University of Minnesota Minneapolis campus as New High School students in the fall of 1986. Twenty-two trimesters (three terms per year for just over seven years) of data were collected on these individuals. Their results reveal that scholarships, loans, and work/study all have negative effects on stopout[28], but that grants had no effect. In a second paper, DesJardins, et al (2001) reestimate their single event hazard model of college stopout and use it to perform simulations whereby they change the amount and type of aid received over time to examine how these changes affect departure decisions. They first obtained a baseline median survival rate of 8.85 terms (2.95 years) which was estimated when conditional upon a loan or scholarship offer, students received the average loan and scholarship offers for the first five years, and no aid thereafter. Next, the authors manipulated the structure and timing of aid packages in various ways and estimated the

[28] The term stopout is commonly used to refer to failure to maintain continuous and consecutive terms of enrollment. DesJardins, et al control for the possibility of graduation prior to first stopout in the single event model by right censoring observations at the time of graduation.

corresponding survival rates. DesJardins, et al report that different types of aid do in fact have different effects on student departure behavior, and that the composition of aid packages matter to students. For example, the Princeton approach, which involves converting all loans to scholarships, increased the median time to stopout from 8.85 (2.95 years) to 11.13 (3.71 years) academic terms. Similarly, the practice of frontloading, providing scholarships and/or grants in the first two years only, increased median time to stopout from 8.85 to 9.69 (3.23 years).

Wetzel, O'Toole and Peterson (1999) focus on the effect of changes in financial aid for freshman and sophomore students at Virginia Commonwealth University (VCU) from 1989-1992[29]. They conclude that increases in real net cost (tuition minus grants) and real tuition reduce the likelihood of retention, while loans and work study have no significant effect. Estimating the effect of financial aid on persistence separately for African-American and White students at VCU, they report that both groups respond negatively to increases in real net costs and real tuition. However, while persistence among white students is negatively related to student loan amounts, for African-American students the relationship is weakly positive. For VCU students of all races, the impact of financial variables pale in comparison to that of academic and social integration variables.

In her study of the effect of the Social Security Student Benefit Program on college attendance and completion, Dynarski (1999) finds evidence to suggest that a student who entered college with the assistance of aid is likely to remain in school longer. Using five cohorts of high school seniors from the National Survey of Youth (NLSY), three from before the program was eliminated (1979-1981) and two from after the program was eliminated

[29] VCU is a large (22,000) urban public university with a high proportion of working and part-time students, as well as substantial numbers of older and minority students.

(1982-1983), she applies a difference-in-differences approach to examine the effect of eligibility for Social Security student benefits due to the death of one's father on college attendance and schooling completed. She concludes that aid eligibility increases the probability of completing at least a year of college by 16.1 percentage points.

Singell (2004) employs University of Oregon data on fall term freshmen applicants and enrollees for the 1997-98 and 1998-99 academic years to estimate the probability that students re-enroll after their first year. He models the re-enrollment decision jointly with the initial enrollment decision in order to estimate the marginal effect of observable attributes (e.g. financial aid) on retention conditioned on unobservable factors (e.g. motivation) that are revealed in the decision to enroll. His findings suggest that the unobserved attributes making a student likely to enroll also cause her to be more likely to re-enroll, and failure to control for this unobserved heterogeneity across students can overstate the impact of financial aid. Looking at the effects of the level of aid in the first year of college, he finds that the more need-based financial aid students receive (grants and subsidized loans), the more likely they are to re-enroll. Specifically, a $1,000 increase in grants and subsidized loans respectively increase retention probabilities by 1.4 and 4.3 percentage points.

Wei and Horn (2002) provide a summary of persistence patterns for Pell grant recipients. Using the Beginning Postsecondary Students Longitudinal Study, "First Follow-up" (BPS:96/98) data, they compared rates of persistence, for Pell recipients and non-recipients, 3 years after they first began their postsecondary education.[30] While they detected no differences between Pell grant recipients and non-recipients in their rates of persistence, Wei and Horn report that being African-American, older than 19 years of age, in the lowest

[30] Persistence in this context refers to the likelihood that a student remains enrolled continuously at an institution of the same or higher level over the 3 year period. Since Pell Grant recipients are predominantly low income students, Pell recipients were only compared to low- and middle-income non-recipients.

income quartile, and working full-time all to be associated with lower persistence rates. Having a parent or parents with an advanced degree, and attending a private not-for-profit four-year institution were associated with higher rates of persistence. Within the subset of low- and middle-income students, Pell recipients were found to differ from nonrecipients in their level of high school academic preparation and the number of factors that put them at risk for leaving postsecondary education without a degree.

Bettinger (2004) examines the effect of Pell grants on the decision to persist after the first year for students in Ohio public colleges. To control for the bias associated with the endogeneity of the Pell grant with respect to other variables which also directly affect college persistence, the author seeks to exploit variation in Pell grants that are independent of college choice and student behavior using both panel and cross-section identification strategies. As a means of panel identification Bettinger imputes what students' Pell grants would have been during the 2000-2001 academic year assuming the only changes affecting the size of the Pell grant are changes in the Pell grant formula or tuition. Cross section identification was achieved by taking advantage of discontinuities in the Pell formula based upon differences in family composition and resources.

Based upon imputed Pell values for the second year of enrollment (panel identification), a \$1,000 increase in a student's Pell grant resulted in a 6.4 – 9.2 percentage point drop in the likelihood that a student would withdraw. By comparing families of different sizes within an income group (cross-section identification) the author reports a 1.2 - 4 percentage point decrease in the likelihood that a student drops out for a \$1,000 increase in the Pell grant.

While studies examining the relationship between financial aid and college persistence and graduation are fairly new to the higher education literature, and the results somewhat mixed, most suggest that increasing grants, scholarships and subsidized loans reduces the likelihood of stopping out and increases the likelihood of graduating. In instances where this is not the case, the effect was not statistically significant. Those who have specifically attempted to estimate the responsiveness of re-enrollment decisions to need-based grants, like the Pell, have reported results ranging from no relationship (DesJardins et al, 1999, 2001; Wei & Horn, 2002) to a modest positive relationship (Bettinger, 2004; Singell, 2004). Such a relationship is consistent with that found in much of the college enrollment literature, suggesting that the Pell grant has little or no effect either upon initial enrollment or re-enrollment. The chart below provides a summary of the results from related literature.

Author(s)	**Data**	**Outcome**	**Types of Aid**	**Effect of Aid on Outcome**
Bettinger (2004)	Freshmen at Ohio public colleges (1999-2001)	Persistence	Pell grant	Reduces stopout
DesJardins, Ahlburg, McCall (1999)	Freshman at University of Minnesota (1986-1992)	Persistence	Scholarships (merit-based), loans, work-study	Reduces stopout
			Grants (need-based)	No effect
Wetzel, O'Toole, Peterson (1999)	Freshmen & sophomores at Virginia Commonwealth University (1989-1992)	Persistence	Real net cost = (tuition – grants)	Reduces stopout
			Loans, work-study	No effect
Singell (2004)	Freshmen at University of Oregon (1997-1999)	Persistence	Need-based grants & subsidized loans	Reduces stopout
Stater (2004)	Three large public universities	Graduation	Grants, subsidized loans & merit aid	Increases probability of graduation
Dynarski (1999)	High school seniors from NLSY (1979 – 1983)	Graduation	Social Security Student Benefits	Increases probability of graduation

This study contributes to the growing literature on financial aid and persistence by addressing three important issues. First, the majority of research in this area is based upon data from a single institution or a single state. As such, the national implications of the results could be limited if particular types of students apply to the institutions being studied, or the state or institution being studied is not very representative of the nation as a whole. For example, two of the six studies cited were based on institutions with a very limited African-American student population (2% at University of Minnesota – DesJardins et al, 1999; 1.3% at University of Oregon – Singell, 2004). Given the fact that over two-thirds of African-American college students receive some type of financial aid it is important that these students be adequately represented in any study of the relationship between financial aid and college outcomes. Second, most persistence studies are focused only on persistence after the first year, and fail to observe enrollment behavior over time (or across institutions) as it leads up to graduation, the ultimate goal of college attendance. While most dropouts occur between the first and second years of college, DesJardins et al (1999, 2001) report significant effects of financial aid on re-enrollment beyond the second year. Third, much of the research providing estimates of the sensitivity of college enrollment and persistence decisions to financial aid is limited by the quality of financial aid data available. For example, many data sets only include measures indicating whether a student received a particular type of aid, or the actual amount of aid received. Receipt of financial aid is likely to be endogenous because it depends on academic performance (merit-based aid) and family income or background (need-based aid), which themselves affect stopout behavior. Failure to control for these relationships will result in biased estimates. Additionally, students who receive aid are part of a subset of the student population who apply for financial aid. If these students are more conscientious regarding their educational pursuits than students who do not apply for, and therefore do not receive, financial aid, then the estimated effects of financial aid will be biased.

Using a national sample of students and detailed financial aid records, this study adopts several estimation methods to deal with endogeneity and selection issues in order to obtain unbiased estimates of the effect of financial aid on college persistence patterns over time.

3. Data

In order to address the data issues described above, I use data from the 1995-96 cohort of the Beginning Postsecondary Students Longitudinal Study (BPS). This data set consists of students who were identified as first time beginning (FTB) postsecondary students in the National Postsecondary Student Aid Study (NPSAS), a program that collects financial aid and other demographic data on nationally representative cross-sectional samples of all students in postsecondary institutions in the 50 states, the District of Columbia, and Puerto Rico. Data are obtained from administrative records of student financial aid, as well as student and parent interviews. BPS picks up where NPSAS leaves off by collecting follow-up information about student experiences during, and transitions through, postsecondary education every 2-3 years for up to six years. Since students in this data set are sampled from colleges and universities across the nation, there will be less potential for obtaining estimates that are unrepresentative of the total population of college students than in a sample from a single university. Furthermore, the availability of a six year panel makes it possible to observe persistence behavior over a longer time horizon. BPS data is also unique because it includes all of the information collected annually on federal student aid forms, as well as records of scheduled Pell awards available from the National Student Loan Data System (NSLDS). NSLDS is a comprehensive database of Title IV loans and Pell grants compiled and maintained by the U.S. Department of Education.

The BPS data set includes 4,865 dependent[31] students between the ages of 17 and 21 who began college at four-year institutions in the fall of the 1995-1996 academic year and completed a FAFSA for that year as well. I restrict the sample to students who filed a FAFSA for the 1995-1996 academic year in order to make use of information provided on the federal aid forms, and for non-applicants this data is missing[32]. While the majority of dependent students in the sample (86%) completed a FAFSA for the 1995-1996 academic year, most of those who didn't reported that their number one reason for not filing was their family could afford to pay for college or they believed their income was too high to qualify for financial aid (60%)[33]. All non-filers reported zero receipt of any type of aid.

Sample means for the full sample of FAFSA filers, as well as Pell recipients and non-recipients are presented in Table 2.1. Comparison of Pell recipients and non-recipients reveals that the average total family income of Pell recipients is more than $40,000 less than that of non-recipients. These differences in family income are reflected in the fact that Pell recipients are also less likely than non-recipients to have college educated parents, and more

[31]Students were considered independent if they were: 1) age 24 or older as of 12/31/1995; 2) a veteran of the U.S. Armed Forces; 3) enrolled in a graduate or professional program beyond a bachelor's degree in 1995-96; 4)married; 5)an orphan or ward of the court; or 6) had legal dependents, other than a spouse.

[32]Using only FAFSA filers in the analysis implies that the estimated effects will only apply to this subsample of students. In the event that changing aid rules results in a shift in the overall demographic of eligible students, and thus the pool of aid applicants, the estimated effects for the current pool of aid applicants would not accurately reflect those who may become eligible in the future. Moreover, if the selection is based in part on factors that are endogenous to the behavior studied here, then this could potentially result in biased estimates. A model of sample selection was estimated and revealed that accounting for self-selection did not appear to significantly affect the estimates. The model is described and estimates presented in Appendix A.

[33]This percentage is based only on the responses of those who answered the question about why they didn't apply. Twenty percent of non-applicants (154 individuals) did not respond to the question.

likely to come from a background where their biological parents are not married either due to divorce, separation, or the fact that they never married. In terms of academic performance, Pell recipients in this sample have an average SAT score that is 105 points lower than that of non-recipients. Though Pell recipients were also less likely to report an A to A- (100 – 90) grade average in high school, differences in first year college grades for recipients and non-recipients are much less pronounced. Pell recipients were also more likely than non-recipients to attend public, in state colleges, and less likely to live on campus while in college. These decisions are consistent with the need many lower income families have to minimize the cost of attending college.

Before discussing patterns in financial aid receipt for the sample, I will describe the different types and sources of financial aid.

4. Financial Aid for College

In analyzing the effect of the Pell grant on persistence and graduation outcomes, it is important to understand the Pell program within the broader context of financial aid. Though the Pell grant is the primary focus of this analysis, few students receive Pell funds as their only source of financial aid. As a matter of fact, only 3 percent of Pell recipients in the sample received Pell grant funds as their sole source of financial aid. More commonly students receive an aid package that consists of a combination of different types of aid including grants, loans, work-study, or some other type of benefit or entitlement (e.g. veterans benefits, military aid, vocational rehabilitation, JTPA, etc.). Along with the federal government, the primary sources of financial aid include state governments, colleges and universities, and private agencies or employers. Eligibility for each type of aid may be based upon need, merit, or a combination of both. In addition to its use in determining eligibility for federal need-based aid programs (Pell, SEOG, subsidized Stafford and Perkins loans, and federal work study), information reported on the FAFSA is also used to evaluate eligibility for non-need-based federal loans (PLUS and unsubsidized Stafford loans), as well as state and some institutional aid programs. Need-based non-federal aid offers are usually made after federal aid has been calculated.

Grants and loans constitute the majority of aid dollars received by students in the sample. More than half of all aid dollars were paid in the form of grants while nearly one-third of total aid was in the form of loans. In terms of eligibility, 64 percent of total financial aid dollars were awarded on the basis of need. The largest single provider of both need-based and merit-based grant dollars to students was postsecondary institutions. This result is not surprising as institutions often use financial aid offers as a means of competing for students. The federal government provides the second largest amount of need-based aid dollars, primarily in the form of Pell grants which represent 75 percent of all federal grant dollars. The distribution of aid dollars by type, source and need is illustrated in Figures 1.1 – 1.3.

In this analysis financial aid will be measured in three ways: (1) Pell versus non-Pell financial aid, (2) total grants and (3) total financial aid. Non-Pell financial aid includes all other need-based grants, merit-based grants and scholarships, and all loans. According to the sample means presented in Table 2.1, Pell recipients were more likely to receive other types of need-based grants and need-based loans, but slightly less likely to receive merit-based grants and scholarships than students who were not Pell recipients. Because of the cap placed on the amount of loans a student may receive each year, the difference in the average amount of loans was smaller than the difference in the average amount of grants for the two groups. The Pell Grant formula and its relationship to other types of financial aid are explained below.

The Pell Grant Formula

The Pell grant was created as the foundation of federal need-based student aid, to which other forms of aid may be added to cover any remaining unmet need. As such, the size Pell grant a student is eligible to receive is determined without consideration of other financial assistance a student may be receiving, or may be eligible to receive. The following formula is used to calculate the amount of Pell funds a student is eligible to receive

Scheduled Pell Award = min (Pell max – EFC, COA – EFC).

The scheduled Pell award represents the size grant a student is eligible to receive. It is essentially an offer that would be known to the student prior to the deadline for their enrollment decision, but may or may not be the amount the student actually receives[34]. The scheduled Pell award will be the amount used throughout this analysis to estimate Pell grant effects. The Pell max represents the maximum appropriated grant for a given year. The maximum Pell grant is specified in the annual appropriations legislation for the U.S. Department of Education which sets the maximum award that can be made during the fiscal year.

The EFC is the amount of money a family can be expected to contribute to the student's educational expenses. This calculation is based on consideration of available

[34]According to the program guidelines, the actual Pell received will be reduced if a student is enrolled less than full-time or full-year, either in months or credit hours. This may occur if a student drops classes during the semester, resulting in less than the requisite 12 or more credit hours per semester for full-time status, or if a student withdraws from the school before the end of the semester. While seventy percent of Pell recipients in the sample were awarded an actual Pell amount that was less than the scheduled amount, over ninety percent of them were enrolled as full-time students. Therefore, changes in enrollment intensity do not appear to be the reason for the difference. Other possible explanations for the differences between scheduled and actual Pell received in the data may be the result of reporting error, or decisions made at the discretion of the institution to pay a student an amount other than the scheduled award. A student may also choose to accept less than the full amount offered.

income and, for some families, available assets. Family size, the number of family members in college, basic living expenses, federal income tax liability, retirement needs, and other expenses are also taken into account when determining available income. The COA is the cost of attendance which includes tuition and fees, an allowance for room and board, books, supplies, transportation, and miscellaneous personal expenses. With the exception of cases where the COA is less than the appropriated maximum or when tuition is sufficiently low (less than $675), the size of the grant is generally determined by the difference between the maximum appropriated grant and the EFC. By law, a minimum award is also set at $400. Students with an estimated award between $200 and $400 are awarded $400 while students with an estimated award of $200 or less do not receive a Pell grant.

At the bottom of Table 2.1 are sample means and standard deviations (in parentheses) for the EFC, as well as the key variables used in determining the EFC. These variables include parent's available income (AI), parent's contribution from assets (PCA), family size, number of children attending college, and the adjusted parent's contribution (APC). Next, I will explain briefly how these variables factor into calculating a student's EFC.

First, parent's available income is calculated from total income minus any allowances for state and federal income taxes, social security taxes, employment expenses, as well as an income protection allowance (IPA) that takes into account the size of the family and the number of children attending college. The IPA (nonlinearly) increases for each additional family member, and (nonlinearly) decreases for each additional college student, given that the student does not live in the household. Second, up to 12 percent of the value of a family's assets (PCA) is added to available income to determine total parent's contribution. These assets include cash, savings and checking accounts, net worth of investments, and net worth of business and/or farm. Asset contributions are excluded for families with income less than \$50,000[35]. Next, a portion of the total parent's contribution (AI + PCA) is divided by the number of children in college to get the adjusted parent's contribution (APC). Finally, the APC is added to the student's contribution to determine the EFC. While in practice, dependent students' EFCs are determined by contributions from both the parents and the student, since the student's contribution is rarely large enough to have a significant effect on the EFC, for the purpose of my analysis I will focus solely on the determinants of parent's contributions.

In addition to being a crucial part of the Pell grant formula, the EFC is also used to determine eligibility for other types of federal, state and institutional financial aid. In addition to the direct relationship between the EFC and various need-based financial aid awards, including the Pell, changes in the Pell grant itself also affect other need-based aid offers by way of its effect on unmet need, represented by the following equation

Unmet Need = COA – EFC – Scheduled Pell.

Recall that other types of need-based aid may be added to the Pell grant to cover any remaining unmet need. Because of these relationships, non-linearities in the Pell and EFC formulas can be used to identify the effect of financial aid on persistence behavior. Strategies for doing this will be discussed in section 6.

[35] Reauthorization of the Higher Education Act (HEA) in 1992 raised the income cutoff for using the simplified EFC formula from \$15,000 to \$50,000. Under the simplified formula asset contributions are excluded.

5. Empirical Model and Methodology

Human capital theory proposes that the decision to enroll in college is similar to an investment decision in which one chooses to make the investment only if the present discounted value (PDV) of the benefits outweigh the PDV of the costs. As an extension of this idea, the decision to persist, or continue enrollment represents a multi-period investment in which the decision to continue enrollment in each subsequent semester is affected by the cumulative investment in time and resources, or duration of previous enrollment. In order to model such a multi-period investment decision I adopt Cox's popular proportional hazard model. The hazard function, h(t), is defined as

$$\mathbf{h(t) = h_0(t)e^{\beta' X(t)}} \tag{19}$$

where t is the duration variable or time until the student decides not to enroll, $h_0(t)$ is the baseline hazard at time t, X is the vector of explanatory variables, both constant and time-varying, and β is the vector of coefficients to be estimated. Though the underlying persistence process is defined in continuous time (a student may decide to leave at any point in time), durations in the data are measured by academic terms or semesters. Therefore, it is necessary to implement the discrete time equivalent of Cox's model, called the complementary log-log (cloglog) model. Since enrollment is determined at the beginning of the term, when t terms are observed, the actual duration interval is [t, t + 1) terms. Failure to enroll in term t, given enrollment in all previous terms will be called a stopout. For those who graduate without any interruptions in their enrollment, observations are censored at the date of graduation. In a single event framework such as this one, I will be estimating, more specifically, the probability of a *first* stopout in any given fall or spring term. The term stopout is commonly used to refer to failure to maintain continuous and consecutive terms of enrollment. The probability of a first stopout in interval [t, t+1) is defined as

$$\mathbf{P(t \leq T < t + 1|T \geq t) = 1 - exp[-exp(\beta'X(t) + \gamma(t))]} \qquad \textbf{(20)}$$

where the $\gamma(t)$ are the logarithm of the integrated baseline hazard pieces, $\log(\int_t^{t+1} h(u)du)$, summarizing the pattern of duration dependence in the interval hazard. The characteristics in **X** are assumed to be constant within each time interval. The probability of enrollment for exactly t terms is then given by

$$\mathbf{P(t \leq T < t + 1) = P(t \leq T < t + 1|T \geq t) \times P(T \geq t)} \qquad \textbf{(21)}$$

where

$$\mathbf{P(T \geq t) = \prod_{s=1}^{t-1} [1 - P(s \leq T < s + 1|T \geq s)]} \qquad \textbf{(22)}$$

is the probability of enrollment in all terms prior to term t.

For a sample of N individuals labelled i = 1,…, N, each with an observed duration of t_i terms and censoring indicator c_i, with $c_i = 1$ for a stopout and $c_i = 0$ for a censored observation (no stopout), the sample likelihood is given by

$$\mathbf{L = \prod_{i=1}^{N} \{ [P(t_i \leq T \leq t_i + 1|T \geq t_i)]^{c_i} \times [P(T \geq t_i)] \},} \qquad \textbf{(23)}$$

$$\mathbf{L = \prod_{i=1}^{N} \{ [1 - exp[-exp(\beta'X_i(t_i) + \gamma(t_i))]]^{c_i} \times \prod_{s=0}^{t_i-1} [exp[-exp(\beta'X_i(s) + \gamma(s))]] \}.} \qquad (24)$$

The baseline hazard is left unspecified and the likelihood function is estimated using a semi-parametric estimation procedure similar to that used by Meyer (1986). By doing so, I am able to simultaneously estimate β and the $\gamma(\,)$'s. This approach prevents inconsistent estimation of β due to a misspecified baseline hazard and provides a flexible (nonparametric) estimate of the baseline hazard.

In addition to the proportional hazard model described above, I also specify the decision to leave college in each term using linear and nonlinear (probit) discrete time, discrete choice panel data models. For the panel data linear probability and probit models, the probability of first stopout is specified by equations (7) and (8) respectively.

$$\mathbf{P(t \leq T < t + 1|T \geq t) = \beta' X_i(t) + \gamma(t)} \tag{25}$$

$$\mathbf{P(t \leq T < t + 1|T \geq t) = \Phi(\beta' X_i(t) + \gamma(t))} \tag{26}$$

The corresponding likelihood function is

$$\mathbf{L} = \prod_{i=1}^{N} \prod_{s=0}^{t_i} \left\{ [1 - P(s \leq T < s+1|T \geq s)]^{1-d_{is}} \times P(s \leq T < s+1|T \geq s)^{d_{is}} \right\}, \tag{27}$$

where $d_{is} = 0$ if $s < \boldsymbol{t_i}$, and $d_{is} = c_i$ if $s = \boldsymbol{t_i}$. These alternative specifications are estimated in order to test the robustness of the proportional hazard estimates.

In order to estimate each of these models, the data set was converted from its original format, containing one row of data per person, into one in which each person contributes $\boldsymbol{t_i}$ rows, where $\boldsymbol{t_i}$ is the number of time periods (e.g. terms) person *i* was at risk of stopout. Term t = 0 corresponds to the fall 1995 semester. Each subsequent term, t = 1, 2,…,7, represents the first, second,…, and seventh semester (excluding summer terms) after fall 1995, up to the spring 1999 semester, at which point the data is right-censored[36]. If person *i* never experiences a stopout within the observed period of analysis, the binary dependent variable d_{is}=0 for all of person *i*'s spell terms (s=1,…, $\boldsymbol{t_i}$). If a stopout is observed for person

[36]Although data for this cohort of BPS are actually collected through the 2001 spring semester, the tuition data are missing for fall 1999 and spring 2000 (terms 9 and 10). Therefore, I am only able to estimate the full model using pre- fall 1999 observations.

i, the binary dependent variable d_{is}=0 for all but the last of person *i*'s spell terms (s=1,..., $\boldsymbol{t}_\mathbf{i}$ – 1) and d_{it}=1 for the last term (s= $\boldsymbol{t}_\mathbf{i}$). Dummy variables for each term of enrollment are included in the equation for non-parametric estimation of the baseline hazard in each interval.

The decision about whether to stopout in any given term is modeled as a function of individual characteristics, family background, high school academic performance, institutional characteristics, financial aid and the opportunity cost of continued college enrollment as measured by local labor market conditions.

Individual and family background variables include gender (1 = male, 0 = female), family income, whether the student is from a broken or single parent home[37], and a series of dummy variables representing each parent's highest level of education. Family income and parental education have been found to have positive effects on college attedance decisions. They are included in this model to test whether they continue to have the same kind of effect on the decision to persist.

High school academic performance is measured using SAT scores and cumulative high school grade point average. High school academic performance provides a measure of academic preparation for college.

The variables used to control for institutional characteristics include the amount of annual tuition and a binary variable indicating whether the school is public or private (1 = public, 0 = private). Finally, average weekly earnings for the manufacturing industry and unemployment rates for the student's home state are included as measures of the opportunity cost of college enrollment in each term.

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[37]These are students whose parents reported on their financial aid application that they were divorced, separated or never married.

While the individual, academic and family background variables are fixed at their 1995-96 values, tuition, unemployment rates, and average weekly earnings are allowed to vary annually. The frequency with which the values are updated was dictated by the frequency with which the data was collected and is available. Updating is done in such a way as to be consistent with the information that would have been available to the student at the time the re-enrollment decision is made.

Naïve estimates of the persistence model, which assume first year financial aid receipts are exogenous, are presented in section 6, followed in section 7 a description of strategies used to account for the endogeneity of financial aid, and the resulting estimated marginal effects.

6. Persistence Outcomes for Four-Year College Students

Table 2.2 presents marginal effects for the basic model of four-year college persistence described above. In order to capture overall differences in persistence for financial aid recipients, dummy variables are used to indicate whether the student received a Pell grant and/or non-Pell aid during their first year in college (1 = yes, 0 = no). The control group consists of the ten percent of FAFSA filers who received no financial aid their first year in college.

The estimates suggest that overall students who received a Pell grant were no more likely to stop out than students who did not receive financial aid. However, those who received non-Pell financial aid were 1.7 to 2.2 percentage points less likely to stop out than students who received no financial aid. High school academic performance was the greatest determinant of stopout behavior. A 200 point increase in the SAT score reduced the probability of stopout by 1.2 to 1.4 percentage points. Compared to students with an A/B

(100-85) high school grade average, B/C students were 3.0 to 4.6 percentage points more likely to stop out. The stopout probability for students with less than a C average was 5.7 to 8.0 percentage points higher than those with an A/B average.

Students were also less likely to stopout when potential labor market earnings were higher. A $1,000 increase in average weekly earnings in the manufacturing industry reduced stopout probabilities by 6.8 – 8.6 percentage points.

Coming from a broken or single parent household (1.0 to 1.3 percentage points) and lower family income (0.2 percentage point per $25,000 decrease in income) were also positively related to the likelihood of stopping out of college before the completion of a degree. While there were not large racial differences in stopout probabilities, African-American and Asian students were approximately one percentage point less likely to stop out than their white counterparts.

Additionally, there appears to be evidence of a pattern of negative duration dependence from one year to the next in that relative to students enrolled for the fall 1995 term, those who were enrolled for subsequent fall terms were less likely to stop out. Students were more likely to stopout between the spring fall semester.

Estimated racial and income marginal effects were statistically significant at the 5% level. All other estimated effects were significant at the 1% level.

Since the sample is restricted to financial aid applicants for the purpose of using information provided on the federal aid forms to identify the effects of aid on stopout behavior, a model of sample selection was estimated to test for potential self-selection bias. The model is described and estimates are presented in Appendix A. Being African-American, from a broken or single parent household, and having lower family income each increased the probability a student would apply for financial aid. Students with higher SAT scores and high school grades were also more likely to file a FAFSA. Despite these differences in filing patterns, accounting for self-selection does not appear to significantly affect the estimates. Based on this, in the remainder of the analysis I do not control for this selection bias.

Table 2.3 presents estimates of the model using linear and non-linear specifications for the amount of scheduled Pell dollars and non-Pell aid dollars received for year one. The results indicate that an additional $1,000 in Pell funds did not have a statistically significant effect on the probability of stopping out in any term. However, an additional $1,000 in non-Pell funds was associated with a 0.2 percentage point reduction in the probability of stopping out in any term. This estimate was statistically significant at the 5% level.

The marginal effects in Tables 2.2 and 2.3 were estimated assuming that receipt of financial aid is exogenous. This method has been commonly used in the literature because of limitations in the way financial aid data is often reported. In reality however, receipt of a Pell grant, or any other type of aid, is endogenous because it depends on student ability or performance (merit-based aid) and family income and background (need-based aid), which themselves affect stopout behavior. Including simple linear controls for income and family background somewhat control for this, but may not be sufficient as the effects of these variables could be highly nonlinear. Also, the non-Pell aid amounts available in the data set represent actual aid received, not offered, and may be endogenous for reasons related to student behaviors, such as enrollment intensity, that affect the amount of aid received. Strategies used to identify the effect of the effect of financial aid on persistence apart from the effects of income and family composition are explored in the next section.

7. Identifying the Effects of Financial Aid on Persistence and Graduation Outcomes

The challenge of estimating the causal effect of the Pell grant, or any financial aid, on college persistence lies in finding a way to isolate changes in the amount of aid that result from changes in variables which are exogenous to the re-enrollment decision. One way of doing this is by exploiting certain non-linearities in the EFC and Pell grant formulas (Bettinger, 2004). For students attending four-year colleges, changes in a student's Pell grant may be generated in two basic ways – (1) changes in the appropriated maximum grant, and (2) changes in family circumstances that affect the EFC such as changes in income, the number of siblings attending college, or family size. I construct instruments based upon exogenous annual changes in the appropriated Pell maximum (panel identified variation), as well as cross-sectional non-linear variation in the EFC, as a means to identify the causal effect of financial aid on persistence outcomes. Each of these instruments is described below.

Panel Identified Variation in Financial Aid

Each year, the federal government sets the maximum Pell grant award that can be made during the fiscal year. This exogenous variation in the maximum appropriated Pell grant over time can be used to identify the effect of financial aid on stopout behavior. Following a procedure like that proposed by Bettinger (2004), I use the Pell Grant formula *(Scheduled Pell grant = Pell Max – EFC)* to impute values for the Pell grant in each year holding the family's EFC constant over time and assuming that only the appropriated maximum changes from year to year. I take this procedure one step further than Bettinger by regressing the actual scheduled Pell grant for each year on this imputed value for each year, and calculating the predicted values[38]. These predicted values are included in the stopout equation in order to estimate the effect of changes in the Pell grant resulting from the exogenous increase in the appropriated maximum over time.

Table 2.4.A presents estimated marginal effects of changes in the scheduled Pell grant on the probability of stopping out. Results from the first stage regression of the actual scheduled Pell amounts on the imputed Pell amounts are presented in Panel A. The estimate suggests that the scheduled Pell amount increases $691 per $1,000 increase in the imputed Pell amount, resulting from changes in the maximum appropriated grant. This estimate was significant at the 1% level.

Panel B of Table 2.4.A includes three sets of estimates. The first set of estimates (columns (1) – (3)) represents marginal effects of the actual scheduled Pell grant. These estimates are used as a basis for determining the extent to which estimates are biased by endogeneity of financial aid or unobserved heterogeneity. The second set of estimates (columns (4) – (6)) represents estimates of the model obtained using the panel-identified instrument to control for the effect of changes in financial aid. Individual time-invariant random effects are added to the model in columns (7) – (9) to control for the effect of unobserved heterogeneity. Across each specification of the model I consistently find that a $1,000 increase in the scheduled Pell grant reduces the likelihood of stopping out by 0.4 to 0.7 percentage points, although these effects are less precisely estimated in the models which control for unobserved heterogeneity[39]. The heterogeneity variance (σ^2_u) for each of those

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[38]Bettinger (2004) does not use predictions from the regression of the actual Pell on the imputed values, but uses the imputed values directly in his stopout equation.

[39]The **xtreg** command used to estimate the random effects linear model typically reports zero heterogeneity standard deviations when there is limited variation in the values of the dependent variables. (in this case they're

models was 1.79 and 0.82, respectively. Controlling for unobserved heterogeneity also changes the pattern of duration dependence, a result that is consistent with Wooldridge (2001) who argues that duration dependence and unobserved heterogeneity cannot be separately identified in single spell hazard models. The estimates for the terms dummies in columns (7) – (9) suggest that the probability of stopping out actually increases through the third fall term (Fall 1997) before it begins to diminish. Ignoring unobserved heterogeneity also resulted in smaller estimated effects of high school grades. Finally, a $10,000 increase in tuition was also associated with a 1.3 – 1.7 percentage point drop in the probability of experiencing a stopout. This represents the combined effect of within institution variation in tuition rates over time as well as variation in tuition rates across institutions. I assume a priori that stopout rates would be positively related to within college increases in tuition. Therefore, the estimated negative effect suggests that the effect of variation in tuition rates across institutions, acting as a proxy for school quality, outweigh the effect of within college variation. This result suggests that students at more expensive (higher quality) institutions are less likely to stopout. Similarly, Dale and Krueger (1999) find that the average tuition charged by a college is positively related to students' subsequent earnings.

Since the Pell grant is geared toward the neediest students (the average income of Pell recipients in the sample is $22,570) I also test for different effects of the grant by economic status and by race. Specifically, the scheduled Pell grant instrument is interacted with race and with a dummy variable used to indicate whether the student's family income is $25,000

just 0 or 1). Therefore, the nonlinear models are more likely to detecting unobserved heterogeneity with a binary dependent variable.

or less[40]. Time-invariant random effects are used to control for unobserved heterogeneity. These estimates, presented in Table 2.4.B, indicate that on average, students with family income of $25,000 or less who received no aid were 2.5 – 3.6 percentage points more likely to stop out in any term than those with income above $25,000 who also received no aid. A $1,000 increase in the Pell grant reduces the stopout rate of students in the low income group by 1.3 – 2.0 percentage points. Only the panel data linear probability (PDLP) model predicts a statistically significant result at the 5% level. Increasing financial aid does not have statistically significant effects on stopout rates for African-American and white students. However, for Hispanic students the SPH and PDP models suggest that a $1,000 increase in financial aid reduces the stopout rate in any term by 1.4 – 1.7 percentage points.

This panel-identification approach exploits variation in the maximum Pell to identify the effect of changes in the Pell grant that are exogenous to stopout behavior. However, this approach is potentially limited in two ways. First, changes in the Pell grant in turn would also affect non-Pell financial aid amounts because a larger Pell grant reduces the amount of unmet need, which is the amount left to be covered by other grants or loans. I am unable to test for these effects using panel-identified instruments because unlike the Pell grant, other aid variables in the data are not reported annually. Second, the panel-identified estimates still may not adequately control for endogeneity related to variation in family characteristics across individuals. The cross-section identified instruments described below will be used to

[40]While there is no legislated income threshold for Pell grant eligibility, formulas used to determine the EFC and the scheduled Pell amount generally restrict the pool of recipients to those within this income range. Seventy-eight percent of aid applicants in the sample with an annual income of $25,000 or less received a Pell grant their first year in college while 11 percent of aid applicants with income above this range were Pell recipients. Income allowances for family size and the number of college students in a family reduce the EFC, thus making some middle- and upper-middle-income students (those with income above $25,000) eligible for Pell funds. Additionally, reauthorization of the Higher Education Act (HEA) in 1992 raised the income cutoff for using the simplified EFC formula from $15,000 to $50,000, thus making more middle-income students eligible for more aid dollars. Under the simplified formula asset contributions are excluded.

control for this endogeneity as well as to examine the direct and indirect effects of variation in the Pell grant on persistence behavior.

Cross-Section Identified Variation in Financial Aid

The second approach uses non-linear cross-section variation in the EFC to identify the effect of financial aid on persistence behavior. Since the EFC is used to determine a student's Pell grant, as well as eligibility for other types of financial aid, what will actually be estimated is the effect of a change in EFC on persistence through a change in the total aid package. In addition to the relationship between the EFC and non-Pell financial aid, changes in the Pell grant, resulting from variation in the EFC, will in turn affect non-Pell aid through its effect on unmet need *(Unmet need = COA – EFC – scheduled Pell)*.

Columns (1) – (3) of Table 2.5 include estimates of the marginal effect of a $1,000 increase in the amount of the actual scheduled Pell grant. The estimated marginal effect of a $1,000 increase in the Pell grant is a 0.2 percentage point reduction in the likelihood of stopping out in any term, but the estimate is not statistically significant.

In columns (4) – (6) I estimated the model using non-linearities in the EFC formula to identify the effect of the Pell grant on a student's likelihood of stopping out. This was done by adding a cubic in the key variables[41] used to determine the EFC (parent's total income, parent's contribution from assets, family size, and the number of children in college) to the model estimated in columns (1) – (3). Random effects are used to control for unobserved heterogeneity in columns (7) – (9). Under these specifications of the model, the marginal effect of a $1,000 increase in the Pell grant is -0.5 to -0.8. These estimated effects are more precisely estimated in the models with unobserved heterogeneity.

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[41] I also estimated the model using linear, quadratic, and quartic functions of the key EFC determinants. The full set of estimates for each of these specifications is presented in Appendix B: Table 1.

Next, I estimate the total effect of all grants (need-based and merit-based) on the probability of stopping out in any term. Again, I use non-linear variation in the EFC to identify the effect of total grant aid on persistence. I first regress total grants on a cubic in the key determinants of the EFC and the scheduled Pell amount[42]. This is done in order to account for the effects of the EFC determinants and the scheduled Pell amount on the amount of other grant aid a student receives. Since non-Pell grant offers may also be dependent upon merit, tuition and/or race, I also include the tuition rate for the 1995-1996 academic year, high school grades, SAT scores, and race indicators in this first stage equation. The predicted values from this equation are used to estimate the marginal effect of a $1,000 increase in total grants on stopout probabilities shown in Table 2.6. The estimates in columns (1) – (3) suggest that a $1,000 increase in actual grant aid reduces the probability of stopping out by 0.3 percentage points. However, after controlling for the endogeneity of total grant aid, the effect of increasing total grants by $1,000 ranges from no effect to a small positive effect (0.2 percentage points), though these estimates are imprecisely estimated.

Finally, I use the same procedure used to identify the effect of total grants to estimate the effect of the total financial aid package on stopout behavior. The results in columns (1) – (3) of Table 2.7 suggest that a $1,000 increase in the total financial aid package reduces the likelihood of stopping out by 0.2 percentage points. However, using non-linearities in the EFC to identify the effect of financial aid, I find that a $1,000 increase in the total aid package (including grants, loans and work study) increases stopout probabilities by 0.6 to 1.1 percentage points. Therefore, it appears that while students may be less responsive to direct changes in grant aid, stopout behavior is significantly affected by changes in the total

[42]Linear, quadratic, cubic and quartic functions of the effects of the EFC determinants on the scheduled Pell amount, total grants and total aid are presented in Appendix B: Table 2. The full set of stopout equation estimates for total grants and total aid are presented in Tables 3 and 4 of Appendix B.

financial aid package which includes non-grant aid, most of which comes in the form of student loans.

Graduation Outcomes for Four-Year College Students

Next, I examine the relationship between financial aid and the likelihood of graduating from college within six years using the cross-section identified financial aid instruments. The marginal effects calculated from a probit model of degree completion are presented in Table 2.8. According to these estimates, a $1,000 increase in financial aid is associated with a 2.0 to 2.8 percentage point increase in the probability of graduating within six years, though the estimates are imprecisely estimated.

Relative to white students, differences in graduation outcomes were not statistically significant for African-American and Asian students. Hispanic students however were approximately 10 to 11 percentage points less likely than white students to graduate within six years of entering college. Other factors, such as being from a broken or single parent, and academic performance, as measured by high school grades and SAT scores, all affected college completion rates in ways that were consistent with their effects on stopout behavior. Students from broken or single parent households had a graduation probability that was 7.5 percentage points lower than students whose parents are married. Students who had B/C high school grade averages were about 19 to 20 percentage points less likely than those with A/B grade averages to graduate within six year, while students with less than a C average in high school were as much as 31 percentage points less likely to complete a bachelor's degree within six years.

Persistence Outcomes for Two-Year College Students

The absence of significant Pell grant effects on four-year college attendance rates was a major motivation for this examination of possible Pell effects on four-year persistence rates. Kane (1995) presents some evidence suggesting that while college enrollment among low-income youth did not increase following the introduction of the Pell grant, public two-year enrollment in fact increased more quickly for low-income youth following the introduction of the Pell grant. In light of this, I also analyze persistence outcomes for students at two-year colleges using a sample of 533 dependent two-year college students who completed a FAFSA for the 1995-1996 year[43]. The relevant period of observation for this sample is two years, or four terms. Sample means are presented in Table 2.9.

On average, students at two-year institutions were from poorer families than those at four-year institutions. Consistent with the financial status of the family, these students were also less likely to have college educated parents and more likely to come from broken or single parent homes. Two-year college students were also less likely to have taken the SAT and those who did scored lower on the test than their four-year counterparts. High school grades were self-reported on the SAT, so for many of these students there is no record of their academic background; however, the distribution of grades reported for the first year of college was similar to that of four-year college students. Since the majority of two-year institutions are community colleges and do not often have on-campus housing, most of these students also live at home with their parents.

Attendance at a four-year college is generally driven by the goal of obtaining at least a bachelor's degree, and students are often screened on the basis of their ability to complete

[43]The total sample size for dependent two-year college dependent students was 743. Estimates from the model of sample selection for two-year college students are presented in Table A2 of Appendix A. Sample selection did not significantly affect the estimates.

this goal by means of the admission process. However, the process of being admitted into a two-year institution is generally less competitive, and the student body less homogeneous in terms of their motivations for attending a two-year college. For example, some may have chosen to attend a two-year college because they were academically unprepared for a four-year program. Others may have opted to attend a two-year institution out of uncertainty about future aspirations, or to take prerequisite courses at a fraction of the cost of enrollment at a four-year college. Regardless of the reason for initial enrollment, students at two-year institutions may or may not intend to complete an associate's degree or transfer to a four-year institution. On average, 91 percent of four-year students in the sample persisted beyond the first year, compared to 81 percent of two-year students.

Tables 2.10 - 2.12 include estimated marginal effects of financial aid and other background characteristics on the probability of stopping out for students attending two-year colleges. The cross-section identification strategy was used to identify the effects of financial aid on stopout behavior. Though the reliability of the estimates may be limited by the small sample size[44], the EFC identified estimates suggest that the marginal effect of a $1,000 increase in financial aid of any type (scheduled Pell, total grants or total aid) reduces the likelihood of stopping out by 1.0 – 1.7 percentage points.

Estimates in columns (4) – (9) of Tables 2.10 – 2.12 (based on EFC identified aid effects) suggest that mother's education significantly affects stopout behavior of two-year college students. Those with mothers who had attended college were between 9 and 10 percentage points less likely to stopout than children of mothers who dropped out of high school. Two-year college students appear to also be more responsive to labor market

[44]Of the 533 students in the two-year sample, only 232 had complete information on the EFC determinants used to identify financial aid effects.

changes. A $1000 increase in average weekly earnings in the manufacturing industry reduced the probability of stopping out by 23.3 to 41.3 percentage points. Again, the limited sample size could affect the precision with which these marginal effects are estimated.

8. Discussion of Results and Conclusion

Despite the fact that the Pell program is the largest federal college aid program intended to offer financial support for college to low-income students, the current consensus within the literature is that Pell grants have not significantly increased college enrollment rates among eligible students. One possible explanation for this has been that high levels of unmet need continue to exist for low income students even after the Pell grant has been applied to the cost of college. Therefore, high college costs and an unwillingness to incur debt continue to be deterrents to college entry.

In this paper I sought to determine whether Pell grants may instead have effects on post entry outcomes such as persistence and graduation. I also sought to contribute to the literature by adopting estimation methods to control for typical endogeneity problems resulting from the way financial aid variables are generally reported. The results of this study suggest that estimated effects of financial aid variables can be significantly biased when the endogeneity of these variables is ignored. Once endogeneity of aid is controlled for, a $1,000 increase in the scheduled Pell grant reduces the probability of stopout for four-year college students by 0.5 to 0.8 percentage points. These estimated effects were consistent across specifications of the model, though the most precise estimates of this effect were obtained using a model which accounted for unobserved heterogeneity. The total effect of grant aid, which included the Pell grant as well as other types of need-based and merit-based grant aid, was found to have no effect on stopout behavior among four-year college students. On the other hand, a \$1,000 increase in the total aid package, including grants, loans and work-study, increased the likelihood of stopping out by 0.6 to 1.1 percentage points. Again, these estimates were consistent across models both with and without controls for unobserved heterogeneity. Since student loans account for the majority of non-grant financial aid, these estimates suggest that students who receive more loan aid are more likely to experience interruptions in their college enrollment.

There was more consistency in the estimated effects of the scheduled Pell grant, total grants and total financial aid on the probability of completing a bachelor's degree within six years. Though none of the estimated effects were statistically significant, the estimated effect was between 2.0 and 2.7 percentage points per \$1,000 increase in the amount of aid, suggesting that even though changes in the total aid package may result in interruptions in student enrollment, ultimately these changes do not significantly affect the likelihood of graduating.

The impact of each of the financial aid measures on stopout behavior for two-year college students was also quite consistent. For this group, the marginal effect of increasing financial aid by \$1,000 was a 1.0 – 1.7 percentage point reduction in the likelihood of stopping out. Though these estimates were obtained from a very small sample, they imply that this group of students may in fact respond differently to increases in aid than students at four-year colleges. While a high occurrence of missing values prevented me from being able to control for tuition in the two-year college stopout equations, I would speculate that because of differences in the cost of attendance at two-year and four-year colleges, the Pell grant and other forms of grant aid are more effective at reducing unmet need for this group of students.

In conclusion, the results of this study suggest that in general students who have a desire to attend college and the potential to meet academic requirements will persist through college and graduate, despite financial limitations. However, for students who do not receive sufficient assistance in the form of merit-based or need-based grants from non-federal sources, this generally means financing their education with student loans. With rising rates of indebtedness and recent increases in student loan interest, questions about the effect of such debt on the ability to build financial security for the future will be an important extension to this analysis.

Table 2.1
Sample Means for FAFSA Filers by Pell Status -- Four-Year College Students (1995)
(Standard Errors in Parentheses)

	1995-1996 FAFSA Filers N = 4865	Pell Recipients N = 1265	Non-Recipients N = 3600
Male	0.43	0.40	0.45
Family Income	$56,573	$22,570	$68,521
	(45064)	(11648)	(46344)
White	0.76	0.59	0.82
African-American	0.09	0.16	0.07
Hispanic	0.08	0.16	0.06
Asian	0.06	0.10	0.05
Father's Education			
less than high school	0.03	0.08	0.02
high school graduate	0.35	0.48	0.30
some college (less than bachelor's degree)	0.12	0.11	0.12
bachelor's degree or beyond	0.47	0.28	0.54
Single Parent/Broken Home	0.28	0.43	0.23
Mother's Education			
less than high school	0.04	0.10	0.01
high school graduate	0.39	0.50	0.35
some college (less than bachelor's degree)	0.15	0.15	0.15
bachelor's degree or beyond	0.41	0.24	0.47
Took the SAT	0.98	0.97	0.98
SAT score[a]	970	892	997
	(212)	(207)	(207)
High School Grades			
A to A-	0.42	0.34	0.45
A- to B	0.30	0.32	0.30
B to B-	0.11	0.15	0.09
B- to C	0.06	0.08	0.06
C to C-	0.01	0.01	0.01
C- to D-	0.002	0.002	0.00
missing	0.10	0.11	0.09
Cumulative 1995-96 College GPA			
3.75 and above	0.09	0.06	0.10
3.25 - 3.74	0.21	0.18	0.23
2.75 - 3.24	0.24	0.23	0.25
2.25 - 2.74	0.21	0.24	0.20
1.75 - 2.24	0.12	0.14	0.12
1.25 - 1.74	0.05	0.07	0.05
below 1.24	0.05	0.07	0.04
missing	0.03	0.02	0.02
Residence while enrolled 1995-96			
on campus	0.75	0.67	0.79
with parents	0.17	0.24	0.15
off campus	0.07	0.09	0.07
Public Institution	0.58	0.62	0.57

Table 2.1 (continued)
Sample Means for FAFSA Filers by Pell Status -- Four-Year College Students (1995)
(Standard Errors in Parentheses)

	1995-1996 FAFSA Filers N = 4865	Pell Recipients N = 1265	Non-Recipients N = 3600
Tuition In State	$7,351	$6,580	$7,620
	(5969)	(5516)	(6098)
Tuition Out of State	$10,321	$9,569	$10,584
	(4395)	(4116)	(4459)
State Unemployment Rate	5.51	5.63	5.46
	(1.16)	(1.27)	(1.12)
Weekly Manufacturing Earnings	$526	$523	$527
	(69)	(68)	(69)
Expected Family Contribution (EFC)	$8,071	$694	$11,155
	(10091)	(745)	(10557)
Share of Aid Applicants Receiving Pell Grant	0.26	1	0
Sheduled Pell Grant[a]	--	$1,663	--
		(685)	
Actual Pell Grant[a]	--	$1,085	--
		(634)	
Share of Aid Applicants Receiving Need-Based Grants (excluding Pell)	0.74	0.93	0.67
Need-Based Grants (excluding Pell)	$4,364	$4,850	$4,068
	(4274)	(4518)	(4092)
Share of Aid Applicants Receiving Merit-Based Grants or Scholarships	0.29	0.23	0.31
Merit-Based Grants or Scholarships	$3,500	$2,983	$3,637
	(3345)	(2998)	(3419)
Share of Aid Applicants Receiving Need-Based Loans	0.52	0.76	0.44
Need-Based Loans	$2,805	$2,882	$2,758
	(1112)	(1045)	(1149)
Share of Aid Applicants Receiving Non-Need-Based Loans	0.16	0.05	0.20
Non-Need-Based Loans	$2,330	$2,650	$2,305
	(923)	(1377)	(874)
Parent's Available Income (AI)	$23,242	$3,159	$31,449
	(23441)	(4408)	(23106)
Parents contribution from assets (PCA)	$2,053	$203	$2,800
	(11182)	(1584)	(13139)
Family Size	4.11	4.15	4.09
	(1.23)	(1.51)	(1.10)
Number in College	1.39	1.44	1.37
	(0.62)	(0.66)	(0.60)
Adjusted Parent's Contribution (APC)	$7,298	$491	$10,104
	(9957)	(624)	(10625)

[a] Variable means include non-zero values only

[b] Mean EFC includes zero values

Figure 2.1
Distribution of Total Aid Dollars by Type

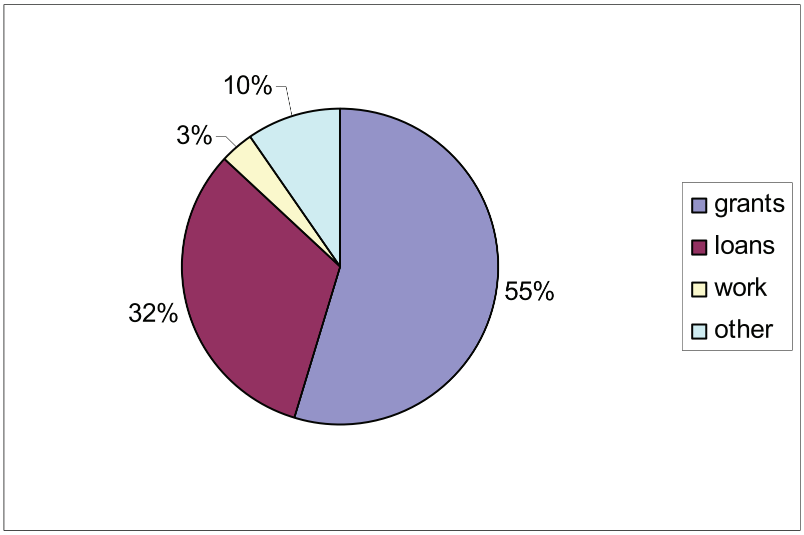

Figure 2.2
Distribution of Total Aid Dollars by Need & Type

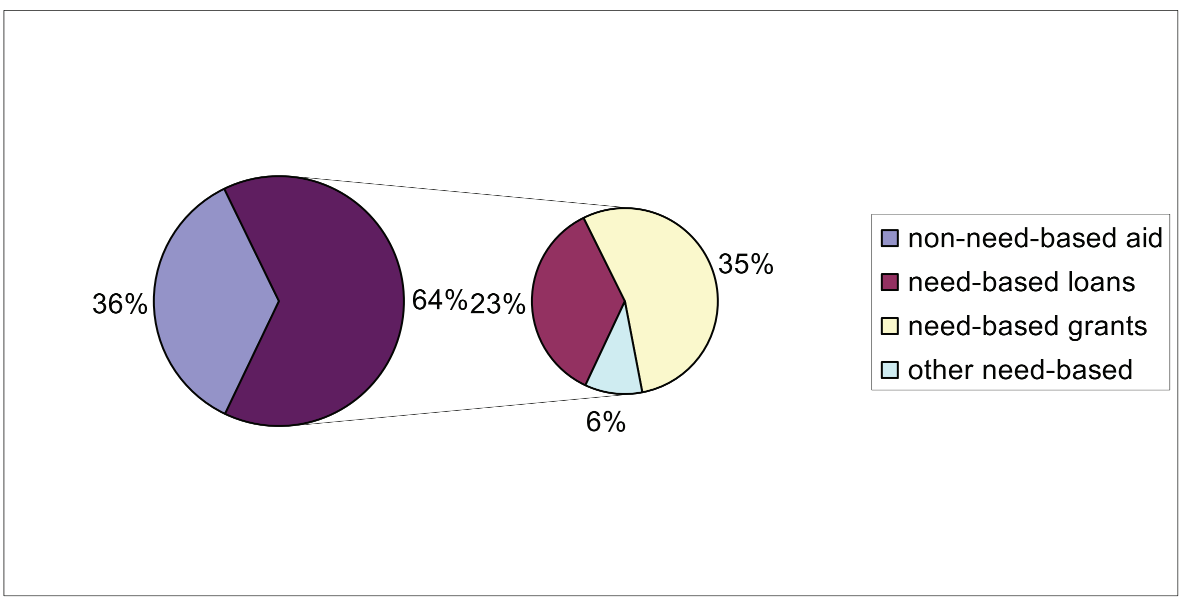

Figure 2.3
Average Grant Dollars by Source & Need

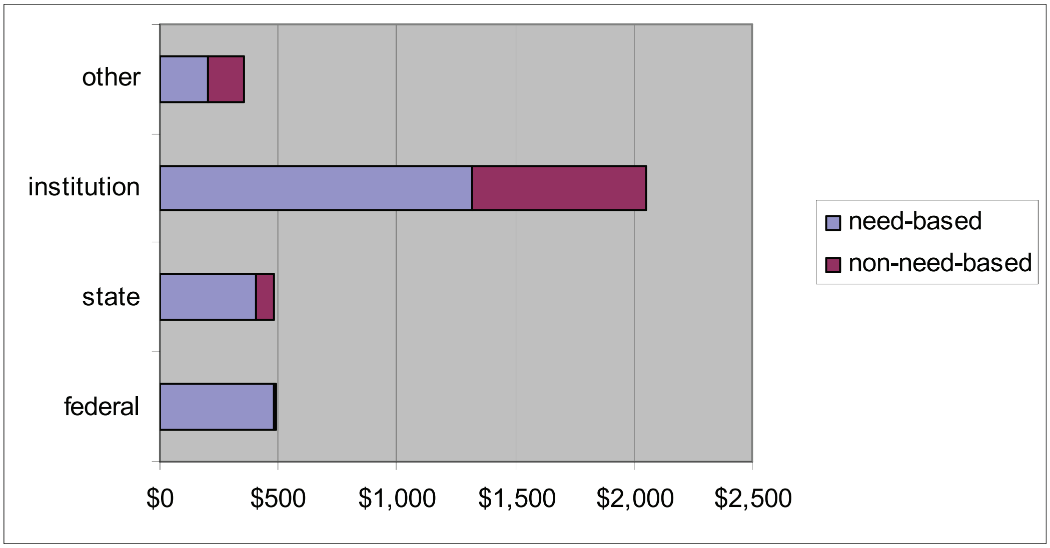

Table 2.2
Probability of First Stopout for Four-Year College Students -- Receipt of Pell Grant in First Year (assumed exogenous)
(Marginal Effects)

	(1) Semiparametric PH Model	(2) Panel LP Model	(3) Panel Probit Model
Received Pell Grant First Year	-0.004	-0.004	-0.005
	(0.003)	(0.004)	(0.004)
Received Non-Pell Financial Aid First Year	-0.017	-0.022	-0.021
	(0.005)**	(0.006)**	(0.006)**
Spring 1996	0.067	0.084	0.075
	(0.006)**	(0.006)**	(0.006)**
Fall 1996	-0.007	-0.008	-0.008
	(0.004)	(0.004)	(0.004)
Spring 1997	0.045	0.051	0.050
	(0.006)**	(0.006)**	(0.006)**
Fall 1997	-0.017	-0.015	-0.016
	(0.004)**	(0.004)**	(0.004)**
Spring 1998	0.006	0.007	0.008
	(0.005)	(0.005)	(0.005)
Fall 1998	-0.040	-0.031	-0.040
	(0.003)**	(0.003)**	(0.004)**
Male	0.003	0.004	0.004
	(0.002)	(0.003)	(0.003)
African-American	-0.008	-0.010	-0.010
	(0.004)*	(0.006)	(0.004)*
Hispanic	-0.002	-0.001	-0.001
	(0.004)	(0.006)	(0.005)
Asian	-0.012	-0.013	-0.013
	(0.005)*	(0.006)*	(0.005)*
Family Income/$25k	-0.002	-0.002	-0.002
	(0.001)*	(0.001)*	(0.001)*
Father high school grad	0.009	0.012	0.010
	(0.008)	(0.011)	(0.010)
Father some college (no bachelor's degree)	0.001	-0.000	0.000
	(0.009)	(0.012)	(0.010)
Father college grad	-0.002	-0.004	-0.004
	(0.008)	(0.012)	(0.010)
Single Parent/Broken Home	0.010	0.013	0.011
	(0.003)**	(0.004)**	(0.003)**
Mother high school grad	0.013	0.016	0.014
	(0.008)	(0.011)	(0.009)
Mother some college (no bachelor's degree)	0.014	0.016	0.015
	(0.010)	(0.011)	(0.011)
Mother college grad	0.008	0.010	0.009
	(0.009)	(0.011)	(0.010)

Table 2.2 (continued)
Probability of First Stopout for Four-Year College Students -- Receipt of Pell Grant in First Year (assumed exogenous)
(Marginal Effects)

	(1) Semiparametric PH Model	(2) Panel LP Model	(3) Panel Probit Model
SAT score/100	-0.006	-0.007	-0.006
	(0.001)**	(0.001)**	(0.001)**
Didn't take SAT or ACT	-0.020	0.003	-0.018
	(0.006)**	(0.022)	(0.009)*
High School GPA: B to C	0.030	0.046	0.037
	(0.004)**	(0.006)**	(0.005)**
High School GPA: C- to D-	0.057	0.080	0.067
	(0.019)**	(0.028)**	(0.023)**
State weekly earnings in mfg. sector/1,000	-0.068	-0.086	-0.076
	(0.018)**	(0.022)**	(0.020)**
State unemployment rate	0.002	0.002	0.002
	(0.001)	(0.001)	(0.001)
Person-term records	28,731	28,731	28,731
N	4,865	4,865	4,865
-2 log L	13,028.27		13,033.31
R-squared		0.04	

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

Full regression includes a constant term, and dummy variables for missing parental education, and missing high school GPA

Table 2.3

Probability of First Stopout for Four-Year College Students -- Scheduled Pell Amount First Year (assumed exogenous)

(Marginal Effects)

	(1) SPH Model	(2) Panel LP Model	(3) PDP Model	(4) SPH Model	(5) Panel LP Model	(6) PDP Model	(7) SPH Model	(8) Panel LP Model	(9) PDP Model
Received Pell Grant First Year							0.001	0.001	0.001
							(0.006)	(0.009)	(0.007)
Amount of Scheduled Pell Grant First Year (000's)	-0.002	-0.002	-0.002	-0.001	-0.001	-0.001	-0.002	-0.002	-0.003
	(0.002)	(0.002)	(0.002)	(0.007)	(0.010)	(0.008)	(0.003)	(0.005)	(0.004)
(Amount of Scheduled Pell Grant First Year)^2 (000's)				-0.000	-0.000	-0.001			
				(0.003)	(0.005)	(0.004)			
Received non-Pell Financial Aid							-0.005	-0.011	-0.007
							(0.004)	(0.006)	(0.005)
Amount of non-Pell Financial Aid (000s)	-0.002	-0.002	-0.002	-0.003	-0.004	-0.003	-0.002	-0.002	-0.002
	(0.000)**	(0.000)**	(0.000)**	(0.001)**	(0.001)**	(0.001)**	(0.000)**	(0.000)**	(0.000)**
(Amount of non-Pell Financial Aid)^2 (000s)				0.000	0.000	0.000			
				(0.000)*	(0.000)**	(0.000)**			
Spring 1996	0.066	0.084	0.075	0.066	0.084	0.076	0.066	0.084	0.076
	(0.006)**	(0.006)**	(0.006)**	(0.006)**	(0.006)**	(0.006)**	(0.006)**	(0.006)**	(0.006)**
Fall 1996	-0.007	-0.008	-0.007	-0.007	-0.008	-0.007	-0.007	-0.008	-0.007
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Spring 1997	0.045	0.051	0.050	0.045	0.051	0.051	0.045	0.051	0.050
	(0.006)**	(0.006)**	(0.006)**	(0.006)**	(0.006)**	(0.006)**	(0.006)**	(0.006)**	(0.006)**
Fall 1997	-0.016	-0.014	-0.016	-0.016	-0.014	-0.016	-0.016	-0.014	-0.016
	(0.004)**	(0.004)**	(0.004)**	(0.004)**	(0.004)**	(0.004)**	(0.004)**	(0.004)**	(0.004)**
Spring 1998	0.006	0.007	0.008	0.006	0.007	0.008	0.006	0.007	0.008
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Fall 1998	-0.039	-0.031	-0.039	-0.039	-0.031	-0.039	-0.039	-0.031	-0.039
	(0.003)**	(0.003)**	(0.004)**	(0.003)**	(0.003)**	(0.004)**	(0.003)**	(0.003)**	(0.004)**

Table 2.3 (continued)

Probability of First Stopout for Four-Year College Students -- Scheduled Pell Amount First Year (assumed exogenous)

(Marginal Effects)

	(1) SPH Model	(2) Panel LP Model	(3) PDP Model	(4) SPH Model	(5) Panel LP Model	(6) PDP Model	(7) SPH Model	(8) Panel LP Model	(9) PDP Model
Male	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004
	(0.002)	(0.003)	(0.003)	(0.002)	(0.003)	(0.003)	(0.002)	(0.003)	(0.003)
African-American	-0.007	-0.009	-0.008	-0.007	-0.008	-0.008	-0.007	-0.009	-0.008
	(0.004)*	(0.006)	(0.004)	(0.004)	(0.006)	(0.004)	(0.004)*	(0.006)	(0.004)
Hispanic	0.000	0.001	0.001	-0.000	0.001	0.001	-0.000	0.001	0.001
	(0.005)	(0.006)	(0.005)	(0.005)	(0.006)	(0.005)	(0.005)	(0.006)	(0.005)
Asian	-0.011	-0.012	-0.012	-0.012	-0.012	-0.012	-0.011	-0.012	-0.012
	(0.005)*	(0.006)*	(0.005)*	(0.005)*	(0.006)*	(0.005)*	(0.005)*	(0.006)*	(0.005)*
Family Income/$25k	-0.002	-0.002	-0.003	-0.003	-0.002	-0.003	-0.002	-0.002	-0.003
	(0.001)*	(0.001)**	(0.001)**	(0.001)**	(0.001)**	(0.001)**	(0.001)*	(0.001)**	(0.001)**
Father high school grad	0.009	0.013	0.010	0.009	0.013	0.010	0.010	0.013	0.010
	(0.008)	(0.011)	(0.010)	(0.008)	(0.011)	(0.010)	(0.008)	(0.011)	(0.010)
Father some college (no bachelor's degree)	0.001	0.000	0.000	0.001	-0.000	0.000	0.001	0.000	0.001
	(0.009)	(0.012)	(0.010)	(0.009)	(0.012)	(0.010)	(0.009)	(0.012)	(0.010)
Father college grad	-0.002	-0.003	-0.003	-0.003	-0.004	-0.003	-0.002	-0.003	-0.003
	(0.008)	(0.012)	(0.009)	(0.008)	(0.012)	(0.009)	(0.008)	(0.012)	(0.009)
Single Parent/Broken Home	0.010	0.014	0.011	0.010	0.013	0.011	0.010	0.013	0.011
	(0.003)**	(0.004)**	(0.003)**	(0.003)**	(0.004)**	(0.003)**	(0.003)**	(0.004)**	(0.003)**
Mother high school grad	0.013	0.016	0.014	0.013	0.016	0.014	0.013	0.015	0.014
	(0.008)	(0.011)	(0.009)	(0.008)	(0.011)	(0.009)	(0.008)	(0.011)	(0.009)
Mother some college (no bachelor's degree)	0.015	0.017	0.016	0.015	0.016	0.015	0.015	0.016	0.015
	(0.010)	(0.011)	(0.011)	(0.010)	(0.012)	(0.011)	(0.010)	(0.011)	(0.011)
Mother college grad	0.009	0.010	0.009	0.008	0.010	0.009	0.008	0.010	0.009
	(0.008)	(0.011)	(0.010)	(0.008)	(0.011)	(0.010)	(0.008)	(0.011)	(0.010)

Table 2.3 (continued)

Probability of First Stopout for Four-Year College Students -- Scheduled Pell Amount First Year (assumed exogenous)

(Marginal Effects)

	(1) SPH Model	(2) Panel LP Model	(3) PDP Model	(4) SPH Model	(5) Panel LP Model	(6) PDP Model	(7) SPH Model	(8) Panel LP Model	(9) PDP Model
SAT score/100	-0.005	-0.006	-0.005	-0.005	-0.006	-0.005	-0.005	-0.006	-0.005
	(0.001)**	(0.001)**	(0.001)**	(0.001)**	(0.001)**	(0.001)**	(0.001)**	(0.001)**	(0.001)**
Didn't take SAT or ACT	-0.015	0.012	-0.012	-0.015	0.011	-0.012	-0.015	0.011	-0.012
	(0.007)*	(0.022)	(0.010)	(0.007)*	(0.022)	(0.010)	(0.007)*	(0.022)	(0.010)
High School GPA: B to C	0.030	0.046	0.036	0.030	0.046	0.036	0.029	0.045	0.036
	(0.004)**	(0.006)**	(0.005)**	(0.004)**	(0.006)**	(0.005)**	(0.004)**	(0.006)**	(0.005)**
High School GPA: C- to D-	0.054	0.080	0.064	0.053	0.078	0.062	0.054	0.079	0.063
	(0.019)**	(0.028)**	(0.023)**	(0.018)**	(0.028)**	(0.023)**	(0.019)**	(0.027)**	(0.023)**
State weekly earnings in mfg. sector/1,000	-0.055	-0.077	-0.063	-0.052	-0.071	-0.060	-0.055	-0.077	-0.063
	(0.017)**	(0.022)**	(0.020)**	(0.017)**	(0.022)**	(0.020)**	(0.017)**	(0.022)**	(0.020)**
State unemployment rate	0.002	0.003	0.003	0.002	0.003	0.003	0.002	0.003	0.003
	(0.001)*	(0.001)*	(0.001)*	(0.001)*	(0.001)	(0.001)*	(0.001)*	(0.001)	(0.001)*
Person-term records	28,731	28,731	28,731	28,731	28,731	28,731	28,731	28,731	28,731
N	4865	4865	4865	4865	4865	4865	4865	4865	4865
-2 log L	12,980.51		12,984.38	12,975.46		12,977.64	12,978.94		12,981.98
R-squared		0.04			0.04			0.04	

Standard errors in parentheses

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

Full regression includes a constant term, and dummy variables for missing parental education, and missing high school GPA

Table 2.4.A
Probability of First Stopout for Four-Year College Students -- Change in Maximum Pell Grant
(Marginal Effects)

Panel A

	Change in Scheduled Pell resulting from Change in Maximum Pell
Imputed Pell Grant/$1,000 (1995-1998)	0.691
	(0.011)**
Constant	0.062
	(0.005)**
Person-term records	24188
N	4116
R-squared	0.57

Panel B

	Actual Scheduled Pell Grant			*Panel-identified Scheduled Pell Grant*			*Panel-identified Scheduled Pell Grant with Random Effects*		
	(1) SPH Model	(2) Panel LP Model	(3) PDP Model	(4) SPH Model	(5) Panel LP Model	(6) PDP Model	(7) SPH Model	(8) Panel LP Model	(9) PDP Model
Scheduled Pell Grant/$1,000 (1995-1998)	-0.004	-0.005	-0.005	-0.005	-0.007	-0.007	-0.005	-0.007	-0.006
	(0.002)*	(0.002)*	(0.002)*	(0.003)*	(0.003)*	(0.003)*	(0.003)	(0.003)*	(0.003)
Spring 1996	0.066	0.083	0.074	0.066	0.084	0.074	0.063	0.084	0.083
	(0.006)**	(0.006)**	(0.006)**	(0.007)**	(0.006)**	(0.007)**	(0.006)**	(0.006)**	(0.008)**
Fall 1996	-0.007	-0.007	-0.007	-0.008	-0.009	-0.009	0.007	-0.009	0.011
	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)*
Spring 1997	0.046	0.051	0.050	0.047	0.053	0.052	0.077	0.053	0.101
	(0.006)**	(0.006)**	(0.006)**	(0.006)**	(0.006)**	(0.007)**	(0.008)**	(0.006)**	(0.010)**
Fall 1997	-0.015	-0.014	-0.015	-0.017	-0.015	-0.017	0.009	-0.015	0.020
	(0.004)**	(0.004)**	(0.004)**	(0.004)**	(0.004)**	(0.005)**	(0.006)	(0.004)**	(0.007)*
Spring 1998	0.007	0.008	0.008	0.008	0.008	0.010	0.045	0.008	0.067
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)	(0.008)**	(0.005)	(0.011)**
Fall 1998	-0.039	-0.030	-0.039	-0.038	-0.028	-0.038	-0.013	-0.028	-0.001
	(0.003)**	(0.003)**	(0.004)**	(0.004)**	(0.004)**	(0.004)**	(0.005)*	(0.004)**	(0.007)

Table 2.4.A (continued)

Probability of First Stopout for Four-Year College Students -- Change in Maximum Pell Grant

(Marginal Effects)

	Actual Scheduled Pell Grant			*Panel-identified Scheduled Pell*			*Panel-identified Scheduled Pell*		
	(1) SPH Model	(2) Panel LP Model	(3) PDP Model	(4) SPH Model	(5) Panel LP Model	(6) PDP Model	(7) SPH Model	(8) Panel LP Model	(9) PDP Model
Male	0.003	0.004	0.004	0.001	0.001	0.002	0.001	0.001	0.001
	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)
African-American	-0.008	-0.009	-0.008	-0.006	-0.007	-0.006	-0.007	-0.007	-0.008
	(0.004)*	(0.006)	(0.004)	(0.004)	(0.007)	(0.005)	(0.004)	(0.007)	(0.005)
Hispanic	0.001	0.003	0.003	0.004	0.007	0.005	0.005	0.007	0.007
	(0.005)	(0.007)	(0.005)	(0.005)	(0.007)	(0.006)	(0.006)	(0.007)	(0.007)
Asian	-0.009	-0.009	-0.010	-0.007	-0.006	-0.007	-0.006	-0.006	-0.007
	(0.005)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.005)	(0.006)	(0.007)
Family Income/$25k	-0.001	-0.001	-0.002	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Father high school grad	0.007	0.009	0.007	0.007	0.010	0.007	0.004	0.010	0.005
	(0.008)	(0.011)	(0.009)	(0.009)	(0.012)	(0.010)	(0.009)	(0.012)	(0.011)
Father some college (no bachelor's degree)	-0.003	-0.005	-0.004	-0.006	-0.009	-0.007	-0.009	-0.009	-0.010
	(0.008)	(0.012)	(0.009)	(0.008)	(0.013)	(0.010)	(0.008)	(0.013)	(0.010)
Father college grad	-0.005	-0.006	-0.005	-0.005	-0.006	-0.005	-0.006	-0.006	-0.008
	(0.008)	(0.012)	(0.009)	(0.009)	(0.012)	(0.010)	(0.009)	(0.012)	(0.011)
Single Parent/Broken Home	0.011	0.015	0.013	0.010	0.013	0.011	0.010	0.013	0.013
	(0.003)**	(0.004)**	(0.003)**	(0.003)**	(0.004)**	(0.004)**	(0.003)**	(0.004)**	(0.004)**
Mother high school grad	0.014	0.017	0.015	0.017	0.020	0.017	0.020	0.020	0.024
	(0.009)	(0.011)	(0.010)	(0.009)	(0.011)	(0.010)	(0.010)*	(0.011)	(0.012)
Mother some college (no bachelor's degree)	0.016	0.018	0.017	0.019	0.021	0.019	0.024	0.021	0.028
	(0.010)	(0.011)	(0.011)	(0.011)	(0.012)	(0.012)	(0.013)	(0.012)	(0.017)
Mother college grad	0.010	0.012	0.011	0.012	0.015	0.012	0.015	0.015	0.015
	(0.009)	(0.011)	(0.010)	(0.009)	(0.012)	(0.011)	(0.010)	(0.012)	(0.012)

Table 2.4.A (continued)
Probability of First Stopout for Four-Year College Students -- Change in Maximum Pell Grant
(Marginal Effects)

	Actual Scheduled Pell Grant			*Panel-identified Scheduled Pell*			*Panel-identified Scheduled Pell*		
	(1) SPH Model	(2) Panel LP Model	(3) PDP Model	(4) SPH Model	(5) Panel LP Model	(6) PDP Model	(7) SPH Model	(8) Panel LP Model	(9) PDP Model
SAT score/100	-0.005	-0.006	-0.005	-0.004	-0.005	-0.004	-0.005	-0.005	-0.006
	(0.001)**	(0.001)**	(0.001)**	(0.001)**	(0.001)**	(0.001)**	(0.001)**	(0.001)**	(0.001)**
Didn't take SAT or ACT	-0.010	0.022	-0.006	-0.005	0.035	0.003	-0.006	0.035	-0.002
	(0.009)	(0.025)	(0.012)	(0.011)	(0.028)	(0.015)	(0.011)	(0.028)	(0.015)
High School GPA: B to C	0.031	0.047	0.038	0.035	0.050	0.041	0.041	0.050	0.054
	(0.004)**	(0.006)**	(0.005)**	(0.005)**	(0.007)**	(0.006)**	(0.006)**	(0.007)**	(0.008)**
High School GPA: C- to D-	0.057	0.082	0.068	0.059	0.083	0.071	0.067	0.083	0.095
	(0.020)**	(0.028)**	(0.024)**	(0.022)**	(0.031)**	(0.027)**	(0.032)*	(0.031)**	(0.044)*
State weekly earnings in mfg. sector/1,000	-0.056	-0.077	-0.064	-0.062	-0.084	-0.072	-0.051	-0.084	-0.059
	(0.018)**	(0.022)**	(0.020)**	(0.019)**	(0.024)**	(0.022)**	(0.020)*	(0.024)**	(0.025)**
State unemployment rate	0.002	0.002	0.003	0.003	0.003	0.003	0.001	0.003	0.001
	(0.001)	(0.001)	(0.001)*	(0.001)*	(0.002)	(0.001)*	(0.001)	(0.002)	(0.002)
Tuition/$10,000	-0.015	-0.013	-0.017	-0.016	-0.013	-0.017	-0.013	-0.013	-0.016
	(0.004)**	(0.004)**	(0.004)**	(0.004)**	(0.005)**	(0.005)**	(0.005)**	(0.005)**	(0.006)**
Public	-0.008	-0.005	-0.008	-0.006	-0.002	-0.005	-0.003	-0.002	-0.003
	(0.005)	(0.006)	(0.005)	(0.005)	(0.006)	(0.006)	(0.005)	(0.006)	(0.006)
Heterogeneity Std. Dev.(s_u)							1.339	0.000	0.903
							(0.051)		(0.033)
Person-term records	28,391	28,391	28,391	23,922	23,922	23,922	23,922	23,922	23,922
N	4,820	4,820	4,820	4,082	4,082	4,082	4,082	4,082	4,082
-2 log L	12,831.03		12,838.72	10,931.96		10,938.07	10,799.03		10,764.81
R-squared		0.04			0.04			0.04	

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

Full regression includes a constant term, and dummy variables for missing parental education, and missing high school GPA
Number of observations diminishes across columns due to missing values for EFC components

Table 2.4.B

Probability of First Stopout for Four-Year College Students -- Change in Maximum Pell Grant by Race and Economic Status

(Marginal Effects)

	(1) SPH Model	(2) Panel LP Model	(3) PDP Model	(4) SPH Model	(5) Panel LP Model	(6) PDP Model
Change in Scheduled Pell Grant/$1,000 (1995-1998)	-0.004	-0.006	-0.004	-0.003	-0.005	-0.004
	(0.004)	(0.005)	(0.005)	(0.003)	(0.004)	(0.004)
Change in Scheduled Pell Grant/$1,000 (1995-1998) * Family Income <= $25k	-0.013	-0.020	-0.016			
	(0.007)	(0.010)*	(0.008)			
Change in Scheduled Pell Grant/$1,000 (1995-1998) * African-American				-0.001	0.001	-0.000
				(0.006)	(0.009)	(0.008)
Change in Scheduled Pell Grant/$1,000 (1995-1998) * Hispanic				-0.014	-0.017	-0.017
				(0.007)*	(0.009)	(0.008)*
Spring 1996	0.063	0.084	0.083	0.063	0.084	0.083
	(0.006)**	(0.006)**	(0.008)**	(0.006)**	(0.006)**	(0.008)**
Fall 1996	0.007	-0.009	0.011	0.007	-0.009	0.011
	(0.005)	(0.005)	(0.006)	(0.005)	(0.005)	(0.006)
Spring 1997	0.077	0.053	0.100	0.077	0.053	0.101
	(0.008)**	(0.006)**	(0.010)**	(0.008)**	(0.006)**	(0.010)**
Fall 1997	0.010	-0.015	0.020	0.009	-0.015	0.020
	(0.006)	(0.004)**	(0.008)**	(0.006)	(0.004)**	(0.007)**
Spring 1998	0.046	0.009	0.067	0.045	0.009	0.067
	(0.008)**	(0.005)	(0.011)**	(0.008)**	(0.005)	(0.011)**
Fall 1998	-0.012	-0.028	-0.000	-0.013	-0.028	-0.001
	(0.005)*	(0.004)**	(0.007)	(0.005)*	(0.004)**	(0.007)

Table 2.4.B (continued)

Probability of First Stopout for Four-Year College Students -- Change in Maximum Pell Grant by Race and

(Marginal Effects)

	(1) SPH Model	(2) Panel LP Model	(3) PDP Model	(4) SPH Model	(5) Panel LP Model	(6) PDP Model
Male	0.001	0.001	0.001	0.001	0.001	0.001
	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)	(0.004)
African-American	-0.007	-0.006	-0.007	-0.007	-0.008	-0.008
	(0.004)	(0.007)	(0.005)	(0.006)	(0.009)	(0.007)
Hispanic	0.005	0.007	0.008	0.017	0.019	0.022
	(0.006)	(0.007)	(0.007)	(0.009)	(0.010)	(0.012)
Asian	-0.006	-0.006	-0.007	-0.007	-0.008	-0.008
	(0.005)	(0.006)	(0.006)	(0.005)	(0.006)	(0.006)
Family Income/$25,000				-0.001	-0.001	-0.001
				(0.001)	(0.001)	(0.002)
Family Income <= $25,000	0.025	0.036	0.032			
	(0.011)*	(0.014)**	(0.015)*			
Father high school grad	0.004	0.010	0.005	0.004	0.010	0.005
	(0.009)	(0.012)	(0.011)	(0.009)	(0.012)	(0.011)
Father some college (no bachelor's degree)	-0.008	-0.008	-0.010	-0.008	-0.009	-0.010
	(0.008)	(0.013)	(0.010)	(0.008)	(0.013)	(0.010)
Father college grad	-0.007	-0.006	-0.008	-0.007	-0.006	-0.008
	(0.009)	(0.012)	(0.011)	(0.009)	(0.012)	(0.011)
Single Parent/Broken Home	0.010	0.012	0.013	0.010	0.013	0.013
	(0.003)**	(0.004)**	(0.004)**	(0.003)**	(0.004)**	(0.004)**
Mother high school grad	0.021	0.021	0.024	0.017	0.017	0.020
	(0.010)*	(0.011)	(0.012)	(0.010)	(0.011)	(0.012)
Mother some college (no bachelor's degree)	0.024	0.022	0.028	0.019	0.017	0.022
	(0.014)	(0.012)	(0.017)	(0.013)	(0.012)	(0.016)
Mother college grad	0.016	0.016	0.018	0.012	0.012	0.013
	(0.010)	(0.012)	(0.012)	(0.010)	(0.012)	(0.012)

Table 2.4.B (continued)

Probability of First Stopout for Four-Year College Students -- Change in Maximum Pell Grant by Race and

(Marginal Effects)

	(1)	(2)	(3)	(4)	(5)	(6)
	SPH Model	Panel LP Model	PDP Model	SPH Model	Panel LP Model	PDP Model
SAT score/100	-0.005	-0.005	-0.006	-0.005	-0.005	-0.006
	(0.001)**	(0.001)**	(0.001)**	(0.001)**	(0.001)**	(0.001)**
Didn't take SAT or ACT	-0.005	0.035	-0.002	-0.005	0.035	-0.002
	(0.011)	(0.028)	(0.016)	(0.011)	(0.029)	(0.015)
High School GPA: B to C	0.041	0.050	0.054	0.041	0.050	0.054
	(0.006)**	(0.007)**	(0.008)**	(0.006)**	(0.007)**	(0.008)**
High School GPA: C- to D-	0.068	0.083	0.096	0.065	0.082	0.092
	(0.032)*	(0.031)**	(0.044)*	(0.031)*	(0.031)**	(0.043)*
State weekly earnings in mfg. sector/$1,000	-0.049	-0.083	-0.057	-0.050	-0.084	-0.058
	(0.020)*	(0.024)**	(0.025)*	(0.020)*	(0.024)**	(0.025)*
State unemployment rate	0.001	0.003	0.001	0.001	0.003	0.001
	(0.001)	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)
Tuition/$10,000	-0.013	-0.012	-0.016	-0.013	-0.013	-0.016
	(0.005)**	(0.005)**	(0.006)**	(0.005)**	(0.005)**	(0.006)**
Public	-0.003	-0.002	-0.003	-0.003	-0.002	-0.003
	(0.005)	(0.006)	(0.006)	(0.005)	(0.006)	(0.006)
Heterogeneity Std. Dev.(s_u)	1.337		0.902	1.339		0.903
	(0.051)		(0.033)	(0.051)		(0.033)
Person-term records	23,922	23,922	23,922	23,922	23,922	23,922
N	4,082	4,082	4,082	4,082	4,082	4,082
-2 log L	10,793.01		10,759.20	10,794.55		10,760.36
R-squared		0.04			0.04	

Standard errors in parentheses

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

Full regression includes a constant term, and dummy variables for missing parental education, and missing high school GPA

Number of observations diminishes across columns due to missing values for EFC components

Table 2.5

Probability of First Stopout for Four-Year College Students -- Scheduled Pell Grant

(Marginal Effects)

	Actual Scheduled Pell Grant			*EFC identified Scheduled Pell Grant* [a]			*EFC identified Scheduled Pell Grant with Random Effects* [a]		
	(1) SPH Model	(2) Panel LP Model	(3) PDP Model	(4) SPH Model	(5) Panel LP Model	(6) PDP Model	(7) SPH Model	(8) Panel LP Model	(9) PDP Model
Scheduled Pell Grant/$1,000 (1995)	-0.002	-0.002	-0.002	-0.005	-0.007	-0.006	-0.006	-0.007	-0.008
	(0.002)	(0.002)	(0.002)	(0.003)	(0.004)	(0.003)	(0.003)*	(0.004)	(0.004)*
Spring 1996	0.066	0.083	0.074	0.063	0.081	0.071	0.058	0.081	0.076
	(0.006)**	(0.006)**	(0.006)**	(0.007)**	(0.007)**	(0.007)**	(0.006)**	(0.007)**	(0.008)**
Fall 1996	-0.007	-0.007	-0.007	-0.008	-0.008	-0.008	0.006	-0.008	0.009
	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)
Spring 1997	0.046	0.051	0.050	0.045	0.051	0.049	0.069	0.051	0.091
	(0.006)**	(0.006)**	(0.006)**	(0.007)**	(0.007)**	(0.007)**	(0.008)**	(0.007)**	(0.011)**
Fall 1997	-0.015	-0.014	-0.015	-0.016	-0.015	-0.017	0.007	-0.015	0.016
	(0.004)**	(0.004)**	(0.004)**	(0.005)**	(0.005)**	(0.005)**	(0.006)	(0.005)**	(0.007)*
Spring 1998	0.007	0.008	0.009	0.006	0.007	0.007	0.038	0.007	0.057
	(0.005)	(0.005)	(0.005)	(0.006)	(0.006)	(0.006)	(0.008)**	(0.006)	(0.010)**
Fall 1998	-0.039	-0.030	-0.039	-0.038	-0.030	-0.038	-0.016	-0.030	-0.007
	(0.003)**	(0.003)**	(0.004)**	(0.004)**	(0.004)**	(0.004)**	(0.005)**	(0.004)**	(0.006)
Male	0.003	0.004	0.004	-0.000	-0.001	0.000	-0.001	-0.001	-0.001
	(0.002)	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)	(0.004)	(0.004)
African-American	-0.008	-0.009	-0.009	-0.005	-0.006	-0.006	-0.005	-0.006	-0.006
	(0.004)*	(0.006)	(0.004)*	(0.005)	(0.008)	(0.006)	(0.005)	(0.008)	(0.006)
Hispanic	0.001	0.003	0.002	0.006	0.010	0.008	0.008	0.010	0.010
	(0.005)	(0.007)	(0.005)	(0.006)	(0.008)	(0.007)	(0.006)	(0.008)	(0.008)
Asian	-0.010	-0.010	-0.010	-0.006	-0.005	-0.005	-0.005	-0.005	-0.005
	(0.005)*	(0.006)	(0.005)	(0.006)	(0.007)	(0.007)	(0.006)	(0.007)	(0.007)

Table 2.5 (continued)
Probability of First Stopout for Four-Year College Students -- Scheduled Pell Grant
(Marginal Effects)

	Actual Scheduled Pell Grant			*EFC identified Scheduled Pell*			*EFC identified Scheduled Pell*		
	(1) SPH Model	(2) Panel LP Model	(3) PDP Model	(4) SPH Model	(5) Panel LP Model	(6) PDP Model	(7) SPH Model	(8) Panel LP Model	(9) PDP Model
Father high school grad	0.007	0.010	0.007	0.000	-0.001	-0.001	-0.003	-0.001	-0.004
	(0.008)	(0.011)	(0.009)	(0.011)	(0.016)	(0.012)	(0.010)	(0.016)	(0.012)
Father some college (no bachelor's degree)	-0.003	-0.005	-0.004	-0.010	-0.018	-0.013	-0.012	-0.018	-0.015
	(0.008)	(0.012)	(0.009)	(0.009)	(0.017)	(0.011)	(0.008)	(0.017)	(0.009)
Father college grad	-0.005	-0.006	-0.006	-0.009	-0.015	-0.012	-0.011	-0.015	-0.013
	(0.008)	(0.012)	(0.009)	(0.011)	(0.016)	(0.013)	(0.011)	(0.016)	(0.013)
Single Parent/Broken Home	0.011	0.014	0.013	0.011	0.014	0.012	0.011	0.014	0.014
	(0.003)**	(0.004)**	(0.003)**	(0.004)**	(0.005)**	(0.004)**	(0.004)**	(0.005)**	(0.005)**
Mother high school grad	0.014	0.018	0.015	0.019	0.025	0.021	0.022	0.025	0.026
	(0.009)	(0.011)	(0.010)	(0.013)	(0.015)	(0.014)	(0.013)	(0.015)	(0.015)
Mother some college (no bachelor's degree)	0.016	0.018	0.017	0.019	0.023	0.021	0.022	0.023	0.026
	(0.010)	(0.011)	(0.011)	(0.016)	(0.015)	(0.016)	(0.016)	(0.015)	(0.020)
Mother college grad	0.010	0.013	0.011	0.014	0.018	0.015	0.015	0.018	0.017
	(0.009)	(0.011)	(0.010)	(0.012)	(0.015)	(0.013)	(0.012)	(0.015)	(0.014)
SAT score/100	-0.005	-0.006	-0.005	-0.003	-0.004	-0.003	-0.004	-0.004	-0.004
	(0.001)**	(0.001)**	(0.001)**	(0.001)**	(0.001)**	(0.001)**	(0.001)**	(0.001)**	(0.001)**
Didn't take SAT or ACT	-0.010	0.022	-0.006	0.002	0.039	0.009	-0.001	0.039	0.004
	(0.009)	(0.025)	(0.012)	(0.014)	(0.033)	(0.019)	(0.014)	(0.033)	(0.020)
High School GPA: B to C	0.031	0.047	0.038	0.032	0.048	0.039	0.037	0.048	0.049
	(0.004)**	(0.006)**	(0.005)**	(0.005)**	(0.007)**	(0.006)**	(0.007)**	(0.007)**	(0.009)**
High School GPA: C- to D-	0.057	0.082	0.069	0.097	0.130	0.111	0.101	0.130	0.145
	(0.020)**	(0.028)**	(0.024)**	(0.030)**	(0.043)**	(0.037)**	(0.049)*	(0.043)**	(0.067)*

Table 2.5 (continued)

Probability of First Stopout for Four-Year College Students -- Scheduled Pell Grant

(Marginal Effects)

	Actual Scheduled Pell Grant			*EFC identified Scheduled Pell*			*EFC identified Scheduled Pell*		
	(1) SPH Model	(2) Panel LP Model	(3) PDP Model	(4) SPH Model	(5) Panel LP Model	(6) PDP Model	(7) SPH Model	(8) Panel LP Model	(9) PDP Model
State weekly earnings in mfg. sector/1,000	-0.055	-0.076	-0.063	-0.058	-0.082	-0.065	-0.046	-0.082	-0.052
	(0.018)**	(0.022)**	(0.020)**	(0.020)**	(0.026)**	(0.023)**	(0.021)*	(0.026)**	(0.026)*
State unemployment rate	0.002	0.002	0.003	0.002	0.002	0.002	0.000	0.002	-0.000
	(0.001)	(0.001)	(0.001)*	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)	(0.002)
Tuition/$10,000	-0.016	-0.013	-0.017	-0.016	-0.014	-0.017	-0.014	-0.014	-0.016
	(0.004)**	(0.004)**	(0.004)**	(0.005)**	(0.005)**	(0.005)**	(0.005)**	(0.005)**	(0.006)**
Public	-0.008	-0.006	-0.008	-0.008	-0.005	-0.007	-0.005	-0.005	-0.005
	(0.005)	(0.006)	(0.005)	(0.005)	(0.007)	(0.006)	(0.005)	(0.007)	(0.007)
Heterogeneity Std. Dev.(s_u)							1.345		0.907
							(0.056)		(0.036)
Person-term records	28,391	28,391	28,391	20,262	20,262	20,262	20,262	20,262	20,262
N	4,820	4,820	4,820	3,404	3,404	3,404	3,404	3,404	3,404
-2 log L	12,837.10		12,845.50	8,869.45		8,877.41	8,766.20		8,737.11
R-squared		0.04			0.04			0.04	

Standard errors in parentheses

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

[a] The stopout equation used to identify the effect of the scheduled Pell grant also includes a cubic function of total family income, assets, family size and number of siblings in college. Estimated marginal effects of these variables on stopout are presented in Appendix B: Table 1.

Full regression also includes a constant term, and dummy variables for missing parental education, and missing high school GPA

Number of observations diminishes across columns due to missing values for EFC components

Table 2.6
Probability of First Stopout for Four-Year College Students -- Total Grants
(Marginal Effects)

	Actual Total Grants			*EFC Identified Total Grants* [a]			*EFC Identified Total Grants with Random Effects* [a]		
	(1) SPH Model	(2) Panel LP Model	(3) PDP Model	(4) SPH Model	(5) Panel LP Model	(6) PDP Model	(7) SPH Model	(8) Panel LP Model	(9) PDP Model
Total Grants/$1,000 (1995)	-0.003	-0.003	-0.003	0.002	0.000	0.002	0.001	0.000	0.001
	(0.000)**	(0.000)**	(0.000)**	(0.002)	(0.003)	(0.002)	(0.002)	(0.003)	(0.003)
Spring 1996	0.065	0.084	0.075	0.063	0.081	0.070	0.058	0.081	0.076
	(0.006)**	(0.006)**	(0.006)**	(0.007)**	(0.007)**	(0.007)**	(0.006)**	(0.007)**	(0.008)**
Fall 1996	-0.006	-0.007	-0.006	-0.007	-0.008	-0.008	0.006	-0.008	0.009
	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)
Spring 1997	0.045	0.051	0.051	0.044	0.049	0.047	0.068	0.049	0.090
	(0.006)**	(0.006)**	(0.006)**	(0.007)**	(0.007)**	(0.007)**	(0.008)**	(0.007)**	(0.011)**
Fall 1997	-0.015	-0.013	-0.015	-0.016	-0.015	-0.017	0.007	-0.015	0.016
	(0.004)**	(0.004)**	(0.004)**	(0.005)**	(0.005)**	(0.005)**	(0.006)	(0.005)**	(0.007)*
Spring 1998	0.007	0.008	0.009	0.006	0.006	0.007	0.037	0.006	0.056
	(0.005)	(0.005)	(0.005)	(0.006)	(0.006)	(0.006)	(0.008)**	(0.006)	(0.010)**
Fall 1998	-0.038	-0.030	-0.038	-0.038	-0.030	-0.038	-0.016	-0.030	-0.007
	(0.003)**	(0.003)**	(0.004)**	(0.004)**	(0.004)**	(0.004)**	(0.005)**	(0.004)**	(0.006)
Male	0.003	0.003	0.003	-0.000	-0.001	0.001	-0.001	-0.001	-0.001
	(0.002)	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)	(0.004)	(0.004)
African-American	-0.007	-0.008	-0.008	-0.007	-0.007	-0.007	-0.006	-0.007	-0.006
	(0.004)*	(0.006)	(0.004)	(0.005)	(0.008)	(0.006)	(0.005)	(0.008)	(0.006)
Hispanic	0.003	0.005	0.005	0.005	0.010	0.007	0.008	0.010	0.010
	(0.005)	(0.007)	(0.006)	(0.006)	(0.008)	(0.007)	(0.007)	(0.008)	(0.009)
Asian	-0.009	-0.009	-0.009	-0.004	-0.003	-0.004	-0.004	-0.003	-0.004
	(0.005)	(0.006)	(0.005)	(0.006)	(0.007)	(0.007)	(0.006)	(0.007)	(0.007)

Table 2.6 (continued)
Probability of First Stopout for Four-Year College Students -- Total Grants
(Marginal Effects)

	Actual Total Grants			*EFC Identified Total Grants* [a]			*Random Effects* [a]		
	(1) SPH Model	(2) Panel LP Model	(3) PDP Model	(4) SPH Model	(5) Panel LP Model	(6) PDP Model	(7) SPH Model	(8) Panel LP Model	(9) PDP Model
Father high school grad	0.007	0.010	0.008	-0.001	-0.002	-0.002	-0.003	-0.002	-0.004
	(0.008)	(0.011)	(0.009)	(0.010)	(0.016)	(0.012)	(0.010)	(0.016)	(0.012)
Father some college (no bachelor's degree)	-0.003	-0.004	-0.003	-0.011	-0.018	-0.013	-0.013	-0.018	-0.015
	(0.008)	(0.012)	(0.009)	(0.009)	(0.017)	(0.011)	(0.008)	(0.017)	(0.009)
Father college grad	-0.005	-0.006	-0.005	-0.010	-0.015	-0.012	-0.011	-0.015	-0.014
	(0.008)	(0.012)	(0.009)	(0.011)	(0.016)	(0.013)	(0.011)	(0.016)	(0.013)
Single Parent/Broken Home	0.011	0.015	0.012	0.010	0.014	0.012	0.011	0.014	0.013
	(0.003)**	(0.004)**	(0.003)**	(0.004)**	(0.005)**	(0.004)**	(0.004)**	(0.005)**	(0.005)**
Mother high school grad	0.012	0.015	0.013	0.022	0.026	0.023	0.024	0.026	0.028
	(0.008)	(0.011)	(0.009)	(0.013)	(0.015)	(0.014)	(0.013)	(0.015)	(0.016)
Mother some college (no bachelor's degree)	0.014	0.016	0.014	0.022	0.024	0.023	0.024	0.024	0.028
	(0.010)	(0.011)	(0.011)	(0.016)	(0.015)	(0.017)	(0.017)	(0.015)	(0.021)
Mother college grad	0.008	0.010	0.009	0.016	0.019	0.017	0.016	0.019	0.018
	(0.008)	(0.011)	(0.009)	(0.012)	(0.015)	(0.014)	(0.012)	(0.015)	(0.014)
SAT score/100	-0.004	-0.005	-0.004	-0.004	-0.004	-0.004	-0.004	-0.004	-0.004
	(0.001)**	(0.001)**	(0.001)**	(0.001)**	(0.001)**	(0.001)**	(0.001)**	(0.001)**	(0.001)**
Didn't take SAT or ACT	-0.007	0.028	-0.001	-0.003	0.025	0.002	-0.003	0.025	-0.000
	(0.009)	(0.025)	(0.013)	(0.013)	(0.033)	(0.018)	(0.014)	(0.033)	(0.019)
High School GPA: B to C	0.028	0.044	0.034	0.035	0.048	0.042	0.038	0.048	0.050
	(0.004)**	(0.006)**	(0.005)**	(0.006)**	(0.008)**	(0.007)**	(0.008)**	(0.008)**	(0.010)**
High School GPA: C- to D-	0.052	0.080	0.063	0.103	0.131	0.117	0.106	0.131	0.149
	(0.019)**	(0.028)**	(0.023)**	(0.031)**	(0.043)**	(0.038)**	(0.051)*	(0.043)**	(0.069)*

Table 2.6 (continued)

Probability of First Stopout for Four-Year College Students -- Total Grants

(Marginal Effects)

	Actual Total Grants			*EFC Identified Total Grants* [a]			*Random Effects* [a]		
	(1) SPH Model	(2) Panel LP Model	(3) PDP Model	(4) SPH Model	(5) Panel LP Model	(6) PDP Model	(7) SPH Model	(8) Panel LP Model	(9) PDP Model
State weekly earnings in mfg. sector/$1,000	-0.055	-0.080	-0.065	-0.054	-0.078	-0.061	-0.042	-0.078	-0.047
	(0.017)**	(0.022)**	(0.020)**	(0.021)**	(0.026)**	(0.023)**	(0.021)*	(0.026)**	(0.026)
State unemployment rate	0.002	0.003	0.003	0.001	0.001	0.002	-0.000	0.001	-0.001
	(0.001)*	(0.001)	(0.001)*	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)	(0.002)
Tuition/$10,000	-0.006	-0.004	-0.007	-0.023	-0.016	-0.026	-0.017	-0.016	-0.019
	(0.004)	(0.004)	(0.004)	(0.010)*	(0.013)	(0.012)*	(0.010)	(0.013)	(0.013)
Public	-0.010	-0.009	-0.011	-0.009	-0.007	-0.008	-0.006	-0.007	-0.007
	(0.004)*	(0.006)	(0.005)*	(0.005)	(0.007)	(0.006)	(0.005)	(0.007)	(0.007)
Heterogeneity Std. Dev.(s_u)							1.345		0.909
							(0.056)		(0.036)
Person-term records	28,391	28,391	28,391	20,156	20,156	20,156	20,156	20,156	20,156
N	4,820	4,820	4,820	3,378	3,378	3,378	3,378	3,378	3,378
-2 log L	12,771.39		12,782.03	8,817.89		8,825.91	8,716.72		8,687.25
R-squared		0.04			0.04			0.04	

Standard errors in parentheses

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

[a] The stopout equation used to identify the effect of the total grants also includes a cubic function of total family income, assets, family size and number of siblings in college. Estimated marginal effects for these variables are presented in Appendix B: Table3.

Full regression includes a constant term, and dummy variables for missing parental education, and missing high school GPA.

Number of observations diminishes across columns due to missing values for EFC components

Table 2.7

Probability of First Stopout for Four-Year College Students -- Total Financial Aid

(Marginal Effects)

	Actual Total Aid			*EFC Identified Total Aid* [a]			*EFC Identified Total Aid with Random Effects* [a]		
	(1) SPH Model	(2) Panel LP Model	(3) PDP Model	(4) SPH Model	(5) Panel LP Model	(6) PDP Model	(7) SPH Model	(8) Panel LP Model	(9) PDP Model
Total Financial Aid/$1,000 (1995)	-0.002	-0.002	-0.002	0.010	0.006	0.011	0.007	0.006	0.008
	(0.000)**	(0.000)**	(0.000)**	(0.003)**	(0.003)*	(0.003)**	(0.003)**	(0.003)*	(0.003)*
Spring 1996	0.066	0.084	0.076	0.058	0.079	0.066	0.056	0.079	0.073
	(0.006)**	(0.006)**	(0.006)**	(0.007)**	(0.007)**	(0.007)**	(0.006)**	(0.007)**	(0.008)**
Fall 1996	-0.006	-0.007	-0.006	-0.007	-0.008	-0.007	0.007	-0.008	0.010
	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)
Spring 1997	0.046	0.051	0.051	0.044	0.049	0.048	0.069	0.049	0.090
	(0.006)**	(0.006)**	(0.006)**	(0.007)**	(0.007)**	(0.007)**	(0.008)**	(0.007)**	(0.011)**
Fall 1997	-0.015	-0.014	-0.015	-0.015	-0.013	-0.014	0.009	-0.013	0.019
	(0.004)**	(0.004)**	(0.004)**	(0.005)**	(0.005)**	(0.005)**	(0.006)	(0.005)**	(0.008)*
Spring 1998	0.007	0.008	0.009	0.008	0.008	0.010	0.040	0.008	0.060
	(0.005)	(0.005)	(0.005)	(0.006)	(0.006)	(0.006)	(0.008)**	(0.006)	(0.011)**
Fall 1998	-0.038	-0.030	-0.038	-0.036	-0.027	-0.035	-0.014	-0.027	-0.003
	(0.003)**	(0.003)**	(0.004)**	(0.004)**	(0.004)**	(0.004)**	(0.005)*	(0.004)**	(0.007)
Male	0.003	0.004	0.004	-0.001	-0.002	-0.001	-0.002	-0.002	-0.002
	(0.002)	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)	(0.004)	(0.004)
African-American	-0.007	-0.008	-0.008	-0.011	-0.010	-0.012	-0.009	-0.010	-0.010
	(0.004)*	(0.006)	(0.004)	(0.004)**	(0.008)	(0.005)*	(0.004)*	(0.008)	(0.005)
Hispanic	0.001	0.004	0.003	0.004	0.009	0.005	0.006	0.009	0.009
	(0.005)	(0.007)	(0.005)	(0.006)	(0.008)	(0.007)	(0.006)	(0.008)	(0.008)
Asian	-0.011	-0.011	-0.011	0.003	0.002	0.005	0.001	0.002	0.002
	(0.005)*	(0.006)	(0.005)*	(0.007)	(0.007)	(0.008)	(0.007)	(0.007)	(0.009)

Table 2.7 (continued)
Probability of First Stopout for Four-Year College Students -- Total Financial Aid
(Marginal Effects)

	Actual Total Aid			*EFC Identified Total Aid*[a]			*Random Effects*[a]		
	(1) SPH Model	(2) Panel LP Model	(3) PDP Model	(4) SPH Model	(5) Panel LP Model	(6) PDP Model	(7) SPH Model	(8) Panel LP Model	(9) PDP Model
Father high school grad	0.008	0.012	0.009	-0.001	-0.002	-0.002	-0.003	-0.002	-0.004
	(0.008)	(0.011)	(0.009)	(0.010)	(0.016)	(0.012)	(0.010)	(0.016)	(0.012)
Father some college (no bachelor's degree)	-0.001	-0.002	-0.002	-0.011	-0.018	-0.013	-0.013	-0.018	-0.015
	(0.008)	(0.012)	(0.010)	(0.009)	(0.017)	(0.011)	(0.008)	(0.017)	(0.009)
Father college grad	-0.004	-0.005	-0.004	-0.010	-0.015	-0.013	-0.011	-0.015	-0.014
	(0.008)	(0.012)	(0.009)	(0.011)	(0.016)	(0.013)	(0.010)	(0.016)	(0.013)
Single Parent/Broken Home	0.010	0.014	0.012	0.010	0.013	0.011	0.010	0.013	0.013
	(0.003)**	(0.004)**	(0.003)**	(0.004)**	(0.005)**	(0.004)**	(0.004)*	(0.005)**	(0.005)*
Mother high school grad	0.015	0.017	0.016	0.024	0.027	0.025	0.025	0.027	0.029
	(0.008)	(0.011)	(0.009)	(0.013)	(0.015)	(0.014)	(0.013)*	(0.015)	(0.016)
Mother some college (no bachelor's degree)	0.017	0.018	0.018	0.024	0.025	0.025	0.026	0.025	0.030
	(0.010)	(0.011)	(0.011)	(0.017)	(0.015)	(0.017)	(0.017)	(0.015)	(0.021)
Mother college grad	0.010	0.012	0.011	0.017	0.020	0.018	0.018	0.020	0.019
	(0.008)	(0.011)	(0.010)	(0.012)	(0.015)	(0.014)	(0.012)	(0.015)	(0.014)
SAT score/100	-0.004	-0.005	-0.005	-0.004	-0.005	-0.005	-0.004	-0.005	-0.005
	(0.001)**	(0.001)**	(0.001)**	(0.001)**	(0.001)**	(0.001)**	(0.001)**	(0.001)**	(0.001)**
Didn't take SAT or ACT	-0.009	0.024	-0.004	0.017	0.036	0.027	0.012	0.036	0.016
	(0.009)	(0.025)	(0.012)	(0.020)	(0.033)	(0.025)	(0.020)	(0.033)	(0.027)
High School GPA: B to C	0.030	0.046	0.036	0.042	0.051	0.049	0.045	0.051	0.058
	(0.004)**	(0.006)**	(0.005)**	(0.007)**	(0.007)**	(0.007)**	(0.008)**	(0.007)**	(0.010)**
High School GPA: C- to D-	0.055	0.081	0.066	0.126	0.136	0.138	0.128	0.136	0.172
	(0.019)**	(0.028)**	(0.023)**	(0.036)**	(0.043)**	(0.041)**	(0.059)*	(0.043)**	(0.074)*

Table 2.7 (continued)
Probability of First Stopout for Four-Year College Students -- Total Financial Aid
(Marginal Effects)

	Actual Total Aid			*EFC Identified Total Aid* [a]			*Random Effects* [a]		
	(1) SPH Model	(2) Panel LP Model	(3) PDP Model	(4) SPH Model	(5) Panel LP Model	(6) PDP Model	(7) SPH Model	(8) Panel LP Model	(9) PDP Model
State weekly earnings in mfg. sector/1,000	-0.051	-0.075	-0.060	-0.052	-0.077	-0.060	-0.040	-0.077	-0.046
	(0.018)**	(0.022)**	(0.020)**	(0.020)*	(0.026)**	(0.023)**	(0.021)	(0.026)**	(0.026)
State unemployment rate	0.002	0.003	0.003	0.001	0.001	0.001	-0.001	0.001	-0.001
	(0.001)*	(0.001)	(0.001)*	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)	(0.002)
Tuition/$10,000	-0.005	-0.002	-0.005	-0.082	-0.057	-0.094	-0.063	-0.057	-0.068
	(0.004)	(0.005)	(0.005)	(0.018)**	(0.019)**	(0.020)**	(0.018)**	(0.019)**	(0.022)**
Public	-0.009	-0.007	-0.010	-0.008	-0.006	-0.008	-0.005	-0.006	-0.005
	(0.005)	(0.006)	(0.005)	(0.005)	(0.007)	(0.006)	(0.005)	(0.007)	(0.007)
Heterogeneity Std. Dev.(s_u)							1.335		0.902
							(0.057)		(0.037)
Person-term records	28,391	28,391	28,391	20,156	20,156	20,156	20,156	20,156	20,156
N	4,820	4,820	4,820	3,378	3,378	3,378	3,378	3,378	3,378
-2 log L	12,789.63		12,794.55	8,805.13		8,811.98	8,709.27		8,681.21
R-squared		0.04			0.04			0.04	

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

[a] The stopout equation used to identify the effect of the total aid also includes a cubic function of total family income, assets, family size and number of siblings in college. Estimated marginal effects of these variables on stopout are presented in Appendix B: Table 4.

Full regression includes a constant term, and dummy variables for missing parental education, and missing high school GPA.

Number of observations diminishes across columns due to missing values for EFC components.

Table 2.8
Probability of Graduation Within Six Years for Four-Year College Students (Probit Model) -- EFC Identified Financial Aid Instruments
(Marginal Effects)

	(1) Pell	(2) Total Grants	(3) Total Aid
Financial Aid Instrument/$1,000 (1995)	0.028	0.020	0.027
	(0.020)	(0.014)	(0.019)
Male	-0.022	-0.019	-0.025
	(0.018)	(0.018)	(0.018)
African-American	-0.051	-0.059	-0.068
	(0.035)	(0.036)	(0.038)
Hispanic	-0.100	-0.112	-0.105
	(0.036)**	(0.038)**	(0.037)**
Asian	0.021	0.028	0.043
	(0.039)	(0.039)	(0.041)
Father high school grad	-0.041	-0.041	-0.041
	(0.064)	(0.064)	(0.064)
Father some college (no bachelor's degree)	0.022	0.022	0.022
	(0.067)	(0.067)	(0.067)
Father college grad	0.042	0.042	0.042
	(0.065)	(0.065)	(0.065)
Single Parent/Broken Home	-0.075	-0.075	-0.075
	(0.022)**	(0.022)**	(0.022)**
Mother high school grad	-0.073	-0.073	-0.073
	(0.066)	(0.066)	(0.066)
Mother some college (no bachelor's degree)	-0.065	-0.065	-0.065
	(0.071)	(0.071)	(0.071)
Mother college grad	-0.053	-0.053	-0.053
	(0.068)	(0.068)	(0.068)
SAT score/100	0.023	0.017	0.019
	(0.005)**	(0.007)*	(0.006)**
Didn't take SAT or ACT	0.101	0.084	0.138
	(0.089)	(0.092)	(0.088)
High School GPA: B to C	-0.208	-0.189	-0.190
	(0.026)**	(0.029)**	(0.029)**
High School GPA: C- to D-	-0.309	-0.296	-0.290
	(0.100)**	(0.102)**	(0.104)**
State weekly earnings in mfg. sector/$1,000	-0.001	-0.001	-0.001
	(0.131)	(0.131)	(0.131)
State unemployment rate	0.009	0.009	0.009
	(0.008)	(0.008)	(0.008)
Tuition/$10,000	0.123	0.030	-0.075
	(0.030)**	(0.071)	(0.141)
Public	0.018	0.018	0.018
	(0.033)	(0.033)	(0.033)
Observations	3,378	3,378	3,378
-2 log L	4,146.53	4,146.53	4,146.53

Standard errors in parentheses

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

[a] The graduation equation also includes a quartic function of total family income, assets, family size and number of siblings in college. Estimated marginal effects of these variables on stopout are presented in Appendix C: Table 1.

Full regression also includes a constant term, and dummy variables for missing parental education, and missing high school GPA

Table 2.9
Sample Means for Two-Year College Students (1995)
(Standard Errors in Parentheses)

	FAFSA Filers N = 533	Pell Recipients N = 335	Non-Recipients N = 220
Male	0.45	0.37	0.50
Family Income	$36,304	$18,711	$47,857
	(25248)	(10592)	(25418)
White	0.69	0.54	0.79
African-American	0.15	0.26	0.08
Hispanic	0.16	0.20	0.13
Father's Education			
less than high school	0.11	0.12	0.10
high school graduate	0.48	0.55	0.44
some college (less than bachelor's degree)	0.15	0.09	0.18
bachelor's degree or beyond	0.20	0.15	0.24
Single Parent/Broken Home	0.35	0.45	0.28
Mother's Education			
less than high school	0.12	0.15	0.10
high school graduate	0.50	0.52	0.49
some college (less than bachelor's degree)	0.16	0.12	0.18
bachelor's degree or beyond	0.20	0.20	0.20
Took the SAT	0.66	0.59	0.72
SAT score[a]	769	706	802
	(176)	(162)	(174)
High School Grades			
A to A-	0.10	0.07	0.13
A- to B	0.20	0.15	0.24
B to B-	0.12	0.12	0.12
B- to C	0.12	0.13	0.12
C to C-	0.03	0.04	0.03
C- to D-	0.01	0.02	0.01
missing	0.40	0.48	0.36
Cumulative 1995-96 College GPA			
3.75 and above	0.07	0.05	0.09
3.25 - 3.74	0.16	0.13	0.19
2.75 - 3.24	0.23	0.20	0.26
2.25 - 2.74	0.18	0.20	0.17
1.75 - 2.24	0.14	0.20	0.11
1.25 - 1.74	0.08	0.10	0.06
below 1.24	0.12	0.12	0.11
missing	0.01	0.02	0.01
Residence while enrolled 1995-96			
on campus	0.13	0.12	0.14
with parents	0.71	0.72	0.70
off campus	0.17	0.17	0.17
Public Institution	0.65	0.66	0.64
In State Student	0.92	0.95	0.89

Table 2.9 (continued)
Sample Means for Two-Year College Students (1995)
(Standard Errors in Parentheses)

	FAFSA Filers N = 533	Pell Recipients N = 335	Non-Recipients N = 220
State Unemployment Rate	5.60	5.69	5.54
	(1.17)	(1.20)	(1.15)
Weekly Manufacturing Earnings	$513	$511	$514
	(66)	(60)	(70)
Expected Family Contribution (EFC)	$3,787	$512	$6,650
	(5756)	(654)	(6647)
Share of Aid Applicants Receiving Pell Grant	0.40	1	0
Sheduled Pell Grant[a]	--	$1,842	--
		(629)	
Actual Pell Grant[a]	--	$1,172	--
		(627)	
Share of Aid Applicants Receiving Need-Based Grants (excluding Pell)	0.59	0.73	0.50
Need-Based Grants (excluding Pell)	$1,696	$1,813	$1,542
	(1568)	(1631)	(1476)
Share of Aid Applicants Receiving Merit-Based Grants or Scholarships	0.16	0.10	0.20
Merit-Based Grants or Scholarships	$1,576	$1,720	$1,527
	(1436)	(2066)	(1165)
Share of Aid Applicants Receiving Need-Based Loans	0.30	0.36	0.26
Need-Based Loans	$2,460	$2,601	$2,331
	(1035)	(1191)	(855)
Share of Aid Applicants Receiving Non-Need-Based Loans	0.13	0.06	0.17
Non-Need-Based Loans	$2,528	$3,557	$2,279
	(1286)	(1207)	(1185)
Parent's Available Income (AI)	$10,946	$1,777	$18,730
	(13562)	(3392)	(14087)
Parents contribution from assets (PCA)	$533	$347	$620
	(2591)	(1706)	(2916)
Family Size	4.10	4.20	4.02
	(1.37)	(1.51)	(1.24)
Number in College	1.30	1.37	1.23
	(0.54)	(0.61)	(0.46)
Adjusted Parent's Contribution (APC)	$3,040	$306	$5,380
	(4866)	(511)	(5646)

[a] Variable means include non-zero values only
[b] Mean EFC includes zero values

Table 2.10

Probability of First Stopout for Two-Year College Students -- Scheduled Pell Grant

(Marginal Effects)

	Actual Scheduled Pell Grant			*EFC Identified Pell Grant* [a]			*EFC Identified Pell Grant with Random Effects* [a]		
	(1) SPH Model	(2) Panel LP Model	(3) PDP Model	(4) SPH Model	(5) Panel LP Model	(6) PDP Model	(7) SPH Model	(8) Panel LP Model	(9) PDP Model
Scheduled Pell Grant/$1,000 (1995)	0.001	0.000	-0.002	-0.015	-0.016	-0.013	-0.010	-0.016	-0.010
	(0.011)	(0.013)	(0.012)	(0.018)	(0.026)	(0.021)	(0.019)	(0.026)	(0.025)
Spring 1996	0.165	0.168	0.173	0.118	0.128	0.128	0.139	0.128	0.185
	(0.025)**	(0.023)**	(0.024)**	(0.029)**	(0.030)**	(0.030)**	(0.034)**	(0.030)**	(0.044)**
Fall 1996	0.032	0.027	0.034	0.023	0.017	0.016	0.102	0.017	0.146
	(0.027)	(0.021)	(0.026)	(0.031)	(0.027)	(0.031)	(0.042)*	(0.027)	(0.054)**
Male	0.001	0.002	0.002	0.013	0.023	0.023	0.022	0.023	0.030
	(0.018)	(0.020)	(0.020)	(0.024)	(0.029)	(0.027)	(0.026)	(0.029)	(0.033)
African-American	0.012	0.013	0.009	-0.022	-0.015	-0.013	-0.002	-0.015	0.000
	(0.031)	(0.034)	(0.033)	(0.036)	(0.054)	(0.044)	(0.039)	(0.054)	(0.051)
Hispanic	0.045	0.043	0.041	-0.026	-0.030	-0.029	-0.019	-0.030	-0.022
	(0.035)	(0.033)	(0.035)	(0.035)	(0.041)	(0.036)	(0.031)	(0.041)	(0.037)
Father high school grad	0.026	0.029	0.031	0.100	0.078	0.079	0.070	0.078	0.082
	(0.042)	(0.042)	(0.042)	(0.101)	(0.079)	(0.076)	(0.062)	(0.079)	(0.074)
Father some college (no bachelor's degree)	-0.037	-0.033	-0.033	0.043	0.024	0.023	0.018	0.024	0.022
	(0.044)	(0.050)	(0.046)	(0.134)	(0.087)	(0.094)	(0.077)	(0.087)	(0.094)
Father college grad	0.025	0.029	0.032	0.134	0.091	0.098	0.102	0.091	0.120
	(0.051)	(0.048)	(0.052)	(0.160)	(0.084)	(0.102)	(0.107)	(0.084)	(0.131)
Single Parent/Broken Home	0.002	0.005	0.005	0.034	0.040	0.038	0.037	0.040	0.049
	(0.019)	(0.022)	(0.021)	(0.029)	(0.034)	(0.032)	(0.032)	(0.034)	(0.042)
Mother high school grad	0.043	0.041	0.038	-0.151	-0.130	-0.127	-0.121	-0.130	-0.143
	(0.043)	(0.042)	(0.043)	(0.107)	(0.080)	(0.078)	(0.076)	(0.080)	(0.091)
Mother some college (no bachelor's degree)	0.028	0.023	0.018	-0.119	-0.164	-0.118	-0.095	-0.164	-0.101
	(0.056)	(0.048)	(0.052)	(0.046)*	(0.089)	(0.044)**	(0.031)**	(0.089)	(0.034)**
Mother college grad	0.101	0.086	0.089	-0.079	-0.089	-0.074	-0.058	-0.089	-0.063
	(0.068)	(0.049)	(0.059)	(0.054)	(0.088)	(0.055)	(0.037)	(0.088)	(0.040)

Table 2.10 (continued)

Probability of First Stopout for Two-Year College Students -- Scheduled Pell Grant

(Marginal Effects)

	Actual Scheduled Pell Grant			*EFC Identified Pell Grant* [a]			*Random Effects* [a]		
	(1) SPH Model	(2) Panel LP Model	(3) PDP Model	(4) SPH Model	(5) Panel LP Model	(6) PDP Model	(7) SPH Model	(8) Panel LP Model	(9) PDP Model
SAT score/100	0.000	-0.001	-0.002	-0.012	-0.014	-0.015	-0.013	-0.014	-0.017
	(0.007)	(0.008)	(0.008)	(0.009)	(0.010)	(0.009)	(0.009)	(0.010)	(0.011)
Didn't take SAT or ACT	-0.014	-0.020	-0.020	-0.077	-0.099	-0.084	-0.070	-0.099	-0.079
	(0.061)	(0.070)	(0.066)	(0.055)	(0.096)	(0.062)	(0.049)	(0.096)	(0.054)
High School GPA: B to C	0.044	0.038	0.038	0.073	0.057	0.057	0.065	0.057	0.073
	(0.030)	(0.028)	(0.030)	(0.043)	(0.037)	(0.040)	(0.044)	(0.037)	(0.055)
High School GPA: C- to D-	-0.050	-0.052	-0.047	-0.016	-0.031	-0.019	-0.021	-0.031	-0.024
	(0.041)	(0.047)	(0.045)	(0.056)	(0.064)	(0.057)	(0.043)	(0.064)	(0.049)
State weekly earnings in mfg. sector/1,000	-0.378	-0.381	-0.411	-0.263	-0.241	-0.266	-0.223	-0.241	-0.268
	(0.143)**	(0.137)**	(0.153)**	(0.170)	(0.167)	(0.181)	(0.171)	(0.167)	(0.215)
State unemployment rate	-0.004	-0.006	-0.007	-0.013	-0.020	-0.018	-0.018	-0.020	-0.023
	(0.009)	(0.010)	(0.010)	(0.013)	(0.015)	(0.013)	(0.011)	(0.015)	(0.014)
Heterogeneity Std. Dev.(s_u)							1.602		1.336
							(0.190)		(0.157)
Person-term records	1,588	1,588	1,588	860	860	860	860	860	860
N	533	533	533	282	282	282	282	282	282
-2 log L	1,279.65		1,280.61	625.96		627.84	608.58		603.48
R-squared		0.06			0.08			0.08	

Standard errors in parentheses

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

[a] The stopout equation used to identify the effect of the scheduled Pell also includes a quartic function of total family income, assets, family size and number of siblings in college. Estimated marginal effects of these variables on stopout are presented in Appendix D: Table 1.

Full regression includes a constant term, and dummy variables for missing parental education, and missing high school GPA

Table 2.11

Probability of First Stopout for Two-Year College Students -- Total Grants

(Marginal Effects)

	Actual Total Grants Effect			*EFC Identified Total Grants* [a]			*EFC Identified Total Grants with Random Effects* [a]		
	(1) SPH Model	(2) Panel LP Model	(3) PDP Model	(4) SPH Model	(5) Panel LP Model	(6) PDP Model	(7) SPH Model	(8) Panel LP Model	(9) PDP Model
Total Grants/$1,000 (1995)	-0.018	-0.019	-0.022	-0.013	-0.015	-0.011	-0.009	-0.015	-0.009
	(0.005)**	(0.004)**	(0.005)**	(0.017)	(0.023)	(0.019)	(0.017)	(0.023)	(0.022)
Spring 1996	0.163	0.170	0.181	0.118	0.128	0.128	0.139	0.128	0.185
	(0.025)**	(0.023)**	(0.024)**	(0.029)**	(0.030)**	(0.030)**	(0.034)**	(0.030)**	(0.044)**
Fall 1996	0.033	0.029	0.038	0.023	0.017	0.016	0.102	0.017	0.146
	(0.026)	(0.020)	(0.026)	(0.031)	(0.027)	(0.031)	(0.042)*	(0.027)	(0.054)**
Male	-0.004	-0.003	-0.002	0.010	0.020	0.021	0.020	0.020	0.028
	(0.018)	(0.020)	(0.019)	(0.025)	(0.029)	(0.028)	(0.026)	(0.029)	(0.033)
African-American	0.018	0.015	0.014	-0.027	-0.022	-0.018	-0.006	-0.022	-0.003
	(0.032)	(0.034)	(0.033)	(0.035)	(0.055)	(0.044)	(0.038)	(0.055)	(0.049)
Hispanic	0.042	0.040	0.042	-0.030	-0.035	-0.033	-0.021	-0.035	-0.025
	(0.035)	(0.034)	(0.035)	(0.034)	(0.042)	(0.036)	(0.030)	(0.042)	(0.036)
Father high school grad	0.028	0.034	0.036	0.100	0.078	0.079	0.070	0.078	0.082
	(0.042)	(0.041)	(0.042)	(0.101)	(0.079)	(0.076)	(0.062)	(0.079)	(0.074)
Father some college (no bachelor's degree)	-0.038	-0.035	-0.032	0.043	0.024	0.023	0.018	0.024	0.022
	(0.043)	(0.049)	(0.045)	(0.134)	(0.087)	(0.094)	(0.077)	(0.087)	(0.094)
Father college grad	0.022	0.028	0.032	0.134	0.091	0.098	0.102	0.091	0.120
	(0.051)	(0.047)	(0.052)	(0.160)	(0.084)	(0.102)	(0.107)	(0.084)	(0.131)
Single Parent/Broken Home	-0.002	0.002	0.002	0.034	0.040	0.038	0.037	0.040	0.049
	(0.019)	(0.022)	(0.021)	(0.029)	(0.034)	(0.032)	(0.032)	(0.034)	(0.042)
Mother high school grad	0.044	0.043	0.038	-0.151	-0.130	-0.127	-0.121	-0.130	-0.143
	(0.044)	(0.042)	(0.042)	(0.107)	(0.080)	(0.078)	(0.076)	(0.080)	(0.091)
Mother some college (no bachelor's degree)	0.026	0.026	0.017	-0.119	-0.164	-0.118	-0.095	-0.164	-0.101
	(0.056)	(0.048)	(0.052)	(0.046)*	(0.089)	(0.044)**	(0.031)**	(0.089)	(0.034)**
Mother college grad	0.100	0.086	0.085	-0.079	-0.089	-0.074	-0.058	-0.089	-0.063
	(0.068)	(0.048)	(0.059)	(0.054)	(0.088)	(0.055)	(0.037)	(0.088)	(0.040)

Table 2.11 (continued)

Probability of First Stopout for Two-Year College Students -- Total Grants

(Marginal Effects)

	Actual Total Grants Effect			*EFC Identified Total Grants* [a]			*Random Effects* [a]		
	(1) SPH Model	(2) Panel LP Model	(3) PDP Model	(4) SPH Model	(5) Panel LP Model	(6) PDP Model	(7) SPH Model	(8) Panel LP Model	(9) PDP Model
SAT score/100	-0.001	-0.002	-0.003	-0.012	-0.014	-0.015	-0.013	-0.014	-0.017
	(0.007)	(0.008)	(0.008)	(0.009)	(0.010)	(0.009)	(0.009)	(0.010)	(0.011)
Didn't take SAT or ACT	-0.042	-0.056	-0.053	-0.088	-0.117	-0.094	-0.076	-0.117	-0.085
	(0.057)	(0.070)	(0.061)	(0.056)	(0.106)	(0.063)	(0.050)	(0.106)	(0.055)
High School GPA: B to C	0.049	0.046	0.047	0.081	0.063	0.063	0.071	0.063	0.079
	(0.030)	(0.028)	(0.030)	(0.045)	(0.038)	(0.042)	(0.046)	(0.038)	(0.058)
High School GPA: C- to D-	-0.053	-0.056	-0.048	-0.020	-0.036	-0.022	-0.023	-0.036	-0.026
	(0.038)	(0.048)	(0.044)	(0.055)	(0.065)	(0.057)	(0.042)	(0.065)	(0.047)
State weekly earnings in mfg. sector/1,000	-0.378	-0.404	-0.413	-0.263	-0.241	-0.266	-0.223	-0.241	-0.268
	(0.137)**	(0.137)**	(0.148)**	(0.170)	(0.167)	(0.181)	(0.171)	(0.167)	(0.215)
State unemployment rate	-0.003	-0.006	-0.006	-0.013	-0.020	-0.018	-0.018	-0.020	-0.023
	(0.009)	(0.010)	(0.009)	(0.013)	(0.015)	(0.013)	(0.011)	(0.015)	(0.014)
Heterogeneity Std. Dev.(s_u)							1.602		1.336
							(0.190)		(0.157)
Person-term records	1,588	1,588	1,588	860	860	860	860	860	860
N	533	533	533	282	282	282	282	282	282
-2 log L	1,264.71		1,261.48	642.43		643.56	608.58496		603.47858
R-squared		0.07			0.08			0.08	

Standard errors in parentheses

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

[a] The stopout equation used to identify the effect of the total grants also includes a quartic function of total family income, assets, family size and number of siblings in college. Estimated marginal effects of these variables on stopout are presented in Appendix D: Table 3.

Full regression includes a constant term, and dummy variables for missing parental education, and missing high school GPA

Table 2.12

Probability of First Stopout for Two-Year College Students -- Total Aid

(Marginal Effects)

	Actual Total Aid			*EFC Identified Total Aid* [a]			*EFC Identified Total Aid with Random Effects* [a]		
	(1) SPH Model	(2) Panel LP Model	(3) PDP Model	(4) SPH Model	(5) Panel LP Model	(6) PDP Model	(7) SPH Model	(8) Panel LP Model	(9) PDP Model
Total Financial Aid/$1,000 (1995)	-0.004	-0.005	-0.005	-0.015	-0.017	-0.013	-0.010	-0.017	-0.010
	(0.003)	(0.003)	(0.003)	(0.019)	(0.026)	(0.021)	(0.020)	(0.026)	(0.025)
Spring 1996	0.165	0.169	0.176	0.118	0.128	0.128	0.139	0.128	0.185
	(0.025)**	(0.023)**	(0.024)**	(0.029)**	(0.030)**	(0.030)**	(0.034)**	(0.030)**	(0.044)**
Fall 1996	0.032	0.027	0.035	0.023	0.017	0.016	0.102	0.017	0.146
	(0.026)	(0.021)	(0.026)	(0.031)	(0.027)	(0.031)	(0.042)*	(0.027)	(0.054)**
Male	0.002	0.003	0.004	0.015	0.025	0.025	0.024	0.025	0.032
	(0.018)	(0.020)	(0.020)	(0.023)	(0.029)	(0.027)	(0.026)	(0.029)	(0.033)
African-American	0.013	0.012	0.009	-0.032	-0.028	-0.022	-0.009	-0.028	-0.007
	(0.032)	(0.034)	(0.032)	(0.035)	(0.058)	(0.045)	(0.039)	(0.058)	(0.050)
Hispanic	0.045	0.043	0.043	-0.028	-0.033	-0.031	-0.020	-0.033	-0.024
	(0.035)	(0.034)	(0.035)	(0.034)	(0.041)	(0.036)	(0.031)	(0.041)	(0.036)
Father high school grad	0.025	0.029	0.031	0.100	0.078	0.079	0.070	0.078	0.082
	(0.042)	(0.041)	(0.042)	(0.101)	(0.079)	(0.076)	(0.062)	(0.079)	(0.074)
Father some college (no bachelor's degree)	-0.037	-0.033	-0.031	0.043	0.024	0.023	0.018	0.024	0.022
	(0.044)	(0.049)	(0.046)	(0.134)	(0.087)	(0.094)	(0.077)	(0.087)	(0.094)
Father college grad	0.021	0.025	0.029	0.134	0.091	0.098	0.102	0.091	0.120
	(0.051)	(0.048)	(0.052)	(0.160)	(0.084)	(0.102)	(0.107)	(0.084)	(0.131)
Single Parent/Broken Home	-0.001	0.002	0.002	0.034	0.040	0.038	0.037	0.040	0.049
	(0.020)	(0.022)	(0.021)	(0.029)	(0.034)	(0.032)	(0.032)	(0.034)	(0.042)
Mother high school grad	0.048	0.046	0.043	-0.151	-0.130	-0.127	-0.121	-0.130	-0.143
	(0.044)	(0.042)	(0.043)	(0.107)	(0.080)	(0.078)	(0.076)	(0.080)	(0.091)
Mother some college (no bachelor's degree)	0.032	0.027	0.022	-0.119	-0.164	-0.118	-0.095	-0.164	-0.101
	(0.058)	(0.049)	(0.053)	(0.046)*	(0.089)	(0.044)**	(0.031)**	(0.089)	(0.034)**
Mother college grad	0.107	0.090	0.093	-0.079	-0.089	-0.074	-0.058	-0.089	-0.063
	(0.070)	(0.049)	(0.060)	(0.054)	(0.088)	(0.055)	(0.037)	(0.088)	(0.040)

Table 2.12 (continued)
Probability of First Stopout for Two-Year College Students -- Total Aid
(Marginal Effects)

	Actual Total Aid			*EFC Identified Total Aid* [a]			*Random Effects* [a]		
	(1) SPH Model	(2) Panel LP Model	(3) PDP Model	(4) SPH Model	(5) Panel LP Model	(6) PDP Model	(7) SPH Model	(8) Panel LP Model	(9) PDP Model
SAT score/100	-0.001	-0.002	-0.003	-0.017	-0.020	-0.019	-0.016	-0.020	-0.020
	(0.007)	(0.008)	(0.008)	(0.011)	(0.014)	(0.012)	(0.011)	(0.014)	(0.014)
Didn't take SAT or ACT	-0.027	-0.038	-0.035	-0.110	-0.155	-0.113	-0.089	-0.155	-0.096
	(0.059)	(0.070)	(0.064)	(0.065)	(0.143)	(0.074)	(0.060)	(0.143)	(0.065)
High School GPA: B to C	0.046	0.040	0.040	0.086	0.067	0.067	0.074	0.067	0.082
	(0.030)	(0.028)	(0.030)	(0.048)	(0.041)	(0.044)	(0.049)	(0.041)	(0.061)
High School GPA: C- to D-	-0.049	-0.051	-0.045	-0.015	-0.029	-0.017	-0.020	-0.029	-0.023
	(0.041)	(0.048)	(0.046)	(0.056)	(0.063)	(0.058)	(0.044)	(0.063)	(0.050)
State weekly earnings in mfg. sector/1,000	-0.373	-0.384	-0.405	-0.263	-0.241	-0.266	-0.223	-0.241	-0.268
	(0.139)**	(0.137)**	(0.150)**	(0.170)	(0.167)	(0.181)	(0.171)	(0.167)	(0.215)
State unemployment rate	-0.004	-0.006	-0.007	-0.013	-0.020	-0.018	-0.018	-0.020	-0.023
	(0.009)	(0.010)	(0.009)	(0.013)	(0.015)	(0.013)	(0.011)	(0.015)	(0.014)
Heterogeneity Std. Dev.(s_u)							1.602		1.336
							(0.190)		(0.157)
Person-term records	1,588	1,588	1,588	860	860	860	860	860	860
N	533	533	533	282	282	282	282	282	282
-2 log L	1,277.19		1,276.98	625.9643		627.8385	608.585		603.4786
R-squared		0.07			0.07			0.07	

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

[a] The stopout equation used to identify the effect of the total aid also includes a quartic function of total family income, assets, family size and number of siblings in college. Estimated marginal effects of these variables on stopout are presented in Appendix D: Table 4.

Full regression includes a constant term, and dummy variables for missing parental education, and missing high school GPA

Appendix A
Sample Selection Model

In order to control for potential sample selection bias associated with restricting the sample to FAFSA filers, I adopt the dichotomous outcome version of Heckman's (1979) sample selection model (van de Ven and van Praag, 1981). Recognizing that estimation of the discrete time panel data probit model on the reorganized person-term data set is equivalent to T independent Bernoulli trials, where T equals the total number of discrete time periods observed for all individuals, the decision to apply for financial aid and the stopout decision can be modeled using the following latent variable framework.

$$\mathbf{F_i^* = Z\alpha + \varepsilon_i^F} \qquad \mathbf{(28)}$$

$$\mathbf{S_{it}^* = X\beta + \varepsilon_{it}^S} \qquad \mathbf{(29)}$$

We observe

$$\mathbf{F_i = 1 \text{ if } F_i^* > 0 \text{ (files FAFSA)}} \qquad \mathbf{(30)}$$

$$\mathbf{F_i = 0 \text{ if } F_i^* \leq 0 \text{ (does not file FAFSA)}} \qquad \mathbf{(31)}$$

The outcome S_{it} is only observed if the student files a FAFSA, and

$$\mathbf{S_{it} = 1 \text{ if } S_{it}^* > 0 \text{ (does not stopout)}} \qquad \mathbf{(32)}$$

$$\mathbf{S_{it} = 0 \text{ if } S_{it}^* \leq 0 \text{ (stops out)}} \qquad \mathbf{(33)}$$

The error terms, ε_i^F and ε_{it}^S are assumed to be normally distributed with correlation ρ. The vectors of covariates **X** and **Z** are identical except for an exclusion restriction imposed on **X**. The ratio of average state tuition rates to average national tuition rates are included in the equation determining filing status, but not the stopout equation. This is used as a measure of the relative cost of education in the individual's home state. Since most students attend in state colleges, those in states with higher tuition rates may be more likely to apply for financial aid. The model is identified through its non-linearity and the exclusion restriction[45]. The **heckprob** command in Stata is used to estimate this model.

Appendix A: Table 1 includes sample means for the full sample of students (including filers and non-filers) and the subsample of FAFSA filers for both samples of four-year and two-year college students. Given that 86 percent of the four-year sample completed a FAFSA for the 1995-1996 academic year, sample means for the full sample and the sample of FAFSA filers are similar except for average parental income.

Basic filing patterns for the two-year sample are similar to those in the four-year sample with the exception of a gender differential. Male students were 8.2 percentage points less likely to apply for financial aid than were females. Finally, the estimates of ρ, the correlation between unobservable factors affecting both the decision to apply for financial aid and the decision to stopout, are not statistically different from zero in either sample. Estimates of the sample selection models are presented in Appendix A: Table 2.

[45] The model is also estimated with X=Z.

Appendix A: Table 1
Sample Means for Full Sample and Aid Applicants
(Standard Errors in Parentheses)

	Four-Year College Students		*Two-Year College Students*	
	1995-1996			
	Full Sample N = 5649	**FAFSA Filers N = 4865**	**Full Sample N = 743**	**FAFSA Filers N = 533**
Male	0.44	0.43	0.49	0.45
Family Income	$62,619	$56,573	$45,151	$36,304
	(54776)	(45064)	(51200)	(25248)
White	0.77	0.76	0.73	0.69
African-American	0.08	0.09	0.12	0.15
Hispanic	0.08	0.08	0.15	0.16
Asian	0.06	0.06		
Father's Education				
less than high school	0.03	0.03	0.09	0.11
high school graduate	0.32	0.35	0.43	0.48
some college (less than bachelor's degree)	0.12	0.12	0.15	0.15
bachelor's degree or beyond	0.49	0.47	0.24	0.20
Single Parent/Broken Home	0.28	0.28	0.33	0.35
Mother's Education				
less than high school	0.03	0.04	0.10	0.12
high school graduate	0.37	0.39	0.45	0.50
some college (less than bachelor's degree)	0.15	0.15	0.18	0.16
bachelor's degree or beyond	0.41	0.41	0.21	0.20
Took the SAT	0.98	0.98	0.64	0.66
SAT score[a]	971	970	776	769
	(210)	(212)	(175)	(176)
High School Grades				
A to A-	0.40	0.42	0.09	0.10
A- to B	0.31	0.30	0.19	0.20
B to B-	0.11	0.11	0.12	0.12
B- to C	0.07	0.06	0.13	0.12
C to C-	0.01	0.01	0.04	0.03
C- to D-	0.001	0.002	0.01	0.01
missing	0.10	0.10	0.43	0.40
Cumulative 1995-96 College GPA				
3.75 and above	0.08	0.09	0.07	0.07
3.25 - 3.74	0.21	0.21	0.15	0.16
2.75 - 3.24	0.25	0.24	0.22	0.23
2.25 - 2.74	0.21	0.21	0.19	0.18
1.75 - 2.24	0.12	0.12	0.14	0.14
1.25 - 1.74	0.06	0.05	0.07	0.08
below 1.24	0.05	0.05	0.14	0.12
missing	0.02	0.03	0.01	0.01
Residence while enrolled 1995-96				
on campus	0.75	0.75	0.11	0.13
with parents	0.18	0.17	0.73	0.71
off campus	0.07	0.07	0.16	0.17

Appendix A: Table 1 (continued)
Sample Means for Full Sample and Aid Applicants
(Standard Errors in Parentheses)

	Four-Year College Students		*Two-Year College Students*	
	1995-1996			
	Full Sample N = 5649	**FAFSA Filers N = 4865**	**Full Sample N = 743**	**FAFSA Filers N = 533**
Public Institution	0.60	0.58	0.74	0.65
In State Student	0.72	0.73	0.92	0.92
Tuition In State	$7,231	$7,351		
	(6038)	(5969)		
Tuition Out of State	$10,331	$10,321		
	(4451)	(4395)		
State Unemployment Rate	5.52	5.51	5.66	5.60
	(1.17)	(1.16)	(1.23)	(1.17)
Weekly Manufacturing Earnings	$525	$526	$514	$513
	(68)	(69)	(66)	(66)

[a] Variable means include non-zero values only

Appendix A: Table 2
Probability of First Stopout -- Selection Corrected Probit Models
(Marginal Effects)

	Four-Year College Students			*Two-Year College Students*		
	(1) Prob of filing FAFSA	(2) Selection Corrected Probit Model **X < Z**	(3) Selection Corrected Probit Model **X = Z**	(4) Prob of filing FAFSA	(5) Selection Corrected Probit Model **X < Z**	(6) Selection Corrected Probit Model **X = Z**
Received Pell Grant First Year		-0.005	-0.005		-0.006	-0.005
		(0.003)	(0.003)		(0.020)	(0.024)
Received Non-Pell Financial Aid First Year		-0.019	-0.019		-0.035	-0.042
		(0.005)**	(0.005)**		(0.022)	(0.034)
Spring 1996		0.070	0.072		0.145	0.173
		(0.007)**	(0.008)**		(0.054)**	(0.092)
Fall 1996		-0.007	-0.007		0.028	0.034
		(0.004)	(0.004)		(0.023)	(0.033)
Spring 1997		0.047	0.047			
		(0.006)**	(0.007)**			
Fall 1997		-0.015	-0.016			
		(0.004)**	(0.004)**			
Spring 1998		0.007	0.008			
		(0.005)	(0.005)			
Fall 1998		-0.037	-0.038			
		(0.004)**	(0.005)**			
Male	-0.002	0.004	0.004	-0.080	-0.005	0.001
	(0.009)	(0.003)	(0.003)	(0.036)*	(0.017)	(0.031)
African-American	0.101	-0.005	-0.006	0.161	0.022	0.012
	(0.008)**	(0.005)	(0.006)	(0.043)**	(0.032)	(0.053)
Hispanic	0.025	0.000	0.000	0.062	0.043	0.044
	(0.016)	(0.005)	(0.005)	(0.052)	(0.030)	(0.035)
Asian	0.012	-0.011	-0.012			
	(0.019)	(0.005)*	(0.005)*			
Family Income/$25k	-0.010	-0.004	-0.004	-0.086	-0.016	-0.008
	(0.002)**	(0.001)**	(0.002)*	(0.016)**	(0.018)	(0.035)
Father high school grad	0.047	0.010	0.010	0.007	0.026	0.031
	(0.033)	(0.009)	(0.009)	(0.076)	(0.037)	(0.045)
Father some college (no bachelor's degree)	-0.006	-0.000	-0.000	-0.022	-0.031	-0.035
	(0.040)	(0.009)	(0.009)	(0.091)	(0.038)	(0.047)
Father college grad	-0.031	-0.005	-0.005	-0.063	0.013	0.024
	(0.038)	(0.009)	(0.009)	(0.089)	(0.045)	(0.064)
Single Parent/Broken Home	0.034	0.012	0.012	0.047	0.006	0.004
	(0.010)**	(0.003)**	(0.003)**	(0.039)	(0.017)	(0.022)
Mother high school grad	-0.031	0.012	0.013	-0.046	0.034	0.039
	(0.045)	(0.009)	(0.009)	(0.078)	(0.037)	(0.048)
Mother some college (no bachelor's degree)	-0.079	0.012	0.013	-0.168	0.007	0.017
	(0.060)	(0.010)	(0.011)	(0.101)	(0.044)	(0.068)
Mother college grad	-0.050	0.007	0.007	-0.123	0.068	0.086
	(0.046)	(0.009)	(0.009)	(0.095)	(0.054)	(0.091)

Appendix A: Table 2 (continued)
Probability of First Stopout -- Selection Corrected Probit Models
(Marginal Effects)

	Four-Year College Students			*Two-Year College Students*		
	(1)	(2)	(3)	(4)	(5)	(6)
	Prob of filing FAFSA	Selection Corrected Probit Model **X < Z**	Selection Corrected Probit Model **X = Z**	Prob of filing FAFSA	Selection Corrected Probit Model **X < Z**	Selection Corrected Probit Model **X = Z**
SAT score/100	0.009	-0.005	-0.006	-0.018	-0.003	-0.003
	(0.002)**	(0.001)**	(0.001)**	(0.014)	(0.007)	(0.008)
Didn't take SAT or ACT	0.069	-0.014	-0.015	-0.162	-0.035	-0.031
	(0.018)**	(0.009)	(0.010)	(0.135)	(0.051)	(0.065)
High School GPA: B to C	-0.052	0.032	0.033	-0.138	0.017	0.033
	(0.015)**	(0.006)**	(0.007)**	(0.058)*	(0.031)	(0.065)
High School GPA: C- to D-	-0.148	0.054	0.057	-0.153	-0.049	-0.051
	(0.078)	(0.022)*	(0.025)*	(0.111)	(0.033)	(0.043)
State weekly earnings in mfg. sector/1,000	0.024	-0.066	-0.068	-0.055	-0.305	-0.377
	(0.073)	(0.020)**	(0.022)**	(0.344)	(0.169)	(0.302)
State unemployment rate	-0.008	0.002	0.002	-0.048	-0.012	-0.010
	(0.004)*	(0.001)	(0.001)	(0.018)**	(0.008)	(0.011)
Avg. State Tuition Rate/Avg. National Tuition Rate	0.026			0.055		
	(0.015)			(0.066)		
Rho [a]		0.318	0.239		0.57588	0.155351
		(0.236)	(0.320)		0.869303	1.204614
Person-term records	33,311	33,311	33,311	2,159	2,159	2,159
N	5,649	5,649	5,649	743	743	743
-2 log L	21,815.84	34,847.36	34,869.94	1,979.58	3,254.90	3,257.96

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

[a] STATA does not estimate rho directly; rather, it estimates a function of rho, atanh rho (Atanh rho=(1/2)ln(((1+rho)/(1-rho))). STATA calculates the standard error of rho from the standard error of atanh rho using the delta method approximation.

Full regression includes a constant term, and dummy variables for missing parental education, and missing high school GPA

Appendix B
Alternative Functional Form Specifications for EFC Identified Aid Instruments
(Stopout of Four-Year College Students)

Appendix B: Table 1
Probability of First Stopout for Four-Year College Students -- EFC Identified Scheduled Pell Instrument -- Linear, Quadratic, Cubic & Quartic Functional Forms
(Marginal Effects)

	Linear			*Quadratic*		
	(1)	(2)	(3)	(4)	(5)	(6)
	SPH Model	Panel LP Model	PDP Model	SPH Model	Panel LP Model	PDP Model
Scheduled Pell Grant/$1,000 (1995)	-0.005	-0.006	-0.005	-0.005	-0.007	-0.006
	(0.002)	(0.003)	(0.003)*	(0.003)*	(0.004)*	(0.003)*
Spring 1996	0.063	0.081	0.071	0.063	0.081	0.071
	(0.007)**	(0.007)**	(0.007)**	(0.007)**	(0.007)**	(0.007)**
Fall 1996	-0.008	-0.008	-0.008	-0.008	-0.008	-0.008
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Spring 1997	0.045	0.051	0.049	0.045	0.051	0.049
	(0.007)**	(0.007)**	(0.007)**	(0.007)**	(0.007)**	(0.007)**
Fall 1997	-0.016	-0.015	-0.017	-0.016	-0.015	-0.017
	(0.005)**	(0.005)**	(0.005)**	(0.005)**	(0.005)**	(0.005)**
Spring 1998	0.006	0.007	0.007	0.006	0.007	0.007
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Fall 1998	-0.038	-0.030	-0.039	-0.038	-0.030	-0.038
	(0.004)**	(0.004)**	(0.004)**	(0.004)**	(0.004)**	(0.004)**
Male	-0.000	-0.001	0.000	-0.000	-0.001	0.000
	(0.003)	(0.004)	(0.003)	(0.003)	(0.004)	(0.003)
African-American	-0.006	-0.006	-0.006	-0.005	-0.006	-0.006
	(0.005)	(0.008)	(0.006)	(0.005)	(0.008)	(0.006)
Hispanic	0.006	0.009	0.008	0.006	0.009	0.008
	(0.006)	(0.008)	(0.007)	(0.006)	(0.008)	(0.007)
Asian	-0.006	-0.005	-0.006	-0.006	-0.006	-0.006
	(0.006)	(0.007)	(0.007)	(0.006)	(0.007)	(0.007)
Father high school grad	-0.001	-0.003	-0.002	-0.000	-0.002	-0.002
	(0.010)	(0.016)	(0.012)	(0.010)	(0.016)	(0.012)
Father some college (no bachelor's degree)	-0.011	-0.020	-0.014	-0.011	-0.019	-0.013
	(0.009)	(0.016)	(0.011)	(0.009)	(0.017)	(0.011)

Appendix B: Table 1 (continued)
Probability of First Stopout for Four-Year College Students -- EFC Identified Scheduled Pell Instrument -- Linear, Quadratic, Cubic & Quartic Functional Forms
(Marginal Effects)

	Linear			*Quadratic*		
	(1)	(2)	(3)	(4)	(5)	(6)
	SPH Model	Panel LP Model	PDP Model	SPH Model	Panel LP Model	PDP Model
Father college grad	-0.011	-0.017	-0.013	-0.010	-0.016	-0.013
	(0.011)	(0.016)	(0.013)	(0.011)	(0.016)	(0.013)
Single Parent/Broken Home	0.010	0.013	0.012	0.010	0.013	0.012
	(0.004)**	(0.005)**	(0.004)**	(0.004)**	(0.005)**	(0.004)**
Mother high school grad	0.019	0.024	0.021	0.019	0.025	0.021
	(0.013)	(0.014)	(0.014)	(0.013)	(0.015)	(0.014)
Mother some college (no bachelor's degree)	0.019	0.022	0.020	0.019	0.022	0.020
	(0.015)	(0.015)	(0.016)	(0.015)	(0.015)	(0.016)
Mother college grad	0.014	0.018	0.015	0.014	0.018	0.015
	(0.012)	(0.015)	(0.013)	(0.012)	(0.015)	(0.013)
SAT score/100	-0.003	-0.004	-0.003	-0.003	-0.004	-0.003
	(0.001)**	(0.001)**	(0.001)**	(0.001)**	(0.001)**	(0.001)**
Didn't take SAT or ACT	0.001	0.038	0.008	0.002	0.039	0.009
	(0.014)	(0.033)	(0.019)	(0.014)	(0.033)	(0.019)
High School GPA: B to C	0.033	0.048	0.040	0.032	0.048	0.039
	(0.005)**	(0.007)**	(0.006)**	(0.005)**	(0.007)**	(0.006)**
High School GPA: C- to D-	0.095	0.129	0.110	0.096	0.129	0.111
	(0.030)**	(0.043)**	(0.037)**	(0.030)**	(0.043)**	(0.037)**
State weekly earnings in mfg. sector/$1,000	-0.059	-0.082	-0.066	-0.059	-0.083	-0.066
	(0.020)**	(0.025)**	(0.023)**	(0.020)**	(0.025)**	(0.023)**
State unemployment rate	0.002	0.002	0.002	0.002	0.002	0.002
	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)
Tuition/$10,000	-0.017	-0.015	-0.018	-0.016	-0.015	-0.018
	(0.005)**	(0.005)**	(0.005)**	(0.005)**	(0.005)**	(0.005)**
Public	-0.008	-0.006	-0.008	-0.008	-0.006	-0.007
	(0.005)	(0.007)	(0.006)	(0.005)	(0.007)	(0.006)

Appendix B: Table 1 (continued)

Probability of First Stopout for Four-Year College Students -- EFC Identified Scheduled Pell Instrument -- Linear, Quadratic, Cubic & Quartic Functional Forms

(Marginal Effects)

	Linear			*Quadratic*		
	(1)	(2)	(3)	(4)	(5)	(6)
	SPH Model	Panel LP Model	PDP Model	SPH Model	Panel LP Model	PDP Model
Total Income/$10,000	-0.000	-0.000	-0.000	-0.001	-0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)
Contribution from Assets/$10,000	-0.001	-0.001	-0.001	-0.003	-0.003	-0.002
	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
Family Size	-0.001	-0.001	-0.001	0.002	0.001	0.001
	(0.001)	(0.002)	(0.001)	(0.005)	(0.007)	(0.006)
Family Members in College	0.001	0.001	0.001	-0.018	-0.022	-0.017
	(0.002)	(0.003)	(0.003)	(0.011)	(0.016)	(0.012)
$(\text{Total Income})^2/10^9$				0.000	0.000	0.000
				(0.000)	(0.001)	(0.001)
$(\text{Contribution from Assets})^2/10^9$				0.001	0.001	0.001
				(0.001)	(0.001)	(0.001)
$(\text{Family Size})^2$				-0.000	-0.000	-0.000
				(0.001)	(0.001)	(0.001)
$(\text{Family Members in College})^2$				0.005	0.006	0.005
				(0.003)	(0.004)	(0.003)
Person-term records	20,262	20,262	20,262	20,262	20,262	20,262
N	3,404	3,404	3,404	3,404	3,404	3,404
-2 log L	8,883.60		8,888.99	8,878.99		8,885.21
R-squared		0.04			0.04	

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

Full regression includes a constant term, and dummy variables for missing parental education, and missing high school GPA.

Appendix B: Table 1 (continued)

Probability of First Stopout for Four-Year College Students -- EFC Identified Scheduled Pell Instrument -- Linear, Quadratic, Cubic & Quartic Functional Forms

(Marginal Effects)

	Cubic			*Quartic* [a]		*Cubic, Random Effects*		
	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	SPH Model	Panel LP Model	PDP Model	Panel LP Model	Panel Probit Model	Semiparametric PH Model	Panel LP Model	Panel Probit Model
Scheduled Pell Grant/$1,000 (1995)	-0.005	-0.007	-0.006	-0.008	-0.007	-0.006	-0.007	-0.008
	(0.003)	(0.004)	(0.003)	(0.004)	(0.004)	(0.003)*	(0.004)	(0.004)*
Spring 1996	0.063	0.081	0.071	0.081	0.071	0.058	0.081	0.076
	(0.007)**	(0.007)**	(0.007)**	(0.007)**	(0.007)**	(0.006)**	(0.007)**	(0.008)**
Fall 1996	-0.008	-0.008	-0.008	-0.008	-0.008	0.006	-0.008	0.009
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)
Spring 1997	0.045	0.051	0.049	0.051	0.049	0.069	0.051	0.091
	(0.007)**	(0.007)**	(0.007)**	(0.007)**	(0.007)**	(0.008)**	(0.007)**	(0.011)**
Fall 1997	-0.016	-0.015	-0.017	-0.014	-0.016	0.007	-0.015	0.016
	(0.005)**	(0.005)**	(0.005)**	(0.005)**	(0.005)**	(0.006)	(0.005)**	(0.007)*
Spring 1998	0.006	0.007	0.007	0.007	0.008	0.038	0.007	0.057
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.008)**	(0.006)	(0.010)**
Fall 1998	-0.038	-0.030	-0.038	-0.030	-0.038	-0.016	-0.030	-0.007
	(0.004)**	(0.004)**	(0.004)**	(0.004)**	(0.004)**	(0.005)**	(0.004)**	(0.006)
Male	-0.000	-0.001	0.000	-0.001	0.000	-0.001	-0.001	-0.001
	(0.003)	(0.004)	(0.003)	(0.004)	(0.003)	(0.003)	(0.004)	(0.004)
African-American	-0.005	-0.006	-0.006	-0.006	-0.006	-0.005	-0.006	-0.006
	(0.005)	(0.008)	(0.006)	(0.008)	(0.006)	(0.005)	(0.008)	(0.006)
Hispanic	0.006	0.010	0.008	0.010	0.008	0.008	0.010	0.010
	(0.006)	(0.008)	(0.007)	(0.008)	(0.007)	(0.006)	(0.008)	(0.008)
Asian	-0.006	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005
	(0.006)	(0.007)	(0.007)	(0.007)	(0.007)	(0.006)	(0.007)	(0.007)
Father high school grad	0.000	-0.001	-0.001	-0.002	-0.001	-0.003	-0.001	-0.004
	(0.011)	(0.016)	(0.012)	(0.016)	(0.012)	(0.010)	(0.016)	(0.012)
Father some college (no bachelor's degree)	-0.010	-0.018	-0.013	-0.018	-0.013	-0.012	-0.018	-0.015
	(0.009)	(0.017)	(0.011)	(0.017)	(0.011)	(0.008)	(0.017)	(0.009)

Appendix B: Table 1 (continued)
Probability of First Stopout for Four-Year College Students -- EFC Identified Scheduled Pell Instrument -- Linear, Quadratic, Cubic & Quartic Functional Forms
(Marginal Effects)

	Cubic			*Quartic* [a]		*Cubic, Random Effects*		
	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	SPH Model	Panel LP Model	PDP Model	Panel LP Model	Panel Probit Model	Semiparametric PH Model	Panel LP Model	Panel Probit Model
Father college grad	-0.009	-0.015	-0.012	-0.016	-0.013	-0.011	-0.015	-0.013
	(0.011)	(0.016)	(0.013)	(0.016)	(0.013)	(0.011)	(0.016)	(0.013)
Single Parent/Broken Home	0.011	0.014	0.012	0.014	0.012	0.011	0.014	0.014
	(0.004)**	(0.005)**	(0.004)**	(0.005)**	(0.004)**	(0.004)**	(0.005)**	(0.005)**
Mother high school grad	0.019	0.025	0.021	0.025	0.021	0.022	0.025	0.026
	(0.013)	(0.015)	(0.014)	(0.015)	(0.014)	(0.013)	(0.015)	(0.015)
Mother some college (no bachelor's degree)	0.019	0.023	0.021	0.023	0.021	0.022	0.023	0.026
	(0.016)	(0.015)	(0.016)	(0.015)	(0.016)	(0.016)	(0.015)	(0.020)
Mother college grad	0.014	0.018	0.015	0.019	0.016	0.015	0.018	0.017
	(0.012)	(0.015)	(0.013)	(0.015)	(0.013)	(0.012)	(0.015)	(0.014)
SAT score/100	-0.003	-0.004	-0.003	-0.004	-0.003	-0.004	-0.004	-0.004
	(0.001)**	(0.001)**	(0.001)**	(0.001)**	(0.001)**	(0.001)**	(0.001)**	(0.001)**
Didn't take SAT or ACT	0.002	0.039	0.009	0.039	0.009	-0.001	0.039	0.004
	(0.014)	(0.033)	(0.019)	(0.033)	(0.019)	(0.014)	(0.033)	(0.020)
High School GPA: B to C	0.032	0.048	0.039	0.048	0.039	0.037	0.048	0.049
	(0.005)**	(0.007)**	(0.006)**	(0.007)**	(0.006)**	(0.007)**	(0.007)**	(0.009)**
High School GPA: C- to D-	0.097	0.130	0.111	0.129	0.111	0.101	0.130	0.145
	(0.030)**	(0.043)**	(0.037)**	(0.043)**	(0.037)**	(0.049)*	(0.043)**	(0.067)*
State weekly earnings in mfg. sector/$1,000	-0.058	-0.082	-0.065	-0.082	-0.065	-0.046	-0.082	-0.052
	(0.020)**	(0.026)**	(0.023)**	(0.026)**	(0.023)**	(0.021)*	(0.026)**	(0.026)*
State unemployment rate	0.002	0.002	0.002	0.002	0.002	0.000	0.002	-0.000
	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)	(0.002)
Tuition/$10,000	-0.016	-0.014	-0.017	-0.014	-0.017	-0.014	-0.014	-0.016
	(0.005)**	(0.005)**	(0.005)**	(0.005)**	(0.005)**	(0.005)**	(0.005)**	(0.006)**
Public	-0.008	-0.005	-0.007	-0.006	-0.007	-0.005	-0.005	-0.005
	(0.005)	(0.007)	(0.006)	(0.007)	(0.006)	(0.005)	(0.007)	(0.007)

Appendix B: Table 1 (continued)
Probability of First Stopout for Four-Year College Students -- EFC Identified Scheduled Pell Instrument -- Linear, Quadratic, Cubic & Quartic Functional Forms
(Marginal Effects)

	Cubic			*Quartic* [a]		*Cubic, Random Effects*		
	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	SPH Model	Panel LP Model	PDP Model	Panel LP Model	Panel Probit Model	Semiparametric PH Model	Panel LP Model	Panel Probit Model
Total Income/$10,000	-0.001	-0.001	-0.001	-0.006	-0.004	-0.001	-0.001	-0.001
	(0.003)	(0.004)	(0.003)	(0.006)	(0.005)	(0.002)	(0.004)	(0.003)
Contribution from Assets/$10,000	-0.006	-0.006	-0.006	-0.004	-0.004	-0.007	-0.006	-0.007
	(0.004)	(0.004)	(0.004)	(0.005)	(0.006)	(0.004)	(0.004)	(0.004)
Family Size	0.016	0.017	0.012	0.022	0.015	0.013	0.017	0.012
	(0.018)	(0.026)	(0.021)	(0.078)	(0.063)	(0.018)	(0.026)	(0.023)
Family Members in College	0.095	0.190	0.110	-1.259	-0.853	0.086	0.190	0.106
	(0.043)*	(0.091)*	(0.057)	(0.357)**	(0.024)**	(0.052)	(0.091)*	(0.065)
(Total Income)^2/10^9	0.000	-0.000	0.000	0.008	0.004	0.001	-0.000	0.001
	(0.002)	(0.003)	(0.002)	(0.007)	(0.006)	(0.002)	(0.003)	(0.002)
(Contribution from Assets)^2/10^9	0.007	0.007	0.007	0.000	0.001	0.007	0.007	0.008
	(0.004)	(0.005)	(0.004)	(0.013)	(0.014)	(0.005)	(0.005)	(0.006)
(Family Size)^2	-0.003	-0.003	-0.002	-0.005	-0.003	-0.003	-0.003	-0.002
	(0.004)	(0.005)	(0.004)	(0.024)	(0.019)	(0.004)	(0.005)	(0.005)
(Family Members in College)^2	-0.051	-0.101	-0.059	0.902	0.612	-0.047	-0.101	-0.057
	(0.020)*	(0.047)*	(0.028)*	(0.237)**	(0.022)**	(0.025)	(0.047)*	(0.032)
(Total Income)^3/10^{14}	0.000	0.000	0.000	-0.004	-0.002	-0.000	0.000	-0.000
	(0.000)	(0.001)	(0.001)	(0.004)	(0.003)	(0.000)	(0.001)	(0.001)
(Contribution from Assets)^3/10^{14}	-0.002	-0.001	-0.002	0.003	0.003	-0.002	-0.001	-0.002
	(0.001)	(0.001)	(0.001)	(0.009)	(0.009)	(0.001)	(0.001)	(0.002)
(Family Size)^3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.003)	(0.003)	(0.000)	(0.000)	(0.000)

Appendix B: Table 1 (continued)
Probability of First Stopout for Four-Year College Students -- EFC Identified Scheduled Pell
(Marginal Effects)

	Cubic			*Quartic* [a]		*Cubic, Random Effects*		
	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	SPH Model	Panel LP Model	PDP Model	Panel LP Model	Panel Probit Model	Semiparametric PH Model	Panel LP Model	Panel Probit Model
$(\text{Family Members in College})^3$	0.008	0.016	0.009	-0.266	-0.181	0.008	0.016	0.009
	(0.003)**	(0.007)*	(0.004)*	(0.063)**	(0.010)**	(0.004)*	(0.007)*	(0.005)*
$(\text{Total Income})^4/10^{14}$				0.000	0.000			
				(0.000)	(0.000)			
$(\text{Contribution from Assets})^4/10^{14}$				-0.000	-0.000			
				(0.000)	(0.000)			
$(\text{Family Size})^4$				-0.000	-0.000			
				(0.000)	(0.000)			
$(\text{Family Members in College})^4$				0.028	0.019			
				(0.006)**	(0.001)**			
Person-term records	20,262	20,262	20,262	20,262	20,262	20,262	20,262	20,262
N	3,404	3,404	3,404	3,404	3,404	3,404	3,404	3,404
-2 log L	8,869.45		8,877.41		8,875.77	8,766.20		8,737.11
R-squared		0.04		0.04			0.04	

Standard errors in parentheses

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

[a] STATA was unable to estimate the quartic functional form of the Semiparametric Proportional Hazard (SPH) model (complementary log-log for discrete time).

Full regression includes a constant term, and dummy variables for missing parental education, and missing high school GPA.

Appendix B: Table 2

Four-Year College Students: Determinants of Financial Aid Amounts - Linear, Quadratic, Cubic, and Quartic Functional Forms

(Marginal Effects)

	Scheduled Pell Grant				*Total Grants*			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Level of Scheduled Pell Grant First Year/$1,000					1.392	1.139	1.261	1.395
					(0.096)**	(0.108)**	(0.121)**	(0.127)**
Total Income/$10,000	-0.099	-0.259	-0.527	-0.799	-0.328	-0.546	-0.349	0.138
	(0.005)**	(0.019)**	(0.027)**	(0.030)**	(0.019)**	(0.046)**	(0.096)**	(0.161)
Contribution from Assets/$10,000	0.007	-0.032	-0.120	-0.162	-0.231	-0.468	-0.656	-1.295
	(0.009)	(0.016)	(0.018)**	(0.023)**	(0.049)**	(0.086)**	(0.134)**	(0.202)**
Family Size	0.080	0.061	0.143	1.155	0.154	0.611	0.462	2.851
	(0.011)**	(0.045)	(0.138)	(0.398)**	(0.051)**	(0.215)**	(0.746)	(2.299)
Family Members in College	0.040	0.075	-0.102	-1.498	0.370	0.071	-1.698	-4.664
	(0.017)*	(0.063)	(0.254)	(1.166)	(0.095)**	(0.431)	(1.908)	(11.145)
(Total Income)^2/10^9		0.085	0.365	0.810		0.103	-0.076	-0.801
		(0.012)**	(0.030)**	(0.041)**		(0.019)**	(0.080)	(0.208)**
(Contribution from Assets)^2/10^9		0.010	0.084	0.256		0.121	0.480	2.605
		(0.005)*	(0.021)**	(0.056)**		(0.039)**	(0.173)**	(0.533)**
(Family Size)^2		0.002	-0.012	-0.332		-0.046	-0.020	-0.783
		(0.005)	(0.028)	(0.124)**		(0.022)*	(0.148)	(0.710)
(Family Members in College)^2		-0.009	0.081	1.058		0.080	0.948	2.942
		(0.016)	(0.122)	(0.761)		(0.113)	(0.927)	(7.488)
(Total Income)^3/10^{14}			-0.068	-0.310			0.041	0.414
			(0.009)**	(0.021)**			(0.018)*	(0.101)**
(Contribution from Assets)^3/10^{14}			-0.014	-0.133			-0.093	-1.586
			(0.005)**	(0.036)**			(0.042)*	(0.355)**
(Family Size)^3			0.001	0.042			-0.001	0.098
			(0.002)	(0.016)**			(0.009)	(0.091)
(Family Members in College)^3			-0.013	-0.291			-0.127	-0.662
			(0.017)	(0.198)			(0.135)	(2.032)

Appendix B: Table 2 (continued)
Four-Year College Students: Determinants of Financial Aid Amounts - Linear, Quadratic, Cubic, and Quartic Functional Forms
(Marginal Effects)

	Scheduled Pell Grant				*Total Grants*			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$(\text{Total Income})^4/10^{14}$				0.000				-0.000
				(0.000)**				(0.000)**
$(\text{Contribution from Assets})^4/10^{14}$				0.000				0.000
				(0.000)**				(0.000)**
$(\text{Family Size})^4$				-0.002				-0.005
				(0.001)*				(0.004)
$(\text{Family Members in College})^4$				0.027				0.050
				(0.018)				(0.191)
Male					-0.196	-0.186	-0.189	-0.185
					(0.117)	(0.116)	(0.116)	(0.116)
African-American					0.366	0.393	0.385	0.376
					(0.222)	(0.221)	(0.221)	(0.220)
Hispanic					0.625	0.591	0.598	0.575
					(0.217)**	(0.216)**	(0.216)**	(0.215)**
Asian					-0.358	-0.406	-0.362	-0.353
					(0.241)	(0.241)	(0.241)	(0.240)
SAT score/100					0.306	0.314	0.316	0.329
					(0.033)**	(0.033)**	(0.033)**	(0.033)**
Didn't take SAT or ACT					0.758	0.798	0.798	0.914
					(0.651)	(0.648)	(0.648)	(0.645)
High School GPA: B to C					-0.882	-0.942	-0.949	-0.942
					(0.169)**	(0.169)**	(0.169)**	(0.168)**
High School GPA: C- to D-					-0.711	-0.716	-0.701	-0.699
					(0.674)	(0.671)	(0.671)	(0.668)
Tuition/$10,000 (1995)					4.526	4.550	4.565	4.583
					(0.104)**	(0.104)**	(0.104)**	(0.104)**
N	3432	3432	3432	3432	3378	3378	3378	3378
R-squared	0.27	0.44	0.56	0.60	0.50	0.51	0.51	0.51

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

Appendix B: Table 2 (continued)

Four-Year College Students: Determinants of Financial Aid Amounts - Linear, Quadratic, Cubic, and Quartic Functional Forms

(Marginal Effects)

	Total Aid			
	(9)	(10)	(11)	(12)
Level of Scheduled Pell Grant First Year/$1,000	0.978	0.705	0.821	1.045
	(0.121)**	(0.135)**	(0.157)**	(0.157)**
Total Income/$10,000	-0.410	-0.647	-0.441	0.335
	(0.036)**	(0.066)**	(0.153)**	(0.237)
Contribution from Assets/$10,000	-0.484	-1.076	-1.790	-2.810
	(0.130)**	(0.172)**	(0.284)**	(0.365)**
Family Size	0.157	0.979	0.781	0.006
	(0.069)*	(0.265)**	(0.981)	(3.067)
Family Members in College	0.618	0.620	-2.102	-0.702
	(0.133)**	(0.563)	(2.205)	(11.068)
(Total Income)^2/10^9		0.116	-0.065	-1.209
		(0.028)**	(0.136)	(0.326)**
(Contribution from Assets)^2/10^9		0.317	1.549	4.934
		(0.078)**	(0.463)**	(0.997)**
(Family Size)^2		-0.084	-0.050	0.197
		(0.026)**	(0.190)	(0.936)
(Family Members in College)^2		-0.003	1.332	0.339
		(0.142)	(1.030)	(7.203)
(Total Income)^3/10^{14}			0.042	0.628
			(0.030)	(0.163)**
(Contribution from Assets)^3/10^{14}			-0.312	-2.689
			(0.109)**	(0.639)**
(Family Size)^3			-0.002	-0.035
			(0.011)	(0.119)
(Family Members in College)^3			-0.194	0.093
			(0.141)	(1.868)

Appendix B: Table 2 (continued)
Four-Year College Students: Determinants of Financial Aid Amounts - Linear, Quadratic, Cubic, and Quartic Functional Forms
(Marginal Effects)

	Total Aid			
	(9)	(10)	(11)	(12)
$(\text{Total Income})^4/10^{14}$				-0.000
				(0.000)**
$(\text{Contribution from Assets})^4/10^{14}$				0.000
				(0.000)**
$(\text{Family Size})^4$				0.001
				(0.005)
$(\text{Family Members in College})^4$				-0.029
				(0.165)
Male	0.093	0.112	0.104	0.109
	(0.167)	(0.166)	(0.165)	(0.164)
African-American	0.622	0.653	0.624	0.604
	(0.271)*	(0.270)*	(0.270)*	(0.271)*
Hispanic	0.247	0.201	0.196	0.155
	(0.299)	(0.299)	(0.297)	(0.299)
Asian	-0.930	-0.944	-0.862	-0.820
	(0.383)*	(0.372)*	(0.373)*	(0.368)*
SAT score/100	0.123	0.132	0.140	0.160
	(0.047)**	(0.047)**	(0.047)**	(0.046)**
Didn't take SAT or ACT	-1.784	-1.773	-1.746	-1.571
	(0.877)*	(0.876)*	(0.873)*	(0.876)
High School GPA: B to C	-0.560	-0.639	-0.652	-0.648
	(0.205)**	(0.205)**	(0.205)**	(0.205)**
High School GPA: C- to D-	-0.825	-0.838	-0.807	-0.776
	(0.880)	(0.887)	(0.881)	(0.884)
Tuition/$10,000 (1995)	7.220	7.266	7.295	7.322
	(0.173)**	(0.171)**	(0.171)**	(0.169)**
N	3378	3378	3378	3378
R-squared	0.49	0.50	0.50	0.51

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

Appendix B: Table 3
Probability of First Stopout for Four-Year College Students -- EFC Identified Total Grants Instrument -- Linear, Quadratic & Cubic Functional Forms
(Marginal Effects)

	Linear			*Quadratic*		
	(1)	(2)	(3)	(4)	(5)	(6)
	SPH Model	Panel LP Model	PDP Model	SPH Model	Panel LP Model	PDP Model
Total Grants/$1,000 (1995)	-0.000	-0.001	-0.000	0.001	-0.001	0.001
	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)
Spring 1996	0.063	0.081	0.071	0.063	0.081	0.071
	(0.007)**	(0.007)**	(0.007)**	(0.007)**	(0.007)**	(0.007)**
Fall 1996	-0.008	-0.008	-0.008	-0.008	-0.008	-0.008
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Spring 1997	0.044	0.049	0.047	0.044	0.049	0.047
	(0.007)**	(0.007)**	(0.007)**	(0.007)**	(0.007)**	(0.007)**
Fall 1997	-0.017	-0.015	-0.017	-0.017	-0.015	-0.017
	(0.005)**	(0.005)**	(0.005)**	(0.005)**	(0.005)**	(0.005)**
Spring 1998	0.005	0.006	0.006	0.005	0.006	0.007
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Fall 1998	-0.039	-0.031	-0.039	-0.039	-0.031	-0.039
	(0.004)**	(0.004)**	(0.004)**	(0.004)**	(0.004)**	(0.004)**
Male	-0.001	-0.001	0.000	-0.000	-0.001	0.000
	(0.003)	(0.004)	(0.003)	(0.003)	(0.004)	(0.003)
African-American	-0.006	-0.006	-0.006	-0.007	-0.006	-0.007
	(0.005)	(0.008)	(0.006)	(0.005)	(0.008)	(0.006)
Hispanic	0.007	0.011	0.008	0.006	0.010	0.007
	(0.006)	(0.008)	(0.007)	(0.006)	(0.008)	(0.007)
Asian	-0.006	-0.006	-0.006	-0.006	-0.005	-0.005
	(0.006)	(0.007)	(0.007)	(0.006)	(0.007)	(0.007)
Father high school grad	-0.001	-0.003	-0.002	-0.001	-0.002	-0.002
	(0.010)	(0.016)	(0.012)	(0.010)	(0.016)	(0.012)
Father some college (no bachelor's degree)	-0.011	-0.019	-0.013	-0.011	-0.019	-0.013
	(0.009)	(0.017)	(0.011)	(0.009)	(0.017)	(0.011)

Appendix B: Table 3 (continued)

Probability of First Stopout for Four-Year College Students -- EFC Identified Total Grants Instrument -- Linear, Quadratic & Cubic Functional Forms

(Marginal Effects)

	Linear			*Quadratic*		
	(1)	(2)	(3)	(4)	(5)	(6)
	SPH Model	Panel LP Model	PDP Model	SPH Model	Panel LP Model	PDP Model
Father college grad	-0.011	-0.016	-0.013	-0.010	-0.016	-0.013
	(0.011)	(0.016)	(0.013)	(0.011)	(0.016)	(0.013)
Single Parent/Broken Home	0.010	0.013	0.011	0.010	0.013	0.011
	(0.004)**	(0.005)**	(0.004)**	(0.004)**	(0.005)**	(0.004)**
Mother high school grad	0.021	0.026	0.023	0.022	0.026	0.024
	(0.013)	(0.015)	(0.014)	(0.013)	(0.015)	(0.014)
Mother some college (no bachelor's degree)	0.022	0.024	0.023	0.023	0.024	0.023
	(0.016)	(0.016)	(0.017)	(0.016)	(0.016)	(0.017)
Mother college grad	0.016	0.019	0.017	0.016	0.020	0.017
	(0.012)	(0.015)	(0.014)	(0.013)	(0.015)	(0.014)
SAT score/100	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003
	(0.001)**	(0.001)**	(0.001)**	(0.001)**	(0.001)*	(0.001)**
Didn't take SAT or ACT	-0.002	0.026	0.003	-0.002	0.026	0.003
	(0.013)	(0.032)	(0.018)	(0.013)	(0.033)	(0.018)
High School GPA: B to C	0.033	0.047	0.039	0.034	0.047	0.041
	(0.006)**	(0.007)**	(0.007)**	(0.006)**	(0.008)**	(0.007)**
High School GPA: C- to D-	0.097	0.128	0.111	0.101	0.130	0.116
	(0.031)**	(0.043)**	(0.037)**	(0.032)**	(0.043)**	(0.038)**
State weekly earnings in mfg. sector/1,000	-0.054	-0.077	-0.060	-0.054	-0.078	-0.061
	(0.021)**	(0.026)**	(0.023)**	(0.021)**	(0.026)**	(0.023)**
State unemployment rate	0.001	0.001	0.002	0.001	0.001	0.002
	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)
Tuition/$10,000	-0.016	-0.009	-0.017	-0.020	-0.013	-0.023
	(0.008)	(0.010)	(0.009)	(0.010)*	(0.013)	(0.011)*
Public	-0.009	-0.007	-0.009	-0.009	-0.007	-0.009
	(0.005)	(0.007)	(0.006)	(0.005)	(0.007)	(0.006)

Appendix B: Table 3 (continued)
Probability of First Stopout for Four-Year College Students -- EFC Identified Total Grants Instrument -- Linear, Quadratic & Cubic Functional Forms
(Marginal Effects)

	Linear			*Quadratic*		
	(1)	(2)	(3)	(4)	(5)	(6)
	SPH Model	Panel LP Model	PDP Model	SPH Model	Panel LP Model	PDP Model
Total Income/$10,000	-0.010	-0.009	-0.010	-0.009	-0.009	-0.008
	(0.007)	(0.010)	(0.009)	(0.008)	(0.010)	(0.009)
Contribution from Assets/$10,000	-0.002	-0.001	-0.001	-0.002	-0.003	-0.002
	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)	(0.003)
Family Size	-0.001	-0.001	-0.001	0.000	0.000	-0.000
	(0.001)	(0.002)	(0.002)	(0.006)	(0.008)	(0.006)
Family Members in College	0.001	0.001	0.001	-0.019	-0.024	-0.019
	(0.003)	(0.003)	(0.003)	(0.011)	(0.016)	(0.012)
$(\text{Total Income})^2/10^9$				-0.000	-0.000	-0.000
				(0.001)	(0.001)	(0.001)
$(\text{Contribution from Assets})^2/10^9$				0.001	0.001	0.001
				(0.001)	(0.001)	(0.001)
$(\text{Family Size})^2$				-0.000	-0.000	-0.000
				(0.001)	(0.001)	(0.001)
$(\text{Family Members in College})^2$				0.005	0.007	0.005
				(0.003)	(0.004)	(0.003)
Person-term records	20,156	20,156	20,156	20,156	20,156	20,156
N	3,378	3,378	3,378	3,378	3,378	3,378
-2 log L	8,833.38		8,839.18	8,829.01		8,835.30
R-squared		0.04			0.04	

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

Full regression includes a constant term, and dummy variables for missing parental education, and missing high school GPA

Appendix B: Table 3 (continued)

Probability of First Stopout for Four-Year College Students -- EFC Identified Total Grants Instrument -- Linear, Quadratic & Cubic Functional Forms

(Marginal Effects)

	Cubic			*Quartic* [a]		*Cubic, Random Effects*		
	(7) SPH Model	(8) Panel LP Model	(9) PDP Model	(10) Panel LP Model	(11) PDP Model	(12) SPH Model	(13) Panel LP Model	(14) PDP Model
Total Grants/$1,000 (1995)	0.002	0.000	0.002	-0.000	0.001	0.001	0.000	0.001
	(0.002)	(0.003)	(0.002)	(0.003)	(0.002)	(0.002)	(0.003)	(0.003)
Spring 1996	0.063	0.081	0.070	0.081	0.070	0.058	0.081	0.076
	(0.007)**	(0.007)**	(0.007)**	(0.007)**	(0.007)**	(0.006)**	(0.007)**	(0.008)**
Fall 1996	-0.007	-0.008	-0.008	-0.008	-0.008	0.006	-0.008	0.009
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)
Spring 1997	0.044	0.049	0.047	0.049	0.047	0.068	0.049	0.090
	(0.007)**	(0.007)**	(0.007)**	(0.007)**	(0.007)**	(0.008)**	(0.007)**	(0.011)**
Fall 1997	-0.016	-0.015	-0.017	-0.015	-0.017	0.007	-0.015	0.016
	(0.005)**	(0.005)**	(0.005)**	(0.005)**	(0.005)**	(0.006)	(0.005)**	(0.007)*
Spring 1998	0.006	0.006	0.007	0.006	0.007	0.037	0.006	0.056
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.008)**	(0.006)	(0.010)**
Fall 1998	-0.038	-0.030	-0.038	-0.030	-0.038	-0.016	-0.030	-0.007
	(0.004)**	(0.004)**	(0.004)**	(0.004)**	(0.004)**	(0.005)**	(0.004)**	(0.006)
Male	-0.000	-0.001	0.001	-0.001	0.001	-0.001	-0.001	-0.001
	(0.003)	(0.004)	(0.003)	(0.004)	(0.003)	(0.003)	(0.004)	(0.004)
African-American	-0.007	-0.007	-0.007	-0.006	-0.007	-0.006	-0.007	-0.006
	(0.005)	(0.008)	(0.006)	(0.008)	(0.006)	(0.005)	(0.008)	(0.006)
Hispanic	0.005	0.010	0.007	0.011	0.007	0.008	0.010	0.010
	(0.006)	(0.008)	(0.007)	(0.008)	(0.007)	(0.007)	(0.008)	(0.009)
Asian	-0.004	-0.003	-0.004	-0.004	-0.004	-0.004	-0.003	-0.004
	(0.006)	(0.007)	(0.007)	(0.007)	(0.007)	(0.006)	(0.007)	(0.007)
Father high school grad	-0.001	-0.002	-0.002	-0.002	-0.002	-0.003	-0.002	-0.004
	(0.010)	(0.016)	(0.012)	(0.016)	(0.012)	(0.010)	(0.016)	(0.012)
Father some college (no bachelor's degree)	-0.011	-0.018	-0.013	-0.018	-0.013	-0.013	-0.018	-0.015
	(0.009)	(0.017)	(0.011)	(0.017)	(0.011)	(0.008)	(0.017)	(0.009)

Appendix B: Table 3 (continued)

Probability of First Stopout for Four-Year College Students -- EFC Identified Total Grants Instrument -- Linear, Quadratic & Cubic Functional Forms

(Marginal Effects)

	Cubic			*Quartic* [a]		*Cubic, Random Effects*		
	(7) SPH Model	(8) Panel LP Model	(9) PDP Model	(10) Panel LP Model	(11) PDP Model	(12) SPH Model	(13) Panel LP Model	(14) PDP Model
Father college grad	-0.010	-0.015	-0.012	-0.015	-0.013	-0.011	-0.015	-0.014
	(0.011)	(0.016)	(0.013)	(0.016)	(0.013)	(0.011)	(0.016)	(0.013)
Single Parent/Broken Home	0.010	0.014	0.012	0.014	0.012	0.011	0.014	0.013
	(0.004)**	(0.005)**	(0.004)**	(0.005)**	(0.004)**	(0.004)**	(0.005)**	(0.005)**
Mother high school grad	0.022	0.026	0.023	0.026	0.023	0.024	0.026	0.028
	(0.013)	(0.015)	(0.014)	(0.015)	(0.014)	(0.013)	(0.015)	(0.016)
Mother some college (no bachelor's degree)	0.022	0.024	0.023	0.024	0.023	0.024	0.024	0.028
	(0.016)	(0.015)	(0.017)	(0.016)	(0.017)	(0.017)	(0.015)	(0.021)
Mother college grad	0.016	0.019	0.017	0.019	0.016	0.016	0.019	0.018
	(0.012)	(0.015)	(0.014)	(0.015)	(0.014)	(0.012)	(0.015)	(0.014)
SAT score/100	-0.004	-0.004	-0.004	-0.003	-0.004	-0.004	-0.004	-0.004
	(0.001)**	(0.001)**	(0.001)**	(0.001)*	(0.001)**	(0.001)**	(0.001)**	(0.001)**
Didn't take SAT or ACT	-0.003	0.025	0.002	0.026	0.002	-0.003	0.025	-0.000
	(0.013)	(0.033)	(0.018)	(0.033)	(0.018)	(0.014)	(0.033)	(0.019)
High School GPA: B to C	0.035	0.048	0.042	0.047	0.041	0.038	0.048	0.050
	(0.006)**	(0.008)**	(0.007)**	(0.008)**	(0.007)**	(0.008)**	(0.008)**	(0.010)**
High School GPA: C- to D-	0.103	0.131	0.117	0.130	0.116	0.106	0.131	0.149
	(0.031)**	(0.043)**	(0.038)**	(0.043)**	(0.038)**	(0.051)*	(0.043)**	(0.069)*
State weekly earnings in mfg. sector/1,000	-0.054	-0.078	-0.061	-0.078	-0.061	-0.042	-0.078	-0.047
	(0.021)**	(0.026)**	(0.023)**	(0.026)**	(0.023)**	(0.021)*	(0.026)**	(0.026)
State unemployment rate	0.001	0.001	0.002	0.001	0.002	-0.000	0.001	-0.001
	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)	(0.002)
Tuition/$10,000	-0.023	-0.016	-0.026	-0.013	-0.024	-0.017	-0.016	-0.019
	(0.010)*	(0.013)	(0.012)*	(0.012)	(0.011)*	(0.010)	(0.013)	(0.013)
Public	-0.009	-0.007	-0.008	-0.007	-0.008	-0.006	-0.007	-0.007
	(0.005)	(0.007)	(0.006)	(0.007)	(0.006)	(0.005)	(0.007)	(0.007)

Appendix B: Table 3 (continued)
Probability of First Stopout for Four-Year College Students -- EFC Identified Total Grants Instrument -- Linear, Quadratic & Cubic Functional Forms
(Marginal Effects)

	Cubic			*Quartic*[a]		*Cubic, Random Effects*		
	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	SPH Model	Panel LP Model	PDP Model	Panel LP Model	PDP Model	SPH Model	Panel LP Model	PDP Model
Total Income/$10,000	-0.007	-0.007	-0.007	-0.008	-0.008	-0.007	-0.007	-0.009
	(0.007)	(0.010)	(0.009)	(0.011)	(0.009)	(0.009)	(0.010)	(0.012)
Contribution from Assets/$10,000	-0.004	-0.005	-0.004	-0.004	-0.001	-0.005	-0.005	-0.006
	(0.004)	(0.004)	(0.004)	(0.007)	(0.007)	(0.004)	(0.004)	(0.005)
Family Size	0.012	0.013	0.008	0.009	-0.003	0.010	0.013	0.009
	(0.018)	(0.026)	(0.021)	(0.079)	(0.064)	(0.019)	(0.026)	(0.023)
Family Members in College	0.096	0.187	0.111	-1.262	-0.844	0.086	0.187	0.105
	(0.043)*	(0.092)*	(0.057)	(0.358)**	(0.024)**	(0.052)	(0.092)*	(0.065)
$(\text{Total Income})^2/10^9$	-0.003	-0.003	-0.003	0.000	-0.003	-0.002	-0.003	-0.003
	(0.002)	(0.003)	(0.002)	(0.007)	(0.005)	(0.002)	(0.003)	(0.002)
$(\text{Contribution from Assets})^2/10^9$	0.006	0.006	0.005	-0.000	-0.005	0.006	0.006	0.007
	(0.004)	(0.005)	(0.005)	(0.016)	(0.016)	(0.005)	(0.005)	(0.006)
$(\text{Family Size})^2$	-0.003	-0.003	-0.002	-0.001	0.002	-0.002	-0.003	-0.002
	(0.004)	(0.005)	(0.004)	(0.024)	(0.020)	(0.004)	(0.005)	(0.005)
$(\text{Family Members in College})^2$	-0.052	-0.101	-0.060	0.903	0.605	-0.047	-0.101	-0.058
	(0.021)*	(0.047)*	(0.028)*	(0.237)**	(0.022)**	(0.026)	(0.047)*	(0.032)
$(\text{Total Income})^3/10^{14}$	0.001	0.001	0.001	-0.001	0.001	0.000	0.001	0.001
	(0.000)	(0.001)	(0.000)	(0.003)	(0.003)	(0.000)	(0.001)	(0.000)
$(\text{Contribution from Assets})^3/10^{14}$	-0.001	-0.001	-0.001	0.003	0.006	-0.001	-0.001	-0.002
	(0.001)	(0.001)	(0.001)	(0.011)	(0.010)	(0.001)	(0.001)	(0.002)
$(\text{Family Size})^3$	0.000	0.000	0.000	-0.000	-0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.003)	(0.003)	(0.000)	(0.000)	(0.000)
$(\text{Family Members in College})^3$	0.008	0.016	0.010	-0.266	-0.179	0.008	0.016	0.009
	(0.003)**	(0.007)*	(0.004)*	(0.063)**	(0.010)**	(0.004)*	(0.007)*	(0.005)*

Appendix B: Table 3 (continued)

Probability of First Stopout for Four-Year College Students -- EFC Identified Total Grants Instrument -- Linear, Quadratic & Cubic Functional Forms

(Marginal Effects)

	Cubic			*Quartic* [a]		*Cubic, Random Effects*		
	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	SPH Model	Panel LP Model	PDP Model	Panel LP Model	PDP Model	SPH Model	Panel LP Model	PDP Model
$(\text{Total Income})^4/10^{14}$				0.000	0.000			
				(0.000)	(0.000)			
$(\text{Contribution from Assets})^4/10^{14}$				-0.000	-0.000			
				(0.000)	(0.000)			
$(\text{Family Size})^4$				0.000	0.000			
				(0.000)	(0.000)			
$(\text{Family Members in College})^4$				0.028	0.019			
				(0.006)**	(0.001)**			
Person-term records	20,156	20,156	20,156	20,156	20,156	20,156	20,156	20,156
N	3,378	3,378	3,378	3,378	3,378	3,378	3,378	3,378
-2 log L	8,817.89		8,825.91		8,825.18	8,716.72		8,687.25
R-squared		0.04		0.04			0.04	

Standard errors in parentheses

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

[a] STATA was unable to estimate the quartic functional form of the Semiparametric Proportional Hazard (SPH) model (complementary log-log for discrete time).

Full regression includes a constant term, and dummy variables for missing parental education, and missing high school GPA

Appendix B: Table 4

Probability of First Stopout for Four-Year College Students -- EFC Identified Total Financial Aid Instrument -- Linear, Quadratic, Cubic & Quartic Functional Forms

(Marginal Effects)

	Linear			*Quadratic*		
	(1) Semiparametric PH Model	(2) Panel LP Model	(3) Panel Probit Model	(4) Semiparametric PH Model	(5) Panel LP Model	(6) Panel Probit Model
Total Financial Aid/$1,000 (1995)	0.004	0.002	0.005	0.009	0.006	0.011
	(0.002)	(0.002)	(0.002)*	(0.003)**	(0.003)*	(0.003)**
Spring 1996	0.061	0.080	0.069	0.059	0.079	0.066
	(0.007)**	(0.007)**	(0.007)**	(0.007)**	(0.007)**	(0.007)**
Fall 1996	-0.008	-0.008	-0.008	-0.007	-0.008	-0.008
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Spring 1997	0.044	0.049	0.047	0.044	0.049	0.048
	(0.007)**	(0.007)**	(0.007)**	(0.007)**	(0.007)**	(0.007)**
Fall 1997	-0.016	-0.015	-0.016	-0.015	-0.014	-0.014
	(0.005)**	(0.005)**	(0.005)**	(0.005)**	(0.005)**	(0.005)**
Spring 1998	0.006	0.006	0.008	0.008	0.007	0.010
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Fall 1998	-0.038	-0.029	-0.038	-0.036	-0.027	-0.036
	(0.004)**	(0.004)**	(0.004)**	(0.004)**	(0.004)**	(0.004)**
Male	-0.001	-0.001	-0.000	-0.002	-0.002	-0.001
	(0.003)	(0.004)	(0.003)	(0.003)	(0.004)	(0.003)
African-American	-0.009	-0.008	-0.009	-0.012	-0.011	-0.013
	(0.005)	(0.008)	(0.005)	(0.004)**	(0.008)	(0.005)*
Hispanic	0.005	0.009	0.006	0.004	0.009	0.005
	(0.006)	(0.008)	(0.007)	(0.006)	(0.008)	(0.007)
Asian	-0.004	-0.004	-0.003	0.002	0.000	0.004
	(0.006)	(0.007)	(0.007)	(0.007)	(0.007)	(0.008)
Father high school grad	-0.001	-0.002	-0.002	-0.001	-0.002	-0.002
	(0.010)	(0.016)	(0.012)	(0.010)	(0.016)	(0.012)
Father some college (no bachelor's degree)	-0.011	-0.018	-0.013	-0.012	-0.018	-0.013
	(0.009)	(0.017)	(0.011)	(0.009)	(0.017)	(0.011)

Appendix B: Table 4 (continued)

Probability of First Stopout for Four-Year College Students -- EFC Identified Total Financial Aid Instrument -- Linear, Quadratic, Cubic & Quartic Functional Forms

(Marginal Effects)

	Linear			*Quadratic*		
	(1) Semiparametric PH Model	(2) Panel LP Model	(3) Panel Probit Model	(4) Semiparametric PH Model	(5) Panel LP Model	(6) Panel Probit Model
Father college grad	-0.011	-0.016	-0.013	-0.011	-0.015	-0.013
	(0.011)	(0.016)	(0.013)	(0.011)	(0.016)	(0.013)
Single Parent/Broken Home	0.009	0.012	0.010	0.009	0.012	0.010
	(0.004)*	(0.005)**	(0.004)*	(0.004)*	(0.005)**	(0.004)*
Mother high school grad	0.024	0.028	0.026	0.025	0.028	0.026
	(0.013)	(0.015)	(0.014)	(0.013)	(0.015)	(0.014)
Mother some college (no bachelor's degree)	0.025	0.026	0.026	0.026	0.026	0.026
	(0.017)	(0.016)	(0.017)	(0.017)	(0.016)	(0.017)
Mother college grad	0.018	0.021	0.019	0.019	0.021	0.019
	(0.013)	(0.015)	(0.014)	(0.013)	(0.015)	(0.014)
SAT score/100	-0.004	-0.004	-0.004	-0.004	-0.004	-0.005
	(0.001)**	(0.001)**	(0.001)**	(0.001)**	(0.001)**	(0.001)**
Didn't take SAT or ACT	0.005	0.029	0.013	0.017	0.036	0.028
	(0.016)	(0.033)	(0.021)	(0.020)	(0.033)	(0.026)
High School GPA: B to C	0.036	0.049	0.043	0.042	0.051	0.050
	(0.006)**	(0.007)**	(0.007)**	(0.007)**	(0.007)**	(0.007)**
High School GPA: C- to D-	0.108	0.132	0.123	0.126	0.136	0.139
	(0.033)**	(0.043)**	(0.039)**	(0.037)**	(0.043)**	(0.042)**
State weekly earnings in mfg. sector/1,000	-0.051	-0.075	-0.057	-0.051	-0.077	-0.058
	(0.020)*	(0.026)**	(0.023)*	(0.020)*	(0.026)**	(0.023)*
State unemployment rate	0.001	0.001	0.001	0.001	0.001	0.001
	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)
Tuition/$10,000 (1995)	-0.042	-0.030	-0.050	-0.080	-0.055	-0.093
	(0.014)**	(0.016)	(0.015)**	(0.018)**	(0.020)**	(0.020)**
Public	-0.009	-0.007	-0.009	-0.009	-0.007	-0.008
	(0.005)	(0.007)	(0.006)	(0.005)	(0.007)	(0.006)

Appendix B: Table 4 (continued)
Probability of First Stopout for Four-Year College Students -- EFC Identified Total Financial Aid Instrument -- Linear, Quadratic, Cubic & Quartic Functional Forms
(Marginal Effects)

	Linear			*Quadratic*		
	(1) Semiparametric PH Model	(2) Panel LP Model	(3) Panel Probit Model	(4) Semiparametric PH Model	(5) Panel LP Model	(6) Panel Probit Model
Total Income/$10,000	-0.007	-0.007	-0.007	-0.001	-0.003	0.000
	(0.007)	(0.010)	(0.009)	(0.007)	(0.010)	(0.009)
Contribution from Assets/$10,000	0.000	0.000	0.001	0.007	0.004	0.010
	(0.002)	(0.002)	(0.002)	(0.004)*	(0.004)	(0.004)*
Family Size	-0.002	-0.002	-0.002	-0.009	-0.007	-0.011
	(0.001)	(0.002)	(0.002)	(0.006)	(0.008)	(0.007)
Family Members in College	-0.002	-0.001	-0.002	-0.025	-0.028	-0.026
	(0.003)	(0.003)	(0.003)	(0.011)*	(0.016)	(0.012)*
$(\text{Total Income})^2/10^9$				-0.002	-0.001	-0.002
				(0.001)*	(0.001)	(0.001)**
$(\text{Contribution from Assets})^2/10^9$				-0.002	-0.001	-0.003
				(0.001)	(0.001)	(0.001)*
$(\text{Family Size})^2$				0.001	0.000	0.001
				(0.001)	(0.001)	(0.001)
$(\text{Family Members in College})^2$				0.005	0.007	0.005
				(0.003)	(0.004)	(0.003)
Person-term records	20,156	20,156	20,156	20,156	20,156	20,156
N	3,378	3,378	3,378	3,378	3,378	3,378
-2 log L	8,829.83		8,834.80	8,817.06		8,821.80
R-squared		0.04			0.04	

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

Full regression includes a constant term, and dummy variables for missing parental education, and missing high school GPA

Appendix B: Table 4 (continued)

Probability of First Stopout for Four-Year College Students -- EFC Identified Total Financial Aid Instrument -- Linear, Quadratic, Cubic & Quartic Functional Forms

(Marginal Effects)

	Cubic			*Quartic* [a]		*Cubic, Random Effects*		
	(7) SPH Model	(8) Panel LP Model	(9) PDP Model	(10) Panel LP Model	(11) PDP Model	(12) SPH Model	(13) Panel LP Model	(14) PDP Model
Total Financial Aid/$1,000 (1995)	0.010	0.006	0.011	0.004	0.008	0.007	0.006	0.008
	(0.003)**	(0.003)*	(0.003)**	(0.003)	(0.003)**	(0.003)**	(0.003)*	(0.003)*
Spring 1996	0.058	0.079	0.066	0.080	0.067	0.056	0.079	0.073
	(0.007)**	(0.007)**	(0.007)**	(0.007)**	(0.007)**	(0.006)**	(0.007)**	(0.008)**
Fall 1996	-0.007	-0.008	-0.007	-0.008	-0.008	0.007	-0.008	0.010
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)
Spring 1997	0.044	0.049	0.048	0.049	0.048	0.069	0.049	0.090
	(0.007)**	(0.007)**	(0.007)**	(0.007)**	(0.007)**	(0.008)**	(0.007)**	(0.011)**
Fall 1997	-0.015	-0.013	-0.014	-0.014	-0.015	0.009	-0.013	0.019
	(0.005)**	(0.005)**	(0.005)**	(0.005)**	(0.005)**	(0.006)	(0.005)**	(0.008)*
Spring 1998	0.008	0.008	0.010	0.007	0.009	0.040	0.008	0.060
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.008)**	(0.006)	(0.011)**
Fall 1998	-0.036	-0.027	-0.035	-0.028	-0.036	-0.014	-0.027	-0.003
	(0.004)**	(0.004)**	(0.004)**	(0.004)**	(0.004)**	(0.005)*	(0.004)**	(0.007)
Male	-0.001	-0.002	-0.001	-0.001	-0.000	-0.002	-0.002	-0.002
	(0.003)	(0.004)	(0.003)	(0.004)	(0.003)	(0.003)	(0.004)	(0.004)
African-American	-0.011	-0.010	-0.012	-0.009	-0.011	-0.009	-0.010	-0.010
	(0.004)**	(0.008)	(0.005)*	(0.008)	(0.005)*	(0.004)*	(0.008)	(0.005)
Hispanic	0.004	0.009	0.005	0.010	0.007	0.006	0.009	0.009
	(0.006)	(0.008)	(0.007)	(0.008)	(0.007)	(0.006)	(0.008)	(0.008)
Asian	0.003	0.002	0.005	-0.001	0.001	0.001	0.002	0.002
	(0.007)	(0.007)	(0.008)	(0.007)	(0.008)	(0.007)	(0.007)	(0.009)
Father high school grad	-0.001	-0.002	-0.002	-0.002	-0.002	-0.003	-0.002	-0.004
	(0.010)	(0.016)	(0.012)	(0.016)	(0.012)	(0.010)	(0.016)	(0.012)
Father some college (no bachelor's degree)	-0.011	-0.018	-0.013	-0.018	-0.014	-0.013	-0.018	-0.015
	(0.009)	(0.017)	(0.011)	(0.017)	(0.011)	(0.008)	(0.017)	(0.009)

Appendix B: Table 4 (continued)

Probability of First Stopout for Four-Year College Students -- EFC Identified Total Financial Aid Instrument -- Linear, Quadratic, Cubic & Quartic Functional Forms

(Marginal Effects)

	Cubic			*Quartic* [a]		*Cubic, Random Effects*		
	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	SPH Model	Panel LP Model	PDP Model	Panel LP Model	PDP Model	SPH Model	Panel LP Model	PDP Model
Father college grad	-0.010	-0.015	-0.013	-0.015	-0.013	-0.011	-0.015	-0.014
	(0.011)	(0.016)	(0.013)	(0.016)	(0.013)	(0.010)	(0.016)	(0.013)
Single Parent/Broken Home	0.010	0.013	0.011	0.013	0.012	0.010	0.013	0.013
	(0.004)**	(0.005)**	(0.004)**	(0.005)**	(0.004)**	(0.004)*	(0.005)**	(0.005)*
Mother high school grad	0.024	0.027	0.025	0.027	0.025	0.025	0.027	0.029
	(0.013)	(0.015)	(0.014)	(0.015)	(0.014)	(0.013)*	(0.015)	(0.016)
Mother some college (no bachelor's degree)	0.024	0.025	0.025	0.025	0.025	0.026	0.025	0.030
	(0.017)	(0.015)	(0.017)	(0.016)	(0.017)	(0.017)	(0.015)	(0.021)
Mother college grad	0.017	0.020	0.018	0.020	0.018	0.018	0.020	0.019
	(0.012)	(0.015)	(0.014)	(0.015)	(0.014)	(0.012)	(0.015)	(0.014)
SAT score/100	-0.004	-0.005	-0.005	-0.004	-0.004	-0.004	-0.005	-0.005
	(0.001)**	(0.001)**	(0.001)**	(0.001)**	(0.001)**	(0.001)**	(0.001)**	(0.001)**
Didn't take SAT or ACT	0.017	0.036	0.027	0.031	0.018	0.012	0.036	0.016
	(0.020)	(0.033)	(0.025)	(0.033)	(0.023)	(0.020)	(0.033)	(0.027)
High School GPA: B to C	0.042	0.051	0.049	0.050	0.046	0.045	0.051	0.058
	(0.007)**	(0.007)**	(0.007)**	(0.007)**	(0.007)**	(0.008)**	(0.007)**	(0.010)**
High School GPA: C- to D-	0.126	0.136	0.138	0.134	0.130	0.128	0.136	0.172
	(0.036)**	(0.043)**	(0.041)**	(0.043)**	(0.040)**	(0.059)*	(0.043)**	(0.074)*
State weekly earnings in mfg. sector/1,000	-0.052	-0.077	-0.060	-0.077	-0.060	-0.040	-0.077	-0.046
	(0.020)*	(0.026)**	(0.023)**	(0.026)**	(0.023)**	(0.021)	(0.026)**	(0.026)
State unemployment rate	0.001	0.001	0.001	0.001	0.001	-0.001	0.001	-0.001
	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)	(0.002)
Tuition/$10,000 (1995)	-0.082	-0.057	-0.094	-0.042	-0.072	-0.063	-0.057	-0.068
	(0.018)**	(0.019)**	(0.020)**	(0.018)*	(0.019)**	(0.018)**	(0.019)**	(0.022)**
Public	-0.008	-0.006	-0.008	-0.007	-0.008	-0.005	-0.006	-0.005
	(0.005)	(0.007)	(0.006)	(0.007)	(0.006)	(0.005)	(0.007)	(0.007)

Appendix B: Table 4 (continued)

Probability of First Stopout for Four-Year College Students -- EFC Identified Total Financial Aid Instrument -- Linear, Quadratic, Cubic & Quartic Functional Forms

(Marginal Effects)

	Cubic			*Quartic* [a]		*Cubic, Random Effects*		
	(7) SPH Model	(8) Panel LP Model	(9) PDP Model	(10) Panel LP Model	(11) PDP Model	(12) SPH Model	(13) Panel LP Model	(14) PDP Model
Total Income/$10,000	-0.001	-0.002	0.000	-0.007	-0.006	-0.002	-0.002	-0.003
	(0.007)	(0.010)	(0.009)	(0.011)	(0.009)	(0.009)	(0.010)	(0.012)
Contribution from Assets/$10,000	0.013	0.007	0.016	0.009	0.020	0.008	0.007	0.008
	(0.006)*	(0.006)	(0.007)*	(0.010)	(0.010)*	(0.006)	(0.006)	(0.007)
Family Size	0.003	0.007	-0.002	0.001	-0.006	0.003	0.007	0.001
	(0.018)	(0.026)	(0.021)	(0.078)	(0.063)	(0.019)	(0.026)	(0.023)
Family Members in College	0.112	0.201	0.131	-1.247	-0.830	0.099	0.201	0.120
	(0.044)*	(0.091)*	(0.057)*	(0.357)**	(0.023)**	(0.052)	(0.091)*	(0.065)
$(\text{Total Income})^2/10^9$	-0.005	-0.004	-0.005	0.001	0.000	-0.004	-0.004	-0.004
	(0.002)*	(0.003)	(0.002)*	(0.007)	(0.005)	(0.002)*	(0.003)	(0.002)
$(\text{Contribution from Assets})^2/10^9$	-0.009	-0.004	-0.012	-0.023	-0.041	-0.006	-0.004	-0.005
	(0.006)	(0.007)	(0.007)	(0.019)	(0.020)*	(0.006)	(0.007)	(0.008)
$(\text{Family Size})^2$	-0.002	-0.002	-0.001	0.000	0.001	-0.002	-0.002	-0.001
	(0.004)	(0.005)	(0.004)	(0.023)	(0.019)	(0.004)	(0.005)	(0.005)
$(\text{Family Members in College})^2$	-0.063	-0.109	-0.073	0.893	0.596	-0.056	-0.109	-0.067
	(0.021)**	(0.047)*	(0.028)**	(0.236)**	(0.022)**	(0.026)*	(0.047)*	(0.032)*
$(\text{Total Income})^3/10^{14}$	0.001	0.001	0.001	-0.002	-0.002	0.001	0.001	0.001
	(0.000)	(0.001)	(0.000)	(0.004)	(0.003)	(0.000)	(0.001)	(0.000)
$(\text{Contribution from Assets})^3/10^{14}$	0.002	0.001	0.002	0.016	0.026	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.012)	(0.012)*	(0.002)	(0.001)	(0.002)
$(\text{Family Size})^3$	0.000	0.000	0.000	-0.000	-0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.003)	(0.002)	(0.000)	(0.000)	(0.000)
$(\text{Family Members in College})^3$	0.010	0.017	0.012	-0.264	-0.178	0.009	0.017	0.011
	(0.003)**	(0.007)*	(0.004)**	(0.062)**	(0.010)**	(0.004)*	(0.007)*	(0.005)*

Appendix B: Table 4 (continued)

Probability of First Stopout for Four-Year College Students -- EFC Identified Total Financial Aid Instrument -- Linear, Quadratic, Cubic & Quartic Functional Forms

(Marginal Effects)

	Cubic			*Quartic* [a]		*Cubic, Random Effects*		
	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	SPH Model	Panel LP Model	PDP Model	Panel LP Model	PDP Model	SPH Model	Panel LP Model	PDP Model
$(\text{Total Income})^4/10^{14}$				0.000	0.000			
				(0.000)	(0.000)			
$(\text{Contribution from Assets})^4/10^{14}$				-0.000	-0.000			
				(0.000)	(0.000)*			
$(\text{Family Size})^4$				0.000	0.000			
				(0.000)	(0.000)			
$(\text{Family Members in College})^4$				0.028	0.019			
				(0.006)**	(0.001)**			
Person-term records	20156	20156	20156	20156	20156	20156	20156	20156
N	3,378	3,378	3,378	3,378	3,378	3,378	3,378	3,378
-2 log L	8805.13		8811.9826		8816.1924	8709.2668		8681.2098
R-squared		0.04		0.04			0.04	

Standard errors in parentheses

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

[a] STATA was unable to estimate the quartic functional form of the Semiparametric Proportional Hazard (SPH) model (complementary log-log for discrete time).

Full regression includes a constant term, and dummy variables for missing parental education, and missing high school GPA

Appendix C: Table 1

Probability of Graduation within Six Years for Four-Year College Students (Probit Model) -- EFC Identified Financial Aid Instruments -- Linear, Quadratic & Cubic Functional Forms

(Marginal Effects)

	Pell				*Total Grants*			
	(1) Linear	(2) Quadratic	(3) Cubic	(4) Quartic	(5) Linear	(6) Quadratic	(7) Cubic	(8) Quartic
Financial Aid Instrument/$1,000 (1995)	0.054	0.025	0.026	0.028	0.015	0.022	0.021	0.020
	(0.039)	(0.017)	(0.019)	(0.020)	(0.011)	(0.015)	(0.015)	(0.014)
Male	-0.057	-0.022	-0.022	-0.022	-0.019	-0.018	-0.018	-0.019
	(0.047)	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)
African-American	-0.124	-0.051	-0.051	-0.051	-0.054	-0.060	-0.059	-0.059
	(0.088)	(0.035)	(0.035)	(0.035)	(0.035)	(0.036)	(0.036)	(0.036)
Hispanic	-0.251	-0.098	-0.099	-0.100	-0.108	-0.112	-0.112	-0.112
	(0.091)**	(0.036)**	(0.036)**	(0.036)**	(0.037)**	(0.038)**	(0.038)**	(0.038)**
Asian	0.068	0.025	0.022	0.021	0.031	0.034	0.029	0.028
	(0.103)	(0.039)	(0.039)	(0.039)	(0.039)	(0.039)	(0.039)	(0.039)
Father high school grad	-0.100	-0.040	-0.042	-0.041	-0.039	-0.040	-0.042	-0.041
	(0.164)	(0.064)	(0.064)	(0.064)	(0.063)	(0.064)	(0.064)	(0.064)
Father some college (no bachelor's degree)	0.065	0.023	0.021	0.022	0.025	0.023	0.021	0.022
	(0.175)	(0.066)	(0.067)	(0.067)	(0.066)	(0.066)	(0.067)	(0.067)
Father college grad	0.118	0.042	0.040	0.042	0.045	0.042	0.040	0.042
	(0.168)	(0.065)	(0.065)	(0.065)	(0.065)	(0.065)	(0.065)	(0.065)
Single Parent/Broken Home	-0.174	-0.072	-0.075	-0.075	-0.068	-0.072	-0.075	-0.075
	(0.055)**	(0.022)**	(0.022)**	(0.022)**	(0.022)**	(0.022)**	(0.022)**	(0.022)**
Mother high school grad	-0.177	-0.070	-0.071	-0.073	-0.069	-0.070	-0.071	-0.073
	(0.170)	(0.066)	(0.066)	(0.066)	(0.066)	(0.066)	(0.066)	(0.066)
Mother some college (no bachelor's degree)	-0.158	-0.062	-0.063	-0.065	-0.061	-0.062	-0.063	-0.065
	(0.180)	(0.071)	(0.071)	(0.071)	(0.071)	(0.071)	(0.071)	(0.071)
Mother college grad	-0.126	-0.051	-0.052	-0.053	-0.049	-0.051	-0.052	-0.053
	(0.176)	(0.068)	(0.068)	(0.068)	(0.068)	(0.068)	(0.068)	(0.068)
SAT score/100	0.061	0.023	0.023	0.023	0.019	0.016	0.017	0.017
	(0.014)**	(0.005)**	(0.005)**	(0.005)**	(0.006)**	(0.007)*	(0.007)*	(0.007)*
Didn't take SAT or ACT	0.280	0.101	0.099	0.101	0.093	0.085	0.084	0.084
	(0.258)	(0.089)	(0.089)	(0.089)	(0.090)	(0.092)	(0.092)	(0.092)

Appendix C: Table 1 (continued)

Probability of Graduation within Six Years for Four-Year College Students (Probit Model) -- EFC Identified Financial Aid Instruments -- Linear, Quadratic & Cubic Functional Forms

(Marginal Effects)

	Pell				*Total Grants*			
	(1) Linear	(2) Quadratic	(3) Cubic	(4) Quartic	(5) Linear	(6) Quadratic	(7) Cubic	(8) Quartic
High School GPA: B to C	-0.535	-0.208	-0.208	-0.208	-0.197	-0.187	-0.188	-0.189
	(0.066)**	(0.026)**	(0.026)**	(0.026)**	(0.027)**	(0.030)**	(0.030)**	(0.029)**
High School GPA: C- to D-	-0.791	-0.310	-0.310	-0.309	-0.296	-0.296	-0.296	-0.296
	(0.287)**	(0.100)**	(0.100)**	(0.100)**	(0.102)**	(0.102)**	(0.102)**	(0.102)**
State weekly earnings in mfg. sector/1,000	0.004	0.006	-0.001	-0.001	0.001	0.006	-0.001	-0.001
	(0.340)	(0.131)	(0.131)	(0.131)	(0.131)	(0.131)	(0.131)	(0.131)
State unemployment rate	0.023	0.008	0.009	0.009	0.009	0.008	0.009	0.009
	(0.021)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Tuition/$10,000	0.321	0.124	0.123	0.123	0.056	0.023	0.028	0.030
	(0.076)**	(0.029)**	(0.030)**	(0.030)**	(0.057)	(0.074)	(0.074)	(0.071)
Public	0.045	0.019	0.018	0.018	0.017	0.019	0.018	0.018
	(0.084)	(0.033)	(0.033)	(0.033)	(0.033)	(0.033)	(0.033)	(0.033)
Total Income/$10,000	0.002	0.006	0.007	0.016	0.006	0.018	0.014	0.013
	(0.008)	(0.007)	(0.015)	(0.025)	(0.006)	(0.014)	(0.019)	(0.024)
Contribution from Assets/$10,000	0.019	0.020	0.053	0.036	0.011	0.031	0.067	0.063
	(0.021)	(0.014)	(0.022)*	(0.033)	(0.009)	(0.016)	(0.025)**	(0.039)
Family Size	-0.009	-0.053	-0.145	-0.095	-0.006	-0.067	-0.154	-0.153
	(0.021)	(0.034)	(0.117)	(0.357)	(0.008)	(0.035)	(0.117)	(0.362)
Family Members in College	-0.018	0.087	-0.574	0.864	-0.013	0.085	-0.539	0.958
	(0.038)	(0.067)	(0.363)	(0.005)**	(0.015)	(0.067)	(0.364)	(0.006)**
$(\text{Total Income})^2/10^9$		-0.002	-0.003	-0.016		-0.005	-0.002	-0.000
		(0.003)	(0.013)	(0.033)		(0.004)	(0.012)	(0.029)
$(\text{Contribution from Assets})^2/10^9$		-0.007	-0.060	-0.004		-0.010	-0.070	-0.057
		(0.006)	(0.028)*	(0.089)		(0.006)	(0.029)*	(0.098)
$(\text{Family Size})^2$		0.005	0.024	0.008		0.006	0.024	0.024
		(0.003)	(0.023)	(0.110)		(0.003)	(0.023)	(0.111)

Appendix C: Table 1 (continued)

Probability of Graduation within Six Years for Four-Year College Students (Probit Model) -- EFC Identified Financial Aid Instruments -- Linear, Quadratic & Cubic Functional Forms

(Marginal Effects)

	Pell				*Total Grants*			
	(1) Linear	(2) Quadratic	(3) Cubic	(4) Quartic	(5) Linear	(6) Quadratic	(7) Cubic	(8) Quartic
(Family Members in College)^2		-0.025	0.308	-0.699		-0.026	0.288	-0.759
		(0.017)	(0.180)	(0.077)**		(0.017)	(0.181)	(0.077)**
(Total Income)^3/10^{14}			0.000	0.007			-0.001	-0.001
			(0.003)	(0.016)			(0.003)	(0.015)
(Contribution from Assets)^3/10^{14}			0.014	-0.025			0.015	0.007
			(0.008)	(0.060)			(0.008)*	(0.064)
(Family Size)^3			-0.001	0.001			-0.001	-0.001
			(0.001)	(0.014)			(0.001)	(0.014)
(Family Members in College)^3			-0.050	0.238			-0.047	0.252
			(0.027)	(0.047)**			(0.027)	(0.047)**
(Total Income)^4/10^{14}				-0.000				0.000
				(0.000)				(0.000)
(Contribution from Assets)^4/10^{14}				0.000				0.000
				(0.000)				(0.000)
(Family Size)^4				-0.000				-0.000
				(0.001)				(0.001)
(Family Members in College)^4				-0.029				-0.030
				(0.007)**				(0.007)**
N	3,378	3,378	3,378	3,378	3,378	3,378	3,378	3,378
-2 log L	4,161.21	4,155.67	4,147.21	4,146.53	4,161.21	4,155.67	4,147.21	4,146.53

Standard errors in parentheses

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

Full regression includes a constant term, and dummy variables for missing parental education, and missing high school GPA

Appendix C: Table 1 (continued)

Probability of Graduation within Six Years for Four-Year College Students (Probit Model) -- EFC Identified Financial Aid Instruments -- Linear, Quadratic & Cubic Functional Forms

(Marginal Effects)

	Total Aid			
	(9)	(10)	(11)	(12)
	Linear	Quadratic	Cubic	Quartic
Financial Aid Instrument/$1,000 (1995)	0.021	0.036	0.032	0.027
	(0.015)	(0.024)	(0.023)	(0.019)
Male	-0.024	-0.026	-0.026	-0.025
	(0.018)	(0.018)	(0.018)	(0.018)
African-American	-0.062	-0.075	-0.071	-0.068
	(0.037)	(0.040)	(0.039)	(0.038)
Hispanic	-0.104	-0.105	-0.106	-0.105
	(0.037)**	(0.037)**	(0.037)**	(0.037)**
Asian	0.045	0.058	0.048	0.043
	(0.039)	(0.043)	(0.043)	(0.041)
Father high school grad	-0.039	-0.040	-0.042	-0.041
	(0.063)	(0.064)	(0.064)	(0.064)
Father some college (no bachelor's degree)	0.025	0.023	0.021	0.022
	(0.066)	(0.066)	(0.067)	(0.067)
Father college grad	0.045	0.042	0.040	0.042
	(0.065)	(0.065)	(0.065)	(0.065)
Single Parent/Broken Home	-0.068	-0.072	-0.075	-0.075
	(0.022)**	(0.022)**	(0.022)**	(0.022)**
Mother high school grad	-0.069	-0.070	-0.071	-0.073
	(0.066)	(0.066)	(0.066)	(0.066)
Mother some college (no bachelor's degree)	-0.061	-0.062	-0.063	-0.065
	(0.071)	(0.071)	(0.071)	(0.071)
Mother college grad	-0.049	-0.051	-0.052	-0.053
	(0.068)	(0.068)	(0.068)	(0.068)
SAT score/100	0.021	0.019	0.019	0.019
	(0.006)**	(0.006)**	(0.006)**	(0.006)**
Didn't take SAT or ACT	0.136	0.155	0.147	0.138
	(0.088)	(0.088)	(0.089)	(0.088)

Appendix C: Table 1 (continued)
Probability of Graduation within Six Years for Four-Year College Students (Probit Model) -- EFC Identified Financial Aid Instruments -- Linear, Quadratic & Cubic Functional Forms
(Marginal Effects)

	Total Aid			
	(9) Linear	(10) Quadratic	(11) Cubic	(12) Quartic
High School GPA: B to C	-0.198	-0.185	-0.187	-0.190
	(0.027)**	(0.030)**	(0.030)**	(0.029)**
High School GPA: C- to D-	-0.289	-0.282	-0.286	-0.290
	(0.103)**	(0.105)**	(0.105)**	(0.104)**
State weekly earnings in mfg. sector/1,000	0.001	0.006	-0.001	-0.001
	(0.131)	(0.131)	(0.131)	(0.131)
State unemployment rate	0.009	0.008	0.009	0.009
	(0.008)	(0.008)	(0.008)	(0.008)
Tuition/$10,000	-0.030	-0.137	-0.109	-0.075
	(0.114)	(0.175)	(0.169)	(0.141)
Public	0.017	0.019	0.018	0.018
	(0.033)	(0.033)	(0.033)	(0.033)
Total Income/$10,000	0.010	0.029	0.021	0.007
	(0.008)	(0.020)	(0.023)	(0.022)
Contribution from Assets/$10,000	0.018	0.059	0.110	0.112
	(0.011)	(0.029)*	(0.048)*	(0.065)
Family Size	-0.007	-0.088	-0.170	-0.095
	(0.009)	(0.042)*	(0.118)	(0.357)
Family Members in College	-0.020	0.064	-0.507	0.883
	(0.018)	(0.069)	(0.367)	(0.005)**
(Total Income)^2/10^9		-0.006	-0.001	0.016
		(0.005)	(0.012)	(0.030)
(Contribution from Assets)^2/10^9		-0.019	-0.109	-0.138
		(0.010)	(0.046)*	(0.132)
(Family Size)^2		0.008	0.025	0.002
		(0.004)*	(0.023)	(0.110)
(Family Members in College)^2		-0.025	0.265	-0.708
		(0.017)	(0.184)	(0.077)**

Appendix C: Table 1 (continued)

Probability of Graduation within Six Years for Four-Year College Students (Probit Model) -- EFC Identified Financial Aid Instruments -- Linear, Quadratic & Cubic Functional Forms

(Marginal Effects)

	Total Aid			
	(9) Linear	(10) Quadratic	(11) Cubic	(12) Quartic
$(\text{Total Income})^3/10^{14}$			-0.001	-0.010
			(0.003)	(0.016)
$(\text{Contribution from Assets})^3/10^{14}$			0.023	0.047
			(0.011)*	(0.080)
$(\text{Family Size})^3$			-0.001	0.002
			(0.001)	(0.014)
$(\text{Family Members in College})^3$			-0.044	0.236
			(0.027)	(0.047)**
$(\text{Total Income})^4/10^{14}$				0.000
				(0.000)
$(\text{Contribution from Assets})^4/10^{14}$				-0.000
				(0.000)
$(\text{Family Size})^4$				-0.000
				(0.001)
$(\text{Family Members in College})^4$				-0.028
				(0.007)**
N	3,378	3,378	3,378	3,378
-2 log L	4,161.21	4,155.67	4,147.21	4,146.53

Standard errors in parentheses

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

Full regression includes a constant term, and dummy variables for missing parental education, and missing high school GPA

Appendix D
Alternative Functional Form Specifications for EFC Identified Aid Instruments
(Stopout of Two-Year College Students)

Appendix D: Table 1
Probability of First Stopout for Two-Year College Students -- EFC Identified Scheduled Pell Instrument -- Linear, Quadratic & Cubic Functional Forms
(Marginal Effects)

	Linear			*Quadratic*		
	(1)	(2)	(3)	(4)	(5)	(6)
	SPH Model	Panel LP Model	PDP Model	SPH Model	Panel LP Model	PDP Model
Scheduled Pell Grant/$1,000 (1995)	-0.017	-0.022	-0.017	-0.013	-0.019	-0.014
	(0.019)	(0.022)	(0.019)	(0.019)	(0.026)	(0.021)
Spring 1996	0.117	0.127	0.126	0.116	0.127	0.127
	(0.030)**	(0.030)**	(0.030)**	(0.029)**	(0.030)**	(0.030)**
Fall 1996	0.018	0.014	0.012	0.019	0.014	0.013
	(0.031)	(0.027)	(0.031)	(0.031)	(0.026)	(0.031)
Male	0.012	0.019	0.021	0.017	0.021	0.024
	(0.024)	(0.027)	(0.026)	(0.024)	(0.027)	(0.026)
African-American	-0.000	0.008	0.010	-0.005	-0.000	0.000
	(0.044)	(0.055)	(0.049)	(0.041)	(0.053)	(0.046)
Hispanic	-0.011	-0.015	-0.018	-0.017	-0.018	-0.022
	(0.038)	(0.040)	(0.037)	(0.038)	(0.041)	(0.038)
Father high school grad	0.077	0.076	0.071	0.092	0.075	0.078
	(0.086)	(0.078)	(0.073)	(0.100)	(0.078)	(0.076)
Father some college (no bachelor's degree)	-0.001	0.007	-0.001	0.021	0.008	0.009
	(0.096)	(0.086)	(0.084)	(0.120)	(0.086)	(0.090)
Father college grad	0.093	0.082	0.083	0.112	0.078	0.089
	(0.125)	(0.082)	(0.095)	(0.148)	(0.083)	(0.100)
Single Parent/Broken Home	0.030	0.036	0.037	0.035	0.040	0.039
	(0.028)	(0.033)	(0.032)	(0.029)	(0.033)	(0.031)
Mother high school grad	-0.106	-0.110	-0.103	-0.139	-0.122	-0.123
	(0.080)	(0.081)	(0.072)	(0.103)	(0.081)	(0.079)
Mother some college (no bachelor's degree)	-0.102	-0.145	-0.109	-0.116	-0.157	-0.119
	(0.047)*	(0.089)	(0.046)*	(0.049)*	(0.089)	(0.045)**
Mother college grad	-0.052	-0.062	-0.054	-0.077	-0.080	-0.072
	(0.054)	(0.088)	(0.058)	(0.057)	(0.088)	(0.056)

Appendix D: Table 1 (continued)

Probability of First Stopout for Two-Year College Students -- EFC Identified Scheduled Pell Instrument -- Linear, Quadratic & Cubic Functional Forms

(Marginal Effects)

	Linear			*Quadratic*		
	(1)	(2)	(3)	(4)	(5)	(6)
	SPH Model	Panel LP Model	PDP Model	SPH Model	Panel LP Model	PDP Model
SAT score/100	-0.011	-0.012	-0.013	-0.012	-0.013	-0.013
	(0.009)	(0.010)	(0.009)	(0.009)	(0.010)	(0.010)
Didn't take SAT or ACT	-0.062	-0.071	-0.061	-0.067	-0.076	-0.066
	(0.064)	(0.094)	(0.070)	(0.061)	(0.095)	(0.069)
High School GPA: B to C	0.059	0.048	0.050	0.060	0.047	0.050
	(0.040)	(0.035)	(0.039)	(0.041)	(0.036)	(0.039)
High School GPA: C- to D-	-0.016	-0.026	-0.017	-0.019	-0.030	-0.020
	(0.056)	(0.062)	(0.058)	(0.054)	(0.062)	(0.056)
State weekly earnings in mfg. sector/1,000	-0.228	-0.234	-0.239	-0.230	-0.236	-0.244
	(0.173)	(0.164)	(0.180)	(0.168)	(0.163)	(0.177)
State unemployment rate	-0.014	-0.020	-0.018	-0.015	-0.019	-0.018
	(0.013)	(0.015)	(0.013)	(0.013)	(0.015)	(0.013)
Total Income/$10,000	-0.007	-0.009	-0.007	-0.008	-0.010	-0.005
	(0.007)	(0.008)	(0.007)	(0.023)	(0.028)	(0.024)
Contribution from Assets/$10,000	0.035	0.081	0.064	-0.181	-0.187	-0.171
	(0.048)	(0.071)	(0.051)	(0.157)	(0.144)	(0.156)
Family Size	0.013	0.014	0.012	0.005	0.008	0.005
	(0.009)	(0.010)	(0.010)	(0.034)	(0.039)	(0.037)
Family Members in College	-0.030	-0.033	-0.034	-0.023	-0.020	-0.034
	(0.024)	(0.025)	(0.025)	(0.144)	(0.143)	(0.152)

Appendix D: Table 1 (continued)
Probability of First Stopout for Two-Year College Students -- EFC Identified Scheduled Pell Instrument -- Linear, Quadratic & Cubic Functional Forms
(Marginal Effects)

	Linear			*Quadratic*		
	(1) SPH Model	(2) Panel LP Model	(3) PDP Model	(4) SPH Model	(5) Panel LP Model	(6) PDP Model
$(\text{Total Income})^2/10^9$				0.005	0.003	-0.000
				(0.021)	(0.024)	(0.021)
$(\text{Contribution from Assets})^2/10^9$				1.120	1.632	1.295
				(0.770)	(0.924)	(0.829)
$(\text{Family Size})^2$				0.001	0.001	0.001
				(0.003)	(0.004)	(0.004)
$(\text{Family Members in College})^2$				-0.002	-0.004	-0.000
				(0.042)	(0.041)	(0.045)
Person-term records	860	860	860	860	860	860
N	282	282	282	282	282	282
-2 log L	638.49		638.38	635.12		635.01
R-squared		0.07			0.08	

Standard errors in parentheses
* significant at 5%; ** significant at 1%
Full regression includes a constant term, and dummy variables for missing parental education, and missing high school GPA

Appendix D: Table 1 (continued)
Probability of First Stopout for Two-Year College Students -- EFC Identified Scheduled Pell Instrument -- Linear, Quadratic & Cubic Functional Forms
(Marginal Effects)

	Cubic			*Quartic*			*Quartic, Random Effects*		
	(7) SPH Model	(8) Panel LP Model	(9) PDP Model	(10) SPH Model	(11) Panel LP Model	(12) PDP Model	(13) SPH Model	(14) Panel LP Model	(15) PDP Model
Scheduled Pell Grant/$1,000 (1995)	-0.015	-0.018	-0.014	-0.015	-0.016	-0.013	-0.010	-0.016	-0.010
	(0.019)	(0.026)	(0.021)	(0.018)	(0.026)	(0.021)	(0.019)	(0.026)	(0.025)
Spring 1996	0.117	0.128	0.127	0.118	0.128	0.128	0.139	0.128	0.185
	(0.029)**	(0.030)**	(0.030)**	(0.029)**	(0.030)**	(0.030)**	(0.034)**	(0.030)**	(0.044)**
Fall 1996	0.020	0.015	0.013	0.023	0.017	0.016	0.102	0.017	0.146
	(0.031)	(0.026)	(0.031)	(0.031)	(0.027)	(0.031)	(0.042)*	(0.027)	(0.054)**
Male	0.014	0.023	0.024	0.013	0.023	0.023	0.022	0.023	0.030
	(0.023)	(0.028)	(0.026)	(0.024)	(0.029)	(0.027)	(0.026)	(0.029)	(0.033)
African-American	-0.021	-0.012	-0.011	-0.022	-0.015	-0.013	-0.002	-0.015	0.000
	(0.038)	(0.053)	(0.045)	(0.036)	(0.054)	(0.044)	(0.039)	(0.054)	(0.051)
Hispanic	-0.024	-0.027	-0.028	-0.026	-0.030	-0.029	-0.019	-0.030	-0.022
	(0.036)	(0.041)	(0.037)	(0.035)	(0.041)	(0.036)	(0.031)	(0.041)	(0.037)
Father high school grad	0.098	0.081	0.081	0.100	0.078	0.079	0.070	0.078	0.082
	(0.102)	(0.078)	(0.075)	(0.101)	(0.079)	(0.076)	(0.062)	(0.079)	(0.074)
Father some college (no bachelor's degree)	0.043	0.030	0.028	0.043	0.024	0.023	0.018	0.024	0.022
	(0.134)	(0.086)	(0.095)	(0.134)	(0.087)	(0.094)	(0.077)	(0.087)	(0.094)
Father college grad	0.126	0.090	0.098	0.134	0.091	0.098	0.102	0.091	0.120
	(0.158)	(0.083)	(0.102)	(0.160)	(0.084)	(0.102)	(0.107)	(0.084)	(0.131)
Single Parent/Broken Home	0.032	0.039	0.037	0.034	0.040	0.038	0.037	0.040	0.049
	(0.028)	(0.033)	(0.031)	(0.029)	(0.034)	(0.032)	(0.032)	(0.034)	(0.042)
Mother high school grad	-0.146	-0.132	-0.127	-0.151	-0.130	-0.127	-0.121	-0.130	-0.143
	(0.106)	(0.079)	(0.077)	(0.107)	(0.080)	(0.078)	(0.076)	(0.080)	(0.091)
Mother some college (no bachelor's degree)	-0.117	-0.164	-0.118	-0.119	-0.164	-0.118	-0.095	-0.164	-0.101
	(0.049)*	(0.088)	(0.044)**	(0.046)*	(0.089)	(0.044)**	(0.031)**	(0.089)	(0.034)**
Mother college grad	-0.078	-0.093	-0.075	-0.079	-0.089	-0.074	-0.058	-0.089	-0.063
	(0.056)	(0.087)	(0.054)	(0.054)	(0.088)	(0.055)	(0.037)	(0.088)	(0.040)

Appendix D: Table 1 (continued)
Probability of First Stopout for Two-Year College Students -- EFC Identified Scheduled Pell Instrument -- Linear, Quadratic & Cubic Functional Forms
(Marginal Effects)

	Cubic			*Quartic*			*Quartic, Random Effects*		
	(7) SPH Model	(8) Panel LP Model	(9) PDP Model	(10) SPH Model	(11) Panel LP Model	(12) PDP Model	(13) SPH Model	(14) Panel LP Model	(15) PDP Model
SAT score/100	-0.013	-0.015	-0.015	-0.012	-0.014	-0.015	-0.013	-0.014	-0.017
	(0.009)	(0.010)	(0.010)	(0.009)	(0.010)	(0.009)	(0.009)	(0.010)	(0.011)
Didn't take SAT or ACT	-0.079	-0.097	-0.083	-0.077	-0.099	-0.084	-0.070	-0.099	-0.079
	(0.056)	(0.095)	(0.063)	(0.055)	(0.096)	(0.062)	(0.049)	(0.096)	(0.054)
High School GPA: B to C	0.063	0.049	0.051	0.073	0.057	0.057	0.065	0.057	0.073
	(0.040)	(0.036)	(0.039)	(0.043)	(0.037)	(0.040)	(0.044)	(0.037)	(0.055)
High School GPA: C- to D-	-0.016	-0.032	-0.019	-0.016	-0.031	-0.019	-0.021	-0.031	-0.024
	(0.055)	(0.062)	(0.057)	(0.056)	(0.064)	(0.057)	(0.043)	(0.064)	(0.049)
State weekly earnings in mfg. sector/1,000	-0.231	-0.221	-0.244	-0.263	-0.241	-0.266	-0.223	-0.241	-0.268
	(0.170)	(0.166)	(0.178)	(0.170)	(0.167)	(0.181)	(0.171)	(0.167)	(0.215)
State unemployment rate	-0.014	-0.021	-0.019	-0.013	-0.020	-0.018	-0.018	-0.020	-0.023
	(0.013)	(0.015)	(0.013)	(0.013)	(0.015)	(0.013)	(0.011)	(0.015)	(0.014)
Total Income/$10,000	0.044	0.055	0.049	-0.045	-0.027	-0.029	-0.033	-0.027	-0.030
	(0.036)	(0.048)	(0.040)	(0.071)	(0.101)	(0.084)	(0.079)	(0.101)	(0.101)
Contribution from Assets/$10,000	-0.208	-0.105	-0.094	0.187	0.176	0.232	0.362	0.176	0.400
	(0.409)	(0.303)	(0.339)	(0.485)	(0.601)	(0.536)	(0.492)	(0.601)	(0.626)
Family Size	-0.148	-0.211	-0.204	0.125	0.007	0.016	0.073	0.007	0.051
	(0.121)	(0.155)	(0.136)	(0.404)	(0.533)	(0.444)	(0.434)	(0.533)	(0.551)
Family Members in College									
$(\text{Total Income})^2/10^9$	-0.100	-0.123	-0.108	0.196	0.148	0.153	0.169	0.148	0.173
	(0.056)	(0.076)	(0.066)	(0.220)	(0.281)	(0.255)	(0.243)	(0.281)	(0.309)
$(\text{Contribution from Assets})^2/10^9$	1.962	0.353	0.161	-11.666	-9.334	-11.042	-15.064	-9.334	-16.368
	(6.458)	(4.689)	(5.306)	(13.127)	(18.465)	(15.696)	(14.433)	(18.465)	(18.323)
$(\text{Family Size})^2$	0.032	0.045	0.044	-0.059	-0.025	-0.028	-0.049	-0.025	-0.047
	(0.024)	(0.030)	(0.027)	(0.126)	(0.164)	(0.138)	(0.139)	(0.164)	(0.175)
$(\text{Family Members in College})^2$	-0.014	-0.015	-0.016						
	(0.038)	(0.039)	(0.040)						

Appendix D: Table 1 (continued)

Probability of First Stopout for Two-Year College Students -- EFC Identified Scheduled Pell Instrument -- Linear, Quadratic & Cubic Functional Forms

(Marginal Effects)

	Cubic			*Quartic*			*Quartic, Random Effects*		
	(7) SPH Model	(8) Panel LP Model	(9) PDP Model	(10) SPH Model	(11) Panel LP Model	(12) PDP Model	(13) SPH Model	(14) Panel LP Model	(15) PDP Model
$(\text{Total Income})^3/10^{14}$	0.055	0.069	0.058	-0.305	-0.259	-0.264	-0.279	-0.259	-0.299
	(0.026)*	(0.037)	(0.032)	(0.256)	(0.307)	(0.294)	(0.287)	(0.307)	(0.367)
$(\text{Contribution from Assets})^3/10^{14}$	-3.229	3.959	3.427	122.728	94.514	107.232	141.674	94.514	152.716
	(21.182)	(15.621)	(17.706)	(108.817)	(161.273)	(133.836)	(121.502)	(161.273)	(154.280)
$(\text{Family Size})^3$	-0.002	-0.003	-0.003	0.010	0.006	0.007	0.010	0.006	0.010
	(0.001)	(0.002)	(0.002)	(0.016)	(0.021)	(0.018)	(0.018)	(0.021)	(0.023)
$(\text{Family Members in College})^3$	0.002	0.002	0.002	-0.009	-0.010	-0.011	-0.009	-0.010	-0.011
	(0.013)	(0.013)	(0.014)	(0.014)	(0.015)	(0.015)	(0.014)	(0.015)	(0.017)
$(\text{Total Income})^4/10^{14}$				0.000	0.000	0.000	0.000	0.000	0.000
				(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$(\text{Contribution from Assets})^4/10^{14}$				-0.003	-0.002	-0.003	-0.004	-0.002	-0.004
				(0.003)	(0.004)	(0.003)	(0.003)	(0.004)	(0.004)
$(\text{Family Size})^4$				-0.001	-0.000	-0.000	-0.001	-0.000	-0.001
				(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
$(\text{Family Members in College})^4$				0.002	0.002	0.003	0.002	0.002	0.003
				(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)
Person-term records	860	860	860	860	860	860	860	860	860
N	282	282	282	282	282	282	282	282	282
-2 log L	629.52		629.77	625.96		627.84	608.58		603.48
R-squared		0.08			0.08			0.08	

Standard errors in parentheses

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

Full regression includes a constant term, and dummy variables for missing parental education, and missing high school GPA

Appendix D: Table 2
Two-Year College Students: Determinants of Financial Aid Amounts - Linear, Quadratic, Cubic, and Quartic Functional Forms
(Marginal Effects)

	Scheduled Pell Grant				*Total Grants*			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Level of Scheduled Pell Grant First Year/$1,000					1.138	1.112	1.113	1.115
					(0.148)**	(0.164)**	(0.164)**	(0.165)**
Total Income/$10,000	-0.226	-0.659	-0.669	-0.221	0.033	0.008	-0.118	0.670
	(0.024)**	(0.074)**	(0.165)**	(0.430)	(0.056)	(0.171)	(0.306)	(0.732)
Contribution from Assets/$10,000	0.216	0.576	0.228	2.183	0.179	1.300	2.123	-3.721
	(0.303)	(0.399)	(0.952)	(1.508)	(0.374)	(1.507)	(2.451)	(4.597)
Family Size	0.124	0.203	0.195	0.391	-0.112	-0.332	-0.646	3.073
	(0.031)**	(0.118)	(0.468)	(1.368)	(0.072)	(0.258)	(0.949)	(3.254)
Family Members in College	0.150	0.236	0.000	0.000	-0.091	0.217	0.000	0.000
	(0.077)	(0.400)	(0.000)	(0.000)	(0.194)	(0.986)	(0.000)	(0.000)
(Total Income)^2/10^9		0.000	0.000	-0.000		0.000	0.000	-0.000
		(0.000)**	(0.000)	(0.000)		(0.000)	(0.000)	(0.000)
(Contribution from Assets)^2/10^9		-0.000	0.000	-0.001		-0.000	-0.000	0.002
		(0.000)**	(0.000)	(0.000)		(0.000)	(0.000)	(0.001)
(Family Size)^2		-0.006	-0.004	-0.073		0.023	0.087	-1.110
		(0.011)	(0.089)	(0.416)		(0.023)	(0.180)	(1.025)
(Family Members in College)^2		-0.054	0.070	0.000		-0.089	0.021	0.000
		(0.110)	(0.110)	(0.000)		(0.248)	(0.300)	(0.000)
(Total Income)^3/10^{14}			-0.000	0.000			-0.000	0.000
			(0.000)	(0.000)			(0.000)	(0.000)
(Contribution from Assets)^3/10^{14}			-0.000	0.000			0.000	-0.000
			(0.000)	(0.000)			(0.000)	(0.000)
(Family Size)^3			-0.000	0.010			-0.004	0.153
			(0.005)	(0.053)			(0.010)	(0.133)
(Family Members in College)^3			-0.020	0.034			-0.017	0.032
			(0.036)	(0.042)			(0.091)	(0.120)

Appendix D: Table 2 (continued)
Two-Year College Students: Determinants of Financial Aid Amounts - Linear, Quadratic, Cubic, and Quartic
(Marginal Effects)

	Scheduled Pell Grant				*Total Grants*			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$(\text{Total Income})^4/10^{14}$				-0.000				-0.000
				(0.000)				(0.000)
$(\text{Contribution from Assets})^4/10^{14}$				-0.000				0.000
				(0.000)				(0.000)
$(\text{Family Size})^4$				-0.000				-0.007
				(0.002)				(0.006)
$(\text{Family Members in College})^4$				-0.011				-0.015
				(0.014)				(0.038)
Male					-0.199	-0.200	-0.198	-0.198
					(0.215)	(0.217)	(0.218)	(0.227)
African-American					-0.477	-0.434	-0.414	-0.426
					(0.278)	(0.283)	(0.296)	(0.295)
Hispanic					-0.330	-0.352	-0.362	-0.363
					(0.222)	(0.226)	(0.233)	(0.235)
SAT score/100					0.001	0.000	-0.001	0.005
					(0.084)	(0.084)	(0.088)	(0.088)
Didn't take SAT or ACT					-1.300	-1.283	-1.312	-1.202
					(0.957)	(0.940)	(0.974)	(0.999)
High School GPA: B to C					0.408	0.427	0.421	0.434
					(0.258)	(0.262)	(0.267)	(0.270)
High School GPA: C- to D-					-0.333	-0.288	-0.290	-0.315
					(0.451)	(0.456)	(0.456)	(0.464)
Observations	282	282	282	282	282	282	282	282
R-squared	0.40	0.53	0.53	0.55	0.28	0.28	0.29	0.30

Robust standard errors in parentheses
* significant at 5%; ** significant at 1%

Appendix D: Table 2 (continued)

Two-Year College Students: Determinants of Financial Aid Amounts - Linear, Quadratic, Cubic, and Quartic Functional Forms

(Marginal Effects)

	Total Aid			
	(9)	(10)	(11)	(12)
Level of Scheduled Pell Grant First Year/$1,000	0.994	1.013	1.020	0.972
	(0.290)**	(0.316)**	(0.315)**	(0.324)**
Total Income/$10,000	0.219	0.334	0.387	1.954
	(0.115)	(0.320)	(0.554)	(1.196)
Contribution from Assets/$10,000	-0.217	2.506	6.139	3.358
	(0.636)	(2.123)	(5.656)	(10.159)
Family Size	0.009	0.156	3.015	1.704
	(0.147)	(0.635)	(2.106)	(6.982)
Family Members in College	-0.569	1.241	0.000	0.000
	(0.395)	(1.955)	(0.000)	(0.000)
(Total Income)^2/10^9		-0.000	-0.000	-0.000
		(0.000)	(0.000)	(0.000)
(Contribution from Assets)^2/10^9		-0.000	-0.001	0.000
		(0.000)	(0.001)	(0.003)
(Family Size)^2		-0.015	-0.599	-0.177
		(0.063)	(0.412)	(2.184)
(Family Members in College)^2		-0.528	0.190	0.000
		(0.509)	(0.588)	(0.000)
(Total Income)^3/10^{14}			0.000	0.000
			(0.000)	(0.000)
(Contribution from Assets)^3/10^{14}			0.000	-0.000
			(0.000)	(0.000)
(Family Size)^3			0.036	-0.019
			(0.025)	(0.281)
(Family Members in College)^3			-0.121	0.045
			(0.182)	(0.241)

Appendix D: Table 2 (continued)
Two-Year College Students: Determinants of Financial Aid Amounts - Linear, Quadratic, Cubic,
(Marginal Effects)

	Total Aid			
	(9)	(10)	(11)	(12)
$(\text{Total Income})^4/10^{14}$				-0.000
				(0.000)
$(\text{Contribution from Assets})^4/10^{14}$				0.000
				(0.000)
$(\text{Family Size})^4$				0.002
				(0.013)
$(\text{Family Members in College})^4$				-0.035
				(0.078)
Male	0.158	0.151	0.129	0.169
	(0.460)	(0.463)	(0.467)	(0.470)
African-American	-0.895	-0.728	-0.795	-0.771
	(0.592)	(0.599)	(0.614)	(0.620)
Hispanic	-0.223	-0.228	-0.209	-0.180
	(0.585)	(0.585)	(0.596)	(0.596)
SAT score/100	-0.329	-0.305	-0.316	-0.313
	(0.173)	(0.177)	(0.183)	(0.185)
Didn't take SAT or ACT	-3.595	-3.426	-3.400	-3.270
	(1.712)*	(1.723)*	(1.768)	(1.818)
High School GPA: B to C	0.577	0.585	0.680	0.621
	(0.565)	(0.584)	(0.600)	(0.610)
High School GPA: C- to D-	0.064	0.112	0.125	0.119
	(0.916)	(0.930)	(0.930)	(0.934)
Observations	282	282	282	282
R-squared	0.08	0.09	0.10	0.10

Robust standard errors in parentheses
* significant at 5%; ** significant at 1%

Appendix D: Table 3

Probability of First Stopout for Two-Year College Students -- EFC Identified Total Grant Instrument -- Linear, Quadratic, Cubic & Quartic Functional Forms

(Marginal Effects)

	Linear			*Quadratic*			*Cubic*		
	(1) SPH Model	(2) Panel LP Model	(3) PDP Model	(4) SPH Model	(5) Panel LP Model	(6) PDP Model	(7) SPH Model	(8) Panel LP Model	(9) PDP Model
Total Grants/$1,000 (1995)	-0.015	-0.020	-0.015	-0.012	-0.017	-0.012	-0.014	-0.016	-0.012
	(0.017)	(0.020)	(0.017)	(0.017)	(0.023)	(0.018)	(0.017)	(0.023)	(0.019)
Spring 1996	0.117	0.127	0.126	0.116	0.127	0.127	0.117	0.128	0.127
	(0.030)**	(0.030)**	(0.030)**	(0.029)**	(0.030)**	(0.030)**	(0.029)**	(0.030)**	(0.030)**
Fall 1996	0.018	0.014	0.012	0.019	0.014	0.013	0.020	0.015	0.013
	(0.031)	(0.027)	(0.031)	(0.031)	(0.026)	(0.031)	(0.031)	(0.026)	(0.031)
Male	0.009	0.015	0.018	0.015	0.017	0.021	0.011	0.020	0.021
	(0.025)	(0.028)	(0.027)	(0.025)	(0.028)	(0.027)	(0.024)	(0.028)	(0.027)
African-American	-0.007	-0.002	0.003	-0.010	-0.008	-0.005	-0.025	-0.019	-0.016
	(0.044)	(0.056)	(0.049)	(0.040)	(0.054)	(0.046)	(0.036)	(0.054)	(0.044)
Hispanic	-0.016	-0.021	-0.022	-0.021	-0.024	-0.026	-0.028	-0.033	-0.032
	(0.037)	(0.040)	(0.037)	(0.037)	(0.041)	(0.037)	(0.035)	(0.042)	(0.036)
Father high school grad	0.077	0.076	0.071	0.092	0.075	0.078	0.098	0.081	0.081
	(0.086)	(0.078)	(0.073)	(0.100)	(0.078)	(0.076)	(0.102)	(0.078)	(0.075)
Father some college (no bachelor's degree)	-0.001	0.007	-0.001	0.021	0.008	0.009	0.043	0.030	0.028
	(0.096)	(0.086)	(0.084)	(0.120)	(0.086)	(0.090)	(0.134)	(0.086)	(0.095)
Father college grad	0.093	0.082	0.083	0.112	0.078	0.089	0.126	0.090	0.098
	(0.125)	(0.082)	(0.095)	(0.148)	(0.083)	(0.100)	(0.158)	(0.083)	(0.102)
Single Parent/Broken Home	0.030	0.036	0.037	0.035	0.040	0.039	0.032	0.039	0.037
	(0.028)	(0.033)	(0.032)	(0.029)	(0.033)	(0.031)	(0.028)	(0.033)	(0.031)
Mother high school grad	-0.106	-0.110	-0.103	-0.139	-0.122	-0.123	-0.146	-0.132	-0.127
	(0.080)	(0.081)	(0.072)	(0.103)	(0.081)	(0.079)	(0.106)	(0.079)	(0.077)
Mother some college (no bachelor's degree)	-0.102	-0.145	-0.109	-0.116	-0.157	-0.119	-0.117	-0.164	-0.118
	(0.047)*	(0.089)	(0.046)*	(0.049)*	(0.089)	(0.045)**	(0.049)*	(0.088)	(0.044)**
Mother college grad	-0.052	-0.062	-0.054	-0.077	-0.080	-0.072	-0.078	-0.093	-0.075
	(0.054)	(0.088)	(0.058)	(0.057)	(0.088)	(0.056)	(0.056)	(0.087)	(0.054)

Appendix D: Table 3 (continued)
Probability of First Stopout for Two-Year College Students -- EFC Identified Total Grant Instrument -- Linear, Quadratic, Cubic & Quartic Functional Forms
(Marginal Effects)

	Linear			*Quadratic*			*Cubic*		
	(1) SPH Model	(2) Panel LP Model	(3) PDP Model	(4) SPH Model	(5) Panel LP Model	(6) PDP Model	(7) SPH Model	(8) Panel LP Model	(9) PDP Model
SAT score/100	-0.011	-0.012	-0.013	-0.012	-0.013	-0.013	-0.013	-0.015	-0.015
	(0.009)	(0.010)	(0.009)	(0.009)	(0.010)	(0.010)	(0.009)	(0.010)	(0.010)
Didn't take SAT or ACT	-0.076	-0.097	-0.076	-0.079	-0.098	-0.078	-0.091	-0.118	-0.094
	(0.064)	(0.102)	(0.069)	(0.062)	(0.106)	(0.070)	(0.057)	(0.106)	(0.064)
High School GPA: B to C	0.066	0.056	0.057	0.066	0.054	0.056	0.070	0.056	0.057
	(0.043)	(0.037)	(0.041)	(0.043)	(0.038)	(0.041)	(0.043)	(0.037)	(0.041)
High School GPA: C- to D-	-0.020	-0.032	-0.021	-0.022	-0.035	-0.023	-0.020	-0.037	-0.022
	(0.055)	(0.063)	(0.057)	(0.053)	(0.063)	(0.055)	(0.054)	(0.063)	(0.056)
State weekly earnings in mfg. sector/1,000	-0.228	-0.234	-0.239	-0.230	-0.236	-0.244	-0.231	-0.221	-0.244
	(0.173)	(0.164)	(0.180)	(0.168)	(0.163)	(0.177)	(0.170)	(0.166)	(0.178)
State unemployment rate	-0.014	-0.020	-0.018	-0.015	-0.019	-0.018	-0.014	-0.021	-0.019
	(0.013)	(0.015)	(0.013)	(0.013)	(0.015)	(0.013)	(0.013)	(0.015)	(0.013)
Total Income/$10,000	-0.006	-0.008	-0.007	-0.008	-0.009	-0.005	0.043	0.053	0.048
	(0.007)	(0.007)	(0.007)	(0.023)	(0.028)	(0.023)	(0.037)	(0.049)	(0.040)
Contribution from Assets/$10,000	0.037	0.085	0.067	-0.165	-0.165	-0.155	-0.179	-0.071	-0.067
	(0.046)	(0.070)	(0.050)	(0.158)	(0.145)	(0.157)	(0.410)	(0.305)	(0.339)
Family Size	0.011	0.012	0.010	0.001	0.002	0.001	-0.157	-0.221	-0.212
	(0.009)	(0.010)	(0.009)	(0.034)	(0.039)	(0.037)	(0.122)	(0.157)	(0.137)
Family Members in College	-0.031	-0.035	-0.035	-0.020	-0.016	-0.031			
	(0.024)	(0.024)	(0.025)	(0.144)	(0.143)	(0.152)			
$(\text{Total Income})^2/10^9$				-0.004	-0.006	-0.001	-0.014	-0.015	-0.016
				(0.042)	(0.041)	(0.045)	(0.038)	(0.039)	(0.040)
$(\text{Contribution from Assets})^2/10^9$				0.005	0.004	0.000	-0.096	-0.119	-0.104
				(0.022)	(0.024)	(0.021)	(0.057)	(0.078)	(0.066)
$(\text{Family Size})^2$				1.044	1.523	1.218	1.648	-0.017	-0.125
				(0.788)	(0.945)	(0.846)	(6.475)	(4.724)	(5.307)

Appendix D: Table 3 (continued)

Probability of First Stopout for Two-Year College Students -- EFC Identified Total Grant Instrument -- Linear, Quadratic, Cubic & Quartic Functional Forms

(Marginal Effects)

	Linear			*Quadratic*			*Cubic*		
	(1) SPH Model	(2) Panel LP Model	(3) PDP Model	(4) SPH Model	(5) Panel LP Model	(6) PDP Model	(7) SPH Model	(8) Panel LP Model	(9) PDP Model
(Family Members in College)^2				0.001	0.001	0.001	0.034	0.046	0.045
				(0.003)	(0.004)	(0.004)	(0.024)	(0.030)	(0.027)
(Total Income)^3/10^{14}							0.053	0.066	0.056
							(0.026)*	(0.038)	(0.032)
(Contribution from Assets)^3/10^{14}							-2.373	4.969	4.208
							(21.212)	(15.681)	(17.684)
(Family Size)^3							-0.002	-0.003	-0.003
							(0.001)	(0.002)	(0.002)
(Family Members in College)^3							0.002	0.001	0.002
							(0.013)	(0.013)	(0.014)
Person-term records	860	860	860	860	860	860	860	860	860
N	282	282	282	282	282	282	282	282	282
-2 log L	638.49		638.38	635.12		635.01	629.52		629.77
R-squared		0.07			0.08			0.08	

Robust standard errors in parentheses

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

Full regression includes a constant term, and dummy variables for missing parental education, and missing high school GPA

Appendix D: Table 3 (continued)

Probability of First Stopout for Two-Year College Students -- EFC Identified Total Grant Instrument -- Linear, Quadratic, Cubic & Quartic Functional Forms

(Marginal Effects)

	Quartic			*Quartic, Random Effects*		
	(7)	(8)	(9)	(10)	(11)	(12)
	SPH Model	Panel LP Model	PDP Model	SPH Model	Panel LP Model	PDP Model
Total Grants/$1,000 (1995)	-0.013	-0.015	-0.011	-0.009	-0.015	-0.009
	(0.017)	(0.023)	(0.019)	(0.017)	(0.023)	(0.022)
Spring 1996	0.118	0.128	0.128	0.139	0.128	0.185
	(0.029)**	(0.030)**	(0.030)**	(0.034)**	(0.030)**	(0.044)**
Fall 1996	0.023	0.017	0.016	0.102	0.017	0.146
	(0.031)	(0.027)	(0.031)	(0.042)*	(0.027)	(0.054)**
Male	0.010	0.020	0.021	0.020	0.020	0.028
	(0.025)	(0.029)	(0.028)	(0.026)	(0.029)	(0.033)
African-American	-0.027	-0.022	-0.018	-0.006	-0.022	-0.003
	(0.035)	(0.055)	(0.044)	(0.038)	(0.055)	(0.049)
Hispanic	-0.030	-0.035	-0.033	-0.021	-0.035	-0.025
	(0.034)	(0.042)	(0.036)	(0.030)	(0.042)	(0.036)
Father high school grad	0.100	0.078	0.079	0.070	0.078	0.082
	(0.101)	(0.079)	(0.076)	(0.062)	(0.079)	(0.074)
Father some college (no bachelor's degree)	0.043	0.024	0.023	0.018	0.024	0.022
	(0.134)	(0.087)	(0.094)	(0.077)	(0.087)	(0.094)
Father college grad	0.134	0.091	0.098	0.102	0.091	0.120
	(0.160)	(0.084)	(0.102)	(0.107)	(0.084)	(0.131)
Single Parent/Broken Home	0.034	0.040	0.038	0.037	0.040	0.049
	(0.029)	(0.034)	(0.032)	(0.032)	(0.034)	(0.042)
Mother high school grad	-0.151	-0.130	-0.127	-0.121	-0.130	-0.143
	(0.107)	(0.080)	(0.078)	(0.076)	(0.080)	(0.091)
Mother some college (no bachelor's degree)	-0.119	-0.164	-0.118	-0.095	-0.164	-0.101
	(0.046)*	(0.089)	(0.044)**	(0.031)**	(0.089)	(0.034)**
Mother college grad	-0.079	-0.089	-0.074	-0.058	-0.089	-0.063
	(0.054)	(0.088)	(0.055)	(0.037)	(0.088)	(0.040)

Appendix D: Table 3 (continued)
Probability of First Stopout for Two-Year College Students -- EFC Identified Total Grant Instrument -- Linear, Quadratic, Cubic & Quartic Functional Forms
(Marginal Effects)

	Quartic			*Quartic, Random Effects*		
	(7)	(8)	(9)	(10)	(11)	(12)
	SPH Model	Panel LP Model	PDP Model	SPH Model	Panel LP Model	PDP Model
SAT score/100	-0.012	-0.014	-0.015	-0.013	-0.014	-0.017
	(0.009)	(0.010)	(0.009)	(0.009)	(0.010)	(0.011)
Didn't take SAT or ACT	-0.088	-0.117	-0.094	-0.076	-0.117	-0.085
	(0.056)	(0.106)	(0.063)	(0.050)	(0.106)	(0.055)
High School GPA: B to C	0.081	0.063	0.063	0.071	0.063	0.079
	(0.045)	(0.038)	(0.042)	(0.046)	(0.038)	(0.058)
High School GPA: C- to D-	-0.020	-0.036	-0.022	-0.023	-0.036	-0.026
	(0.055)	(0.065)	(0.057)	(0.042)	(0.065)	(0.047)
State weekly earnings in mfg. sector/1,000	-0.263	-0.241	-0.266	-0.223	-0.241	-0.268
	(0.170)	(0.167)	(0.181)	(0.171)	(0.167)	(0.215)
State unemployment rate	-0.013	-0.020	-0.018	-0.018	-0.020	-0.023
	(0.013)	(0.015)	(0.013)	(0.011)	(0.015)	(0.014)
Total Income/$10,000	-0.036	-0.017	-0.021	-0.027	-0.017	-0.024
	(0.072)	(0.099)	(0.085)	(0.080)	(0.099)	(0.102)
Contribution from Assets/$10,000	0.137	0.121	0.189	0.330	0.121	0.367
	(0.489)	(0.612)	(0.539)	(0.490)	(0.612)	(0.623)
Family Size	0.167	0.052	0.051	0.099	0.052	0.078
	(0.413)	(0.541)	(0.451)	(0.439)	(0.541)	(0.557)
Family Members in College						
(Total Income)^2/10^9				0.150	0.115	0.153
				(0.251)	(0.283)	(0.319)
(Contribution from Assets)^2/10^9	0.166	0.115	0.127			
	(0.227)	(0.283)	(0.263)			
(Family Size)^2	-9.317	-6.776	-9.057	-13.578	-6.776	-14.832
	(13.302)	(18.997)	(15.849)	(14.456)	(18.997)	(18.346)

Appendix D: Table 3 (continued)

Probability of First Stopout for Two-Year College Students -- EFC Identified Total Grant Instrument -- Linear, Quadratic, Cubic & Quartic Functional Forms

(Marginal Effects)

	Quartic			*Quartic, Random Effects*		
	(7)	(8)	(9)	(10)	(11)	(12)
	SPH Model	Panel LP Model	PDP Model	SPH Model	Panel LP Model	PDP Model
$(\text{Family Members in College})^2$	-0.074	-0.042	-0.041	-0.058	-0.042	-0.057
	(0.130)	(0.167)	(0.141)	(0.140)	(0.167)	(0.178)
$(\text{Total Income})^3/10^{14}$	-0.265	-0.216	-0.230	-0.254	-0.216	-0.273
	(0.266)	(0.314)	(0.307)	(0.299)	(0.314)	(0.382)
$(\text{Contribution from Assets})^3/10^{14}$	99.857	69.593	87.895	127.198	69.593	137.754
	(110.599)	(166.777)	(135.389)	(122.273)	(166.777)	(155.293)
$(\text{Family Size})^3$	0.012	0.009	0.009	0.011	0.009	0.012
	(0.017)	(0.021)	(0.018)	(0.019)	(0.021)	(0.024)
$(\text{Family Members in College})^3$	-0.009	-0.009	-0.010	-0.009	-0.009	-0.011
	(0.014)	(0.015)	(0.015)	(0.014)	(0.015)	(0.017)
$(\text{Total Income})^4/10^{14}$	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$(\text{Contribution from Assets})^4/10^{14}$	-0.003	-0.002	-0.002	-0.003	-0.002	-0.003
	(0.003)	(0.004)	(0.003)	(0.003)	(0.004)	(0.004)
$(\text{Family Size})^4$	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
$(\text{Family Members in College})^4$	0.002	0.002	0.002	0.002	0.002	0.003
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)
Person-term records	860	860	860	860	860	860
N	282	282	282	282	282	282
-2 log L	625.96		627.84	608.58		603.48
R-squared		0.08				

Robust standard errors in parentheses

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

Full regression includes a constant term, and dummy variables for missing parental education, and missing high school GPA

Appendix D: Table 4

Probability of First Stopout for Two-Year College Students -- EFC Identified Total Aid Instrument -- Linear, Quadratic, Cubic & Quartic Functional Forms

(Marginal Effects)

	Linear			*Quadratic*			*Cubic*		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	SPH Model	Panel LP Model	PDP Model	SPH Model	Panel LP Model	PDP Model	SPH Model	Panel LP Model	PDP Model
Total Aid/$1,000 (1995)	-0.017	-0.022	-0.017	-0.013	-0.019	-0.013	-0.015	-0.018	-0.014
	(0.019)	(0.023)	(0.019)	(0.019)	(0.025)	(0.020)	(0.019)	(0.025)	(0.020)
Spring 1996	0.117	0.127	0.126	0.116	0.127	0.127	0.117	0.128	0.127
	(0.030)**	(0.030)**	(0.030)**	(0.029)**	(0.030)**	(0.030)**	(0.029)**	(0.030)**	(0.030)**
Fall 1996	0.018	0.014	0.012	0.019	0.014	0.013	0.020	0.015	0.013
	(0.031)	(0.027)	(0.031)	(0.031)	(0.026)	(0.031)	(0.031)	(0.026)	(0.031)
Male	0.015	0.022	0.024	0.019	0.024	0.026	0.016	0.025	0.026
	(0.023)	(0.027)	(0.026)	(0.024)	(0.027)	(0.026)	(0.023)	(0.027)	(0.026)
African-American	-0.015	-0.012	-0.006	-0.014	-0.014	-0.009	-0.030	-0.026	-0.021
	(0.045)	(0.060)	(0.050)	(0.040)	(0.057)	(0.047)	(0.036)	(0.057)	(0.045)
Hispanic	-0.015	-0.020	-0.021	-0.020	-0.022	-0.025	-0.026	-0.031	-0.030
	(0.038)	(0.040)	(0.037)	(0.037)	(0.041)	(0.037)	(0.035)	(0.042)	(0.036)
Father high school grad	0.077	0.076	0.071	0.092	0.075	0.078	0.098	0.081	0.081
	(0.086)	(0.078)	(0.073)	(0.100)	(0.078)	(0.076)	(0.102)	(0.078)	(0.075)
Father some college (no bachelor's degree)	-0.001	0.007	-0.001	0.021	0.008	0.009	0.043	0.030	0.028
	(0.096)	(0.086)	(0.084)	(0.120)	(0.086)	(0.090)	(0.134)	(0.086)	(0.095)
Father college grad	0.093	0.082	0.083	0.112	0.078	0.089	0.126	0.090	0.098
	(0.125)	(0.082)	(0.095)	(0.148)	(0.083)	(0.100)	(0.158)	(0.083)	(0.102)
Single Parent/Broken Home	0.030	0.036	0.037	0.035	0.040	0.039	0.032	0.039	0.037
	(0.028)	(0.033)	(0.032)	(0.029)	(0.033)	(0.031)	(0.028)	(0.033)	(0.031)
Mother high school grad	-0.106	-0.110	-0.103	-0.139	-0.122	-0.123	-0.146	-0.132	-0.127
	(0.080)	(0.081)	(0.072)	(0.103)	(0.081)	(0.079)	(0.106)	(0.079)	(0.077)
Mother some college (no bachelor's degree)	-0.102	-0.145	-0.109	-0.116	-0.157	-0.119	-0.117	-0.164	-0.118
	(0.047)*	(0.089)	(0.046)*	(0.049)*	(0.089)	(0.045)**	(0.049)*	(0.088)	(0.044)**
Mother college grad	-0.052	-0.062	-0.054	-0.077	-0.080	-0.072	-0.078	-0.093	-0.075
	(0.054)	(0.088)	(0.058)	(0.057)	(0.088)	(0.056)	(0.056)	(0.087)	(0.054)

Appendix D: Table 4 (continued)

Probability of First Stopout for Two-Year College Students -- EFC Identified Total Aid Instrument -- Linear, Quadratic, Cubic & Quartic Functional Forms

(Marginal Effects)

	Linear			*Quadratic*			*Cubic*		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	SPH Model	Panel LP Model	PDP Model	SPH Model	Panel LP Model	PDP Model	SPH Model	Panel LP Model	PDP Model
SAT score/100	-0.017	-0.020	-0.018	-0.016	-0.019	-0.018	-0.017	-0.020	-0.020
	(0.012)	(0.013)	(0.012)	(0.011)	(0.014)	(0.012)	(0.011)	(0.014)	(0.012)
Didn't take SAT or ACT	-0.104	-0.152	-0.106	-0.099	-0.141	-0.100	-0.112	-0.157	-0.114
	(0.074)	(0.135)	(0.076)	(0.071)	(0.142)	(0.080)	(0.066)	(0.142)	(0.074)
High School GPA: B to C	0.071	0.061	0.062	0.069	0.058	0.059	0.076	0.061	0.062
	(0.046)	(0.039)	(0.043)	(0.045)	(0.039)	(0.042)	(0.046)	(0.040)	(0.043)
High School GPA: C- to D-	-0.015	-0.024	-0.016	-0.018	-0.028	-0.019	-0.015	-0.030	-0.017
	(0.057)	(0.062)	(0.058)	(0.054)	(0.062)	(0.057)	(0.056)	(0.062)	(0.057)
State weekly earnings in mfg. sector/1,000	-0.228	-0.234	-0.239	-0.230	-0.236	-0.244	-0.231	-0.221	-0.244
	(0.173)	(0.164)	(0.180)	(0.168)	(0.163)	(0.177)	(0.170)	(0.166)	(0.178)
State unemployment rate	-0.014	-0.020	-0.018	-0.015	-0.019	-0.018	-0.014	-0.021	-0.019
	(0.013)	(0.015)	(0.013)	(0.013)	(0.015)	(0.013)	(0.013)	(0.015)	(0.013)
Total Income/$10,000	-0.003	-0.004	-0.003	-0.004	-0.003	-0.001	0.050	0.062	0.055
	(0.006)	(0.006)	(0.006)	(0.021)	(0.024)	(0.021)	(0.034)	(0.045)	(0.038)
Contribution from Assets/$10,000	0.031	0.077	0.060	-0.148	-0.139	-0.138	-0.117	0.003	-0.010
	(0.050)	(0.072)	(0.052)	(0.162)	(0.153)	(0.162)	(0.423)	(0.334)	(0.354)
Family Size	0.013	0.014	0.012	0.007	0.011	0.007	-0.103	-0.158	-0.163
	(0.009)	(0.010)	(0.010)	(0.034)	(0.040)	(0.038)	(0.133)	(0.171)	(0.149)
Family Members in College	-0.040	-0.046	-0.044	-0.007	0.003	-0.017			
	(0.024)	(0.024)	(0.025)	(0.146)	(0.147)	(0.154)			
$(\text{Total Income})^2/10^9$				0.003	0.001	-0.002	-0.103	-0.127	-0.111
				(0.021)	(0.023)	(0.020)	(0.056)	(0.075)	(0.065)
$(\text{Contribution from Assets})^2/10^9$			-0.009	-0.014	-0.007	-0.011	-0.012	-0.014	
			(0.043)	(0.043)	(0.046)	(0.038)	(0.039)	(0.040)	
$(\text{Family Size})^2$				0.932	1.363	1.105	0.833	-0.980	-0.870
				(0.840)	(1.012)	(0.898)	(6.631)	(5.086)	(5.468)

Appendix D: Table 4 (continued)
Probability of First Stopout for Two-Year College Students -- EFC Identified Total Aid Instrument -- Linear, Quadratic, Cubic & Quartic Functional Forms
(Marginal Effects)

	Linear			*Quadratic*			*Cubic*		
	(1) SPH Model	(2) Panel LP Model	(3) PDP Model	(4) SPH Model	(5) Panel LP Model	(6) PDP Model	(7) SPH Model	(8) Panel LP Model	(9) PDP Model
(Family Members in College)^2				0.000	0.000	0.000	0.024	0.034	0.036
				(0.003)	(0.004)	(0.004)	(0.026)	(0.033)	(0.029)
(Total Income)^3/10^{14}							0.055	0.069	0.058
							(0.026)*	(0.037)	(0.032)
(Contribution from Assets)^3/10^{14}							-0.095	7.659	6.290
							(21.557)	(16.488)	(17.995)
(Family Size)^3							-0.001	-0.002	-0.002
							(0.002)	(0.002)	(0.002)
(Family Members in College)^3							0.000	-0.000	0.001
							(0.013)	(0.014)	(0.014)
Person-term records	860	860	860	860	860	860	860	860	860
N	282	282	282	282	282	282	282	282	282
-2 log L	638.4891		638.38108	635.12448		635.0143	629.52428		629.77138
R-squared		0.07			0.08			0.08	

Robust standard errors in parentheses
* significant at 5%; ** significant at 1%
Full regression includes a constant term, and dummy variables for missing parental education, and missing high school GPA

Appendix D: Table 4 (continued)

Probability of First Stopout for Two-Year College Students -- EFC Identified Total Aid Instrument -- Linear, Quadratic, Cubic & Quartic Functional Forms

(Marginal Effects)

	Quartic			*Quartic, Random Effects*		
	(10)	(11)	(12)	(13)	(14)	(15)
	SPH Model	Panel LP Model	PDP Model	SPH Model	Panel LP Model	PDP Model
Total Aid/$1,000 (1995)	-0.015	-0.017	-0.013	-0.010	-0.017	-0.010
	(0.019)	(0.026)	(0.021)	(0.020)	(0.026)	(0.025)
Spring 1996	0.118	0.128	0.128	0.139	0.128	0.185
	(0.029)**	(0.030)**	(0.030)**	(0.034)**	(0.030)**	(0.044)**
Fall 1996	0.023	0.017	0.016	0.102	0.017	0.146
	(0.031)	(0.027)	(0.031)	(0.042)*	(0.027)	(0.054)**
Male	0.015	0.025	0.025	0.024	0.025	0.032
	(0.023)	(0.029)	(0.027)	(0.026)	(0.029)	(0.033)
African-American	-0.032	-0.028	-0.022	-0.009	-0.028	-0.007
	(0.035)	(0.058)	(0.045)	(0.039)	(0.058)	(0.050)
Hispanic	-0.028	-0.033	-0.031	-0.020	-0.033	-0.024
	(0.034)	(0.041)	(0.036)	(0.031)	(0.041)	(0.036)
Father high school grad	0.100	0.078	0.079	0.070	0.078	0.082
	(0.101)	(0.079)	(0.076)	(0.062)	(0.079)	(0.074)
Father some college (no bachelor's degree)	0.043	0.024	0.023	0.018	0.024	0.022
	(0.134)	(0.087)	(0.094)	(0.077)	(0.087)	(0.094)
Father college grad	0.134	0.091	0.098	0.102	0.091	0.120
	(0.160)	(0.084)	(0.102)	(0.107)	(0.084)	(0.131)
Single Parent/Broken Home	0.034	0.040	0.038	0.037	0.040	0.049
	(0.029)	(0.034)	(0.032)	(0.032)	(0.034)	(0.042)
Mother high school grad	-0.151	-0.130	-0.127	-0.121	-0.130	-0.143
	(0.107)	(0.080)	(0.078)	(0.076)	(0.080)	(0.091)
Mother some college (no bachelor's degree)	-0.119	-0.164	-0.118	-0.095	-0.164	-0.101
	(0.046)*	(0.089)	(0.044)**	(0.031)**	(0.089)	(0.034)**
Mother college grad	-0.079	-0.089	-0.074	-0.058	-0.089	-0.063
	(0.054)	(0.088)	(0.055)	(0.037)	(0.088)	(0.040)

Appendix D: Table 4 (continued)

Probability of First Stopout for Two-Year College Students -- EFC Identified Total Aid Instrument -- Linear, Quadratic, Cubic & Quartic Functional Forms

(Marginal Effects)

	Quartic			*Quartic, Random Effects*		
	(10)	(11)	(12)	(13)	(14)	(15)
	SPH Model	Panel LP Model	PDP Model	SPH Model	Panel LP Model	PDP Model
SAT score/100	-0.017	-0.020	-0.019	-0.016	-0.020	-0.020
	(0.011)	(0.014)	(0.012)	(0.011)	(0.014)	(0.014)
Didn't take SAT or ACT	-0.110	-0.155	-0.113	-0.089	-0.155	-0.096
	(0.065)	(0.143)	(0.074)	(0.060)	(0.143)	(0.065)
High School GPA: B to C	0.086	0.067	0.067	0.074	0.067	0.082
	(0.048)	(0.041)	(0.044)	(0.049)	(0.041)	(0.061)
High School GPA: C- to D-	-0.015	-0.029	-0.017	-0.020	-0.029	-0.023
	(0.056)	(0.063)	(0.058)	(0.044)	(0.063)	(0.050)
State weekly earnings in mfg. sector/1,000	-0.263	-0.241	-0.266	-0.223	-0.241	-0.268
	(0.170)	(0.167)	(0.181)	(0.171)	(0.167)	(0.215)
State unemployment rate	-0.013	-0.020	-0.018	-0.018	-0.020	-0.023
	(0.013)	(0.015)	(0.013)	(0.011)	(0.015)	(0.014)
Total Income/$10,000	-0.014	0.006	-0.003	-0.014	0.006	-0.010
	(0.080)	(0.105)	(0.094)	(0.088)	(0.105)	(0.112)
Contribution from Assets/$10,000	0.239	0.232	0.275	0.395	0.232	0.434
	(0.490)	(0.603)	(0.541)	(0.503)	(0.603)	(0.640)
Family Size	0.151	0.036	0.038	0.090	0.036	0.068
	(0.409)	(0.537)	(0.447)	(0.437)	(0.537)	(0.554)
Family Members in College						
$(\text{Total Income})^2/10^9$	0.115	0.059	0.084	0.118	0.059	0.120
	(0.250)	(0.307)	(0.290)	(0.276)	(0.307)	(0.351)
$(\text{Contribution from Assets})^2/10^9$						
$(\text{Family Size})^2$	-11.387	-9.031	-10.807	-14.888	-9.031	-16.186
	(13.115)	(18.484)	(15.680)	(14.402)	(18.484)	(18.283)

Appendix D: Table 4 (continued)

Probability of First Stopout for Two-Year College Students -- EFC Identified Total Aid Instrument -- Linear, Quadratic, Cubic & Quartic Functional Forms

(Marginal Effects)

	Quartic			*Quartic, Random Effects*		
	(10)	(11)	(12)	(13)	(14)	(15)
	SPH Model	Panel LP Model	PDP Model	SPH Model	Panel LP Model	PDP Model
(Family Members in College)^2	-0.061	-0.028	-0.031	-0.050	-0.028	-0.049
	(0.126)	(0.164)	(0.139)	(0.139)	(0.164)	(0.176)
(Total Income)^3/10^{14}	-0.213	-0.159	-0.186	-0.221	-0.159	-0.239
	(0.291)	(0.343)	(0.336)	(0.327)	(0.343)	(0.416)
(Contribution from Assets)^3/10^{14}	111.881	82.695	98.062	134.809	82.695	145.620
	(108.761)	(162.754)	(133.658)	(120.973)	(162.754)	(153.628)
(Family Size)^3	0.010	0.006	0.007	0.010	0.006	0.010
	(0.016)	(0.021)	(0.018)	(0.018)	(0.021)	(0.023)
(Family Members in College)^3	-0.009	-0.009	-0.010	-0.009	-0.009	-0.011
	(0.014)	(0.015)	(0.015)	(0.014)	(0.015)	(0.017)
(Total Income)^4/10^{14}	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
(Contribution from Assets)^4/10^{14}	-0.003	-0.002	-0.002	-0.003	-0.002	-0.004
	(0.003)	(0.004)	(0.003)	(0.003)	(0.004)	(0.004)
(Family Size)^4	-0.001	-0.000	-0.000	-0.001	-0.000	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
(Family Members in College)^4	0.002	0.002	0.002	0.002	0.002	0.002
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)
Person-term records	860	860	860	860	860	860
N	282	282	282	282	282	282
-2 log L	625.96426		627.83846	608.58496		603.47858
R-squared		0.08			0.08	

Robust standard errors in parentheses

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

Full regression includes a constant term, and dummy variables for missing parental education, and missing high school GPA

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