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Working Paper

Educational financing and lifetime earnings

Working Paper, No. 2002-06

Provided in Cooperation with:
Department of Economics, Brown University

Suggested Citation: Sauer, Robert M. (2002) : Educational financing and lifetime earnings, Working Paper, No. 2002-06, Brown University, Department of Economics, Providence, RI

This Version is available at:
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Educational Financing and Lifetime Earnings

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Working Paper 2002-06

February 2002

Abstract

This paper formulates and estimates a dynamic programming model of the optimal educational financing decisions and post-graduation career choices of law school graduates. The purpose of the paper is to measure the effect of short-term parental cash transfers, received during school, on in-school work and borrowing decisions and post-graduation lifetime outcomes. The estimated parameters of the model imply that parental cash transfers do not significantly influence post-graduation lifetime earnings but do significantly influence lifetime consumption. In addition, a simulated counterfactual loan forgiveness program indicates that educational debt has only a modest influence on post-graduation career choices.

JEL Nos: C15, I22, J24, J44
Keywords: In-school Work, Educational Debt, Scholastic Achievement, Lifetime Consumption

* I thank David Chambers of the University of Michigan Law School for permitting use of the data.

1 Introduction

This paper formulates and estimates a dynamic programming model of the optimal educational financing decisions and post-graduation career choices of law school graduates. The main purpose of the paper is to measure the effect of short-term parental cash transfers, received during school, on in-school work and borrowing decisions and post-graduation lifetime outcomes. The effect of short-term parental cash transfers is assessed relative to the effects of long-term factors such as family background and pre-law school human capital investments. The relative importance of parental cash transfers and the decision to work or borrow have interesting practical implications for the expected impact of recent changes in education policy. For example, tuition tax credits have recently become available and will most probably lead to an increase in the level of parental cash transfers to offspring.[1] In addition, educational loan-forgiveness programs that aim at influencing post-graduation career choices have recently been expanding.[2]

Several recent studies have sought to measure the relative importance of short-term parental cash transfers on lifetime outcomes. These studies generally examine the correlation between family income and schooling attainment (see, e.g., Cameron and Heckman (1998, 2001), Shea (1998), and Keane and Wolpin (2001)). A key insight of these studies is that the well documented and strong correlation between family background and completed schooling levels does not necessarily constitute evidence that short-term parental cash transfers help relieve liquidity constraints thus enabling offspring to attain higher education levels. Family income could also represent long-term influences that foster scholastic ability and preferences for more schooling. Indeed, when some measure of offspring ability is included in the analysis the correlation between family income and completed schooling levels is either wiped out or reverses direction.

This study differs from the previous literature in at least two ways. First, instead of focusing on variation in the level of educational attainment with family income, the focus is on variation in lifetime earnings with educational financing decisions and family background among a group of individuals that have approximately the same years and quality of schooling. All individuals in the sample have an undergraduate degree and completed three years of additional schooling at the same law school. The effect of parental cash transfers is thus analyzed on a different margin.[3] Second, a

[1] Tax benefits for investments in higher education are available through the Hope Credit, the Lifetime Learning Credit and various Education IRAs.

[2] Educational loan-forgiveness programs have existed for many years in law schools and medical schools. Recently, a federal teacher loan-forgiveness program has been instituted in order to increase the supply of public school teachers in school districts that receive Title I funds. Student loan interest payments are also now tax deductible.

[3] The law school alumni data used in this study do not allow examination of the effect of parental cash transfers on the decision to acquire a legal education nor on the decision to drop out of law school. The alumni surveys contain information only on individuals who choose to attend and

direct measure of parental cash transfers is available in the data and is incorporated into the analysis. Due to data limitations, previous studies could only indirectly infer the level of parental financial support.[4]

The mechanisms by which parental cash transfers influence educational financing decisions during school and post-graduation lifetime earnings are fairly straightforward. Individuals that have decided to invest in higher education may have to supplement parental monetary support by working while in school and/or undertaking educational debt in order to fully finance the costs of attendance. An individual that chooses to work while in school may, as a result, be less academically successful due to less time and energy available for studying.[5] In the case of law school graduates, lower scholastic achievement can affect career opportunities by lowering the arrival rate of job offers in high-paying legal jobs thus leading to lower post-graduation lifetime earnings. On the other hand, working while in school may offer a higher standard of living while studying and increase overall lifetime consumption and utility even given the decrease in lifetime earnings upon graduation. In addition, employment during school may have investment value in the post-graduation labor market. The payoff to work experience acquired while in school may compensate for the earnings loss due to lower scholastic achievement.[6]

In contrast to an individual that decides to work while in school, an individual that chooses to undertake educational debt may be more academically successful than otherwise but will generally not achieve a high standard of living during his or her studies. This is mainly due to the institutional borrowing constraints inherent in most financial aid programs and the high cost of borrowing outside the guaranteed student loan system. An individual that undertakes debt, as opposed to working, will also have lower net consumption as soon as loan re-payment begins.[7] However, the level of debt accumulated during school can influence the type of job that is accepted after graduation. Indeed, the presumption of many educational loan-forgiveness programs in elite law schools in the United States is that law school graduates are shying away from public service jobs because of initially low salaries and high educational debt service payments that lead to unacceptably low levels of early post-graduation

complete law school.

[4]Adding parental cash transfers to an OLS regression of lifetime earnings on family background still produces biased estimates since the amount transferred and the unobserved earnings potential of the offspring are correlated. The bias could be in either direction.

[5]To this author's knowledge there are no studies that examine the effect of working while in school on scholastic achievement in graduate or professional school. Eckstein and Wolpin (1999) and Ehrenberg and Sherman (1987) examine the effects of working while in school on scholastic achievement in high school and college, respectively.

[6]See Ruhm (1997), Hotz, Xu, Tienda and Ahituv (1998) and Light (2001) for recent studies that examine the link between high school employment and subsequent earnings. Ehrenberg and Sherman (1987) find that work experience during college has little effect on post-graduation earnings.

[7]Educational debt service payments typically begin upon graduation and after a short grace period.

consumption.[8] Under the assumption that post-graduation borrowing constraints are binding, consumption smoothing considerations may induce law school graduates that decided to undertake educational debt to choose jobs with initially high salaries but with lower expected lifetime earnings.[9] Thus, the level of parental cash transfers and the type of complementary educational financing option chosen can influence career opportunities, career choices and lifetime earnings.

The theoretical framework, in which the effect of parental cash transfers is measured, assumes that individuals maximize the discounted present value of expected lifetime utility by making joint and sequential decisions on whether to work while studying, the level of educational indebtedness and the type of post-graduation employment. Individuals choose, at the beginning of each law school year, whether to not work and not borrow, whether to not work and borrow half the costs of law school attendance (including tuition, fees and minimal living expenses), whether to not work and borrow the full costs of law school attendance, whether to work and not borrow and whether to work and borrow half the costs of law school attendance.[10] The five options in the choice set are subject to a feasibility constraint. An option is not available if the student cannot generate sufficient funds to cover full attendance costs. If the student chooses not to work while in school, attendance costs must be met by a combination of parental transfers, initial assets, unobserved assets during school and educational debt. If the student works, stochastic labor income is added to the pool of resources. The default option of borrowing full attendance costs and not working is assumed to always be available.

The decision problem the individual faces is formulated as a dynamic programming problem under uncertainty so that borrowing and work decisions made in law school fully take into account the expected consequences for scholastic achievement, future job opportunities and consumption levels while in school and during the post-graduation period. Both during law school and after graduation, contemporaneous utility is assumed to depend on consumption according to a CRRA function. The marginal utility of consumption is allowed to differ between the working and borrowing options and post graduation employment sectors in order to capture the disutility of work effort. After graduation, the model of labor market decisions follows the framework developed in Sauer (1998), in which law school graduates choose, in each year after graduation, between five employment sectors: a solo sector, a business sector, a nonprofit sector, a nonelite private law firm sector and an elite private law firm sector. The five employment sectors are differentiated by promotion and dismissal probabilities and the extent of transferability of sector-specific human capital.

[8] Similar concerns about physician specialty and location choice underlie educational loan-forgiveness programs in medical schools.

[9] If individuals suffer a decrease in lifetime earnings in order to smooth post-graduation consumption, then there must be an additional market failure which prevents firms from offering earnings profiles that match the individual's consumption needs. One possibility is that educational debt levels are unobserved or are very costly to monitor.

[10] Discretizing the debt level increases the tractability of the problem.

The dynamic programming problem is solved numerically by backward recursion. The numerical solution is nested in a maximum likelihood procedure that recovers the structural parameters of the decision problem. Construction of the likelihood function is based on simulated event histories and assumes classification error in all reported discrete outcomes. The novel estimation procedure "solves" the computational problem that arises when there are missing endogenous state variables.[11] The observed continuous data on parental cash transfers, initial assets, educational debts, law school employment earnings and accepted post-graduation wage offers are included in estimation via measurement error densities.

The results of the study suggest that parental cash transfers do not have a significant effect on post-graduation lifetime earnings. Family background and pre-law school human capital investments are relatively stronger determinants of lifetime earnings. The effect of parental cash transfers received during school is to encourage in-school work among individuals that can only achieve high consumption levels by working. The income supplement that these individuals receive tends to decrease lifetime earnings since working while in school hurts scholastic achievement. On the other hand, in-school work experience has a significant payoff in the post-graduation labor market. The net effect on lifetime earnings of parental cash transfers is thus negligible.

Parental cash transfers do, however, significantly increase lifetime consumption. Lifetime consumption increases with parental cash transfers for two reasons. First, individuals that are induced to work rather than borrow, and individuals that continue to only borrow, have lower post-graduation debt burdens upon graduation. Second, working while in school increases in-school consumption levels over the consumption levels that are attainable through borrowing. The estimated parameters of the model imply that an extra dollar transferred from parent to offspring increases the lifetime consumption of offspring by 1 dollar and 76 cents. The "additionality effect" of 76 cents can be decomposed into 14 cents of increased in-school consumption and 62 cents of increased post-graduation consumption.

The results of the study also suggest that educational debt has only modest effects on post-graduation career choices. The outcome of a simulated counterfactual loan-forgiveness program that subsidizes debt payments in return for accepting a job in the nonprofit sector indicates that law school graduates that would have entered the nonprofit sector without loan-forgiveness continue to do so. However, they enter the nonprofit sector with more debt. Individuals with generally poor promotion prospects in private law firms also continue to enter the private law firm sectors immediately after graduation due to the investment value of private law firm experience in other sectors of the market. However, these latter individuals exit their jobs earlier and more often transit to the nonprofit sector under loan-forgiveness. The simulated loan-forgiveness program increases participation in the nonprofit sector, in year fifteen after

[11] The estimation procedure was recently introduced by Keane and Wolpin (2001) and is further developed in Keane and Sauer (2001).

graduation, by 1.2 percent.

The rest of the paper is organized as follows. Section 2 describes the data. Section 3 details the structure of the model as well as the solution and estimation method. Section 4 presents the main estimation results and discusses model fit. Section 5 measures the relative importance of short-term parental cash transfers and simulates the outcome of a loan-forgiveness program. Section 6 summarizes and concludes.

2 Data

The data on law school graduates are drawn from alumni surveys administered by the University of Michigan Law School (UMLS). UMLS has been collecting data from surveying all alumni since 1952 and combines alumni responses with information from law school records. This paper uses the information provided by the alumni surveys sent both five and fifteen years after graduation to the classes of 1976 through 1981. Starting with the class of 1976, data on financial support received from parents during school as well as information on initial assets became available. Initial assets are composed of pre-law school savings, veteran benefits, financial contributions of the spouse and other unspecified sources. In addition to parental cash transfers and initial assets, employment earnings during law school and total educational debt upon graduation from law school are reported. The sample ends with the class of 1981 since it was the last fifteen year survey available at the time this study began.[12] The size of each graduating class, the response rate to the more comprehensive fifteen year survey, the number of female and male respondents, the number of white male respondents and the number of white males used in estimation are displayed in Appendix A.

The estimation sample contains 658 white males that graduated within three years of entry to law school, that were not transfer students and that had decipherable law school and post-graduation event histories.[13] It is important to note, however, that it was not necessary to "force" the construction of continuous event histories for those individual's whose histories were only partially observed. The estimation procedure used in this study is especially suited to handle the problem of missing endogenous state variables. Nevertheless, the sample is still somewhat selected in the sense that white males that did not respond to the surveys are generally older upon graduation and less academically successful.[14]

Appendix B reports the estimated total cost of three years of attendance for

[12] Individuals in these class years graduated prior to the introduction of the UMLS loan-forgiveness program.

[13] Only 2 percent of the white male respondents were transfer students. Approximately 6 percent of the white male respondents were excluded for taking more than three years to graduate. Including these latter students would considerably complicate model solution and estimation. Another 2 percent of the white male respondents were excluded due to having highly inconsistent records.

[14] Age at graduation and scholastic achievement measures for respondents and non-respondents is available from law school records.

in-state and out-of-state UMLS students by class year. These figures are used to construct the levels of parental cash transfers, initial assets and law school employment earnings. The alumni surveys request the percentage of financial support during law school that derives from parental contributions, pre-law school savings, veteran benefits, spousal contributions, employment earnings and other unspecified sources (summing to 100 percent). UMLS provides the average percentage over three years of law school for each financing source for each respondent. Therefore, only total figures over three years of law school can be constructed.

It is important to note that the term "financial support" could have been interpreted differently by each respondent, however, for practical purposes, it is interpreted as meaning total attendance costs. In addition, parental financial support is interpreted as being pure transfers but it could conceivably be a (relatively low interest) loan. Another source of concern is that total employment earnings include summer earnings. Since it is likely that nearly all individuals in the sample worked during the summers prior to law school graduation, employment earnings should systematically overstate earnings during law school years.[15] On the other hand, the structure of the survey question does not permit employment earnings to exceed 100 percent of attendance costs, except for measurement error. Reported employment earnings may, therefore, also understate earnings during law school years. Initial assets, defined as the sum of all other sources of financial support besides parental contributions and employment earnings, may be overstated or understated for the same reasons. The incorporation of measurement error in the estimation procedure is thus quite important.

Table 1 displays descriptive statistics for the estimation sample. The figures show that, at the time of entry to law school, 42 percent have a father that was employed in a blue collar or other occupation, 17 percent have a father that was an attorney or other professional and 41 percent have a father that was a manager, business owner or teacher. These three broad occupational categories of the father are denoted by the dummy variables, F_0, F_1 and F_2, respectively. The father occupation dummies are used to represent the individual's family background.[16]

Pre-law school human capital investments are represented by the quality of the individual's undergraduate education, masters degree status and age at entry to law school. The quality of the undergraduate degree is proxied by the dummy Ivy which indicates having a BA from an Ivy League institution. Twelve percent of the sample has an Ivy League BA. The masters degree status of the individual is represented by the dummy MA. Nine percent of the sample holds a masters degree or higher degree prior to entry to law school. The median age at entry to law school is 22 and the mean is 23. The maximum age is 48. Only 15 percent of the sample entered law school

[15] Students were asked about their work activities during the second summer of law school. Ninety nine percent of the sample reported working.

[16] There is no other information on family background that can be usefully exploited. Most of the mothers in the sample were not working at the time of entry to law school.

over the age of 24. This latter event is denoted in the model by the indicator function $I(age > 24)$. $I(age > 24)$ proxies potential work experience prior to entering law school. The mean Law School Admissions Test score in the sample is 707, reflecting the elite status of UMLS. A test score greater than or equal to the top quintile in the sample is denoted in the model as $I(LSAT > 737)$. The residency status of the students upon entry to law school is represented by the dummy OS. Sixty percent of the sample are out-of-state students and subject to higher tuition levels.

The measures of scholastic achievement that are used are having made law review after the first year of law school, lr, and having graduated law school in the top 20 percent of the class, $t20$. The law review status and the graduating percentile of the student are supplied from law school records. The figures show that 25 percent of the sample made law review and 39 percent graduated in the top 20 percent of the class. This latter statistic highlights the fact that survey respondents are disproportionately academically successful law school students. The minimum graduating percentile in the sample is 38 and the average is 72.

Parental financial support and educational debt are the most important sources of educational financing in the sample. Sixty-one percent of the sample reported receiving parental cash transfers. Individuals with an attorney or other professional father are 30 percent more likely and individuals with a manager, business owner or teacher father are 18 percent more likely than individuals with a blue-collar or other occupation father to receive parental cash transfers. The mean positive amount of parental support is $17,000$ dollars over three years which is slightly more than half the total 3 year attendance costs among out-of-state students. The level of parental support also varies with father's occupation. Individuals with an attorney or other professional father receive 34 percent more transfers and individuals with a manager, business owner or teacher father receive 20 percent more transfers than individuals with a blue-collar or other occupation father.

Sixty-one percent of the sample had positive educational debt upon graduation from law school. The mean positive total debt burden, which includes educational debts accumulated as an undergraduate, is $21,000$.[17] The figures on initial assets upon entry to law school indicate that 48 percent of the sample had positive assets. The mean positive amount of initial assets is $12,600$ dollars. Older law school students have significantly higher initial assets. Approximately 60 percent of initial assets are composed of pre-law school savings. The remainder derives mostly from spousal cash transfers and veteran benefits.

Classification of an individual into the no work/work categories in each year of law school is based on the reported average number of hours worked per week during the law school year. The average number of hours worked per week over the three

[17] Undergraduate debt is likely to be negligible compared to law school debt. Measurement error in total debt is incorporated into estimation in order to partially adjust for this unobserved undergraduate debt component as well as possible overstatement of reported debt levels.

years of law school is 8.9 with a standard deviation of 7.3.[18] A student that reported less than five hours of work per week was placed in the no work category, otherwise he was placed in the work category. Only one work intensity is considered since a negligible number of students worked more than 20 hours per week during any law school year. The model thus considers only a part-time work option.[19] Based on this in-school work classification scheme, 46 percent of the sample had positive employment earnings over the three years of law school. The mean positive amount of employment earnings is $9,637$ dollars.

The employment histories in the post-graduation labor market are constructed as in Sauer (1998). First, employment sectors were assigned in years five and fifteen after graduation according to the responses on the five and fifteen year surveys. The assignment in year one was obtained from a retrospective question on the fifteen year survey. If an attorney reported that he was a sole proprietor, then he was placed in the solo sector in the corresponding year. An attorney employed in a Fortune 500 company, bank or other financial institution, accounting firm, insurance firm, other business organization or other service organization, was placed in the business sector. An attorney employed in federal government, state or local government, legal services, public interest, or an educational institution, was placed in the nonprofit sector. If an attorney was employed in a private law firm, then a cutoff firm size determined assignment to the nonelite (small private law firm) or elite (large private law firm) sector. In order to account for differential private law firm growth during the sample period, the cutoff number of attorneys was allowed to vary over time and geographical location. In year fifteen, a firm outside of New York with less (more) than 100 attorneys and a firm inside New York with less (more) than 200 attorneys was considered nonelite (elite). Moving backwards in time, the nonelite/elite cutoffs in years five and one were 50 and 35, respectively, regardless of location.[20]

Completion of the longitudinal record was generally straight-forward for an attorney who reported, on the fifteen year survey, one or two jobs held since graduation and the number of years on the current job. If more than two jobs were reported, then the reported number of years spent in government and number of years spent in private practice were needed. There were a number of cases in which it was difficult to assign private law firm attorneys to either the nonelite or elite sector in a particular year. A similar classification problem exists for the exact year of promotion to partnership. Private law firm attorneys report being partners in years five and fifteen only. Classification for these cases was left "open". The extent of classification error in the data is estimated along with the other parameters of the model.

[18] Reported hours of work are during the law school year only.

[19] Since the amount of debt in any particular year of law school is not reported no attempt was made to classify students into yearly debt categories.

[20] See Sauer (1998) for more details on the employment history construction and a justification for the assignment strategy.

3 Model

In this section, the basic structure of the model and the solution and estimation methods are discussed. The first subsection describes the decision-making environment in law school. The second subsection describes the decision-making environment in the post-graduation labor market. The third subsection outlines the solution and estimation techniques. The model corresponds to the decision problem of a single individual. However, individuals are allowed to differ in observed and unobserved dimensions.

3.1 Law School

The choice set the individual faces, in each year of law school, denoted as K^{ls}, is assumed to contain five elements: not working and not borrowing ($k = 1$), not working and borrowing half the costs of law school attendance ($k = 2$), not working and borrowing the full costs of law school attendance ($k = 3$), working and not borrowing ($k = 4$), and working and borrowing half the costs of law school attendance ($k = 5$). A choice k is feasible in year t only if financial resources, denoted as y_{kt}, are sufficient to cover the full costs of law school attendance. The full costs of law school attendance consist of tuition and fees, tc, plus minimal living expenses, $c\min$.[21] The feasibility constraint is thus,

$$y_{kt} - (tc + c\min) \geq 0. \tag{1}$$

Total financial resources during the law school year y_{kt} are assumed to derive from five possible sources: parental cash transfers, tr_t^p, initial assets, tr_t^a, stochastic unobserved assets, $tr_t^u e^{\varepsilon_{ut}}$, units of educational debt, where one unit is $.5(tc + c\min)$, and stochastic labor income, $\overline{w}_t e^{\varepsilon_{wt}}$. The choice dependent y_{kt}'s are specified as

$$\begin{aligned}
y_{1t} &= tr_t^p + tr_t^a + tr_t^u e^{\varepsilon_{ut}} \\
y_{2t} &= tr_t^p + tr_t^a + tr_t^u e^{\varepsilon_{ut}} + .5(tc + c\min) \\
y_{3t} &= tc + c\min \\
y_{4t} &= tr_t^p + tr_t^a + tr_t^u e^{\varepsilon_{ut}} + \overline{w}_t e^{\varepsilon_{wt}} \\
y_{5t} &= tr_t^p + tr_t^a + tr_t^u e^{\varepsilon_{ut}} + \overline{w}_t e^{\varepsilon_{wt}} + .5(tc + c\min).
\end{aligned} \tag{2}$$

Stochastic unobserved assets $tr_t^u e^{\varepsilon_{ut}}$ are meant to capture prior summer savings and other unreported monetary or in-kind transfers that affect work and borrowing decisions during the law school year. The stochastic components of unobserved assets and employment earnings, ε_{ut} and ε_{wt}, are allowed to be contemporaneously correlated

[21] See Appendix B for the values of tc and $c\min$ that are used in empirical implementation of the model.

but are assumed to be mutually serially independent.[22] Note that option 3 always satisfies the feasibility constraint.[23]

Consumption c_{kt} corresponding to each choice k is specified as,

$$\begin{aligned} c_{kt} &= c\min + y_{kt} - (tc + c\min),\ k = 1, 4 \\ c_{kt} &= c\min,\ k = 2, 3, 5. \end{aligned} \tag{3}$$

Note that consumption c_{kt} can exceed $c\min$ only when the individual does not borrow. This restriction captures the institutional constraints inherent in the guaranteed student loan system. Total borrowing capacity is limited to tuition and fees plus minimum consumption and is reduced by the extent of outside resources.[24] It is further assumed that it is prohibitively expensive to borrow more than full attendance costs on the non-guaranteed student loan market. It is important to note that the model is not identified without these consumption restrictions in the borrowing options. The identifying restriction is necessary due to the lack of data on individual consumption levels. The value of $c\min$ is also not estimated but is rather fixed at the same law-school determined level for each individual in the sample.

The consumption restrictions in the model imply that it would never be optimal for a student to borrow full attendance costs when he needs to borrow only half since there is a negative effect of accumulated debt on post-graduation consumption. Note that the combined borrowing and working option allows individuals to diversify between the future effects of borrowing and working. In this latter option as well, only minimum consumption can be achieved. In the non-borrowing options, consumption can exceed $c\min$ but it is assumed that excess resources are not saved from year to year.[25]

One drawback of specifying only two discretized borrowing levels, half attendance costs and full attendance costs, is that a student may borrow "too much". That is, if a student's resources, before borrowing, add up to more than half the attendance costs, and he chooses to borrow half the attendance costs, then he would be borrowing too much in order to reach $c\min$. Ideally, the choice set would contain a fine enough discretization of debt levels so that the student could borrow less than half the attendance costs and just enough to cover full attendance costs. The specification of only two borrowing amounts eases computational burden at the cost of larger estimated

[22] The distributional assumption is bivariate normality.

[23] It is assumed, for simplicity, that students can draw on their yearly resources in order to meet tuition payments. That is, possible time inconsistencies in the availability of resources and the tuition payment schedule are ignored.

[24] It is assumed, for simplicity, that resources available to the student are common knowledge. That is, the financial aid office is fully aware of all resources available to the student and reduces borrowing capacity accordingly.

[25] If data on student assets during the school year were available this latter assumption could be relaxed.

measurement error in total educational debt.[26] It should also be noted that since yearly debt levels are not observed, only total accumulated debt upon graduation is observed, the specification of only two borrowing amounts does not contradict any data.

Consumption in the chosen option in year t is assumed to generate contemporaneous utility u_t^k according to a CRRA function,

$$u_t^k = \frac{\mu_k}{\lambda - 1} c_{kt}^{\lambda - 1} \tag{4}$$

where λ is the parameter of constant relative risk aversion. The marginal utility of consumption is a function of k in order to capture the disutility of work effort. Thus, μ_k is restricted to equal one for $k = 1, 2, 3$, and μ_4 is estimated with the added restriction that $\mu_4 = \mu_5$.

Each year in which the student chooses one of the working options an extra unit of in-school work experience is accumulated. Accumulated work experience during law school, hr_t, obeys the law of motion,

$$hr_t = hr_{t-1} + d_4(t) + d_5(t) \tag{5}$$

where the choice variable, $d_k(t)$, is defined such that $d_k(t) = 1$ if option k at time t is chosen and $d_k(t) = 0$ otherwise. The initial condition is $hr_0 = 0$.

Accumulated work experience is treated as an input into the deterministic component of the in-school wage offer function in year t, $\overline{w}_t$, the probability of making law review after the first year of law school, π^{lr}, and the probability of graduating in the top 20 percent of the class, π^{t20}. More specifically,

$$\begin{aligned} w_t &= \overline{w}_t(hr_t, A_1, A_2)e^{\varepsilon_t} \\ \pi^{lr} &= \pi^{lr}(hr_t, A_1, A_2,) \\ \pi^{t20} &= \pi^{t20}(hr_t, A_1, A_2) \end{aligned} \tag{6}$$

where $\overline{w}_t$ is an exponential function of its arguments, leading to a Mincer type wage function. π^{lr} and π^{t20} are logistic functions ensuring that the probabilities lie in the unit interval. The dummy variables A_1 and A_2 correspond to three different unobserved types of individuals in the population, or three different mass points of permanent unobserved heterogeneity.[27]

Each year in which the student chooses one of the borrowing options, units of debt are accumulated. Accumulated debt during law school, db_t obeys the law of motion,

$$db_t = db_{t-1} + d_2(t) + 2d_3(t) + d_5(t) \tag{7}$$

[26] However, the larger total educational debt levels generated by the discretization partially offset the understatement of total educational debt levels due to unaccounted for undergraduate debt.

[27] The number of mass points was not specified a-priori but was rather determined empirically.

The initial condition is $db_0 = 0$.

Accumulated units of debt during law school are an input into a function that generates total educational debt upon graduation. The total education debt function is

$$D_3 = (.5(tc + c\min) * db_3)\,. \tag{8}$$

3.2 The Market for Lawyers

The choice set an individual faces upon graduation from law school, denoted as K^{ml}, is assumed to contain five employment sectors or seven alternative positions: a solo position ($k = 1$), a business position ($k = 2$), a nonprofit position ($k = 3$), a nonelite associate position ($k = 4$), an elite associate position ($k = 5$), a nonelite partner position ($k = 6$) and an elite partner position ($k = 7$). A choice is feasible only if a job offer is received.

The vector of first job offer probabilities is specified as,

$$\mathbf{P}(1) = \{1, P_{02}, P_{03}, P_{04}, P_{05}, 0, 0\} \tag{9}$$

where P_{0k} denotes the probability of receiving an offer to work in position k immediately upon graduation from law school. The restrictions imply that recent law school graduates can become sole proprietors with certainty, cannot directly enter the post-graduation labor market as partners, and face stochastic probabilities of offers in the other positions.

On-the-job offer probabilities, P_{jk}, $j, k \in K^{ml}$, form the matrix,

$$\mathbf{P}(t) = \begin{pmatrix} 1 & P_{12} & P_{13} & P_{14} & P_{15} & 0 & 0 \\ 1 & 1 & P_{23} & P_{24} & P_{25} & 0 & 0 \\ 1 & P_{32} & 1 & P_{34} & P_{35} & 0 & 0 \\ 1 & P_{42} & P_{43} & P_{44} & P_{45} & P_{46} & 0 \\ 1 & P_{52} & P_{53} & P_{54} & P_{55} & 0 & P_{57} \\ 1 & P_{42} & P_{43} & 1 & P_{45} & 1 & 0 \\ 1 & P_{52} & P_{53} & P_{54} & 1 & 0 & 1 \end{pmatrix} \tag{10}$$

for $1 \leq t \leq T - 1$, where T is the terminal period. The restrictions imply that attorneys can always become sole proprietors regardless of prior period position (column one). The zeros in columns six and seven imply that an attorney must spend the prior period as an associate before facing a non-zero partnership probability. Solo, business and nonprofit attorneys can, like partners, always continue in their respective positions.[28]

[28] The job offer probability restrictions are empirically motivated and do not contradict any data in the sample.

Each row vector of job offer probabilities, save the associate continuation probabilities, P_{44} and P_{55}, and the partnership probabilities, P_{46} and P_{57}, are assumed to be multinomial logistic in the individual's accumulated law school work experience, hr_3, whether the individual made law review, lr, whether the individual graduated in the top 20 percent of the class, $t20$, and the individual's unobserved type. That is,

$$P_{jk} = P_{jk}(hr_3, lr, t20, A_1, A_2) \tag{11}$$

for $j = 0, ..., 7$ and $k = 1, ..., 7$. The multinomial logit assumption implies that only one offer will be received in each period and ensures that all arrival rates lie in the unit interval.

Promotion and dismissal in the nonelite and elite private law firm sectors occur within an up-or-out employment structure.[29] The event of coming up for partnership review, at the beginning of year t, is denoted as $R(t)$. $R(t) = 1$ if the associate comes up for review and $R(t) = 0$ otherwise. The probability that $R(t) = 1$, denoted as $P_{c4}(t)$ in the nonelite sector and $P_{c5}(t)$ in the elite sector, is assumed to be equal to zero for $t < 4$ and is constant otherwise. The associate continuation probabilities are thus

$$P_{kk} = \begin{cases} 0 & \text{when } R(t) = 1 \\ 1 & \text{otherwise} \end{cases} \tag{12}$$

for $k = 4, 5$. That is, the associate will either not come up for review, in which case remaining an associate is an option, or will come up for review and will either be offered partnership or be dismissed from the sector.

The partnership probabilities P_{46} and P_{57} are zero unless $R(t) = 1$. If $R(t) = 1$ then,

$$\begin{aligned} P_{46} &= P_{46}(lr, t20, x_{2t}, A_1, A_2) \\ P_{57} &= P_{57}(lr, t20, x_{1t}, A_1, A_2). \end{aligned} \tag{13}$$

The promotion probabilities are specified as logistic functions of law school scholastic achievement, unobserved type and cross experience in the post-graduation labor market. That is, P_{46} is allowed to be a function of accumulated experience in the elite sector, x_{2t}, and P_{57} is allowed to be a function of accumulated experience outside of the elite sector, x_{1t}.[30]

The two accumulated experience terms, x_{1t} and x_{2t} evolve according to the following law of motion:

[29] For more on up-or-out employment structures in the market for lawyers see O'Flaherty and Siow (1995).

[30] The specification of different promotion probabilities in small and large firms is motivated by the findings of Spurr (1987).

$$
\begin{aligned}
x_{1t} &= x_{1,t-1} + d_1(t) + d_2(t) + d_3(t) + d_4(t) + d_6(t) \\
x_{2t} &= x_{2,t-1} + d_5(t) + d_7(t).
\end{aligned} \tag{14}
$$

The initial conditions are $x_{10} = x_{20} = 0$.[31]

Accumulated sector-specific experience enters into the post-graduation wage offer function in position k in year t,

$$
\begin{aligned}
\ln \overline{w}_{kt} &= \beta_{k0} + \beta_{k1} hr_3 + \beta_{k2} lr + \beta_{k3} t20 + \beta_{k4} A_1 + \beta_{k5} A_2 \\
&\quad + \beta_{k6} x_{1t} - \beta_{k7} x_{1t}^2 + \beta_{k8} x_{2t} - \beta_{k9} x_{2t}^2 + \varepsilon_{kt}
\end{aligned} \tag{15}
$$

The inclusion of cross experience in the wage offer functions allows for transferability of sector-specific human capital. Note that accumulated in-school work experience and scholastic achievement in law school are allowed to affect both the arrival rates of job offers and the level of wage offers in the post-graduation labor market. The stochastic component ε_{kt} is an alternative-specific productivity shock. Productivity shocks are assumed to be normally distributed and contemporaneously correlated but are mutually serially independent.

Post-graduation consumption at time t in position k is specified as,

$$
c_{kt} = w_{kt} - g\left(D_3\right) \tag{16}
$$

where $g\left(\cdot\right)$ is a function which transforms total educational debt upon graduation from law school, D_3, into yearly debt service payments.[32] Given the lack of data on post-graduation asset levels it is assumed that no saving and no further borrowing occurs after graduation.[33] c_{kt} generates contemporaneous utility according to the CRRA utility function specified earlier, however, different μ_k terms are estimated in order to capture the disutility of work effort over the various post-graduation employment sectors.[34] The identifying restriction on μ_k is $\mu_k = 1$, for $k = 3$. Estimated disutilities are thus relative to the disutility of work effort in the nonprofit sector.

[31] Ideally, accumulated experience in each position in the market for lawyers would be in the state space. However, this is computationally impractical. It is most important to distinguish elite sector experience since this type of experience is known to have considerable investment value.

[32] Yearly debt service payments are not reported in the data. Debt service payments are calculated off of the D_3 generated by the model by assuming a loan term of 10 years, a real yearly interest rate of 5.3% and equal yearly payments.

[33] Further borrowing after graduation might take the form of lengthening the term of the loan. Lengthening the term to 15 years does not considerably change the results. Due to lack of data, periodic larger than required debt-service payments are not incorporated into the model, nor is loan default.

[34] Assuming linear utility, or pure wealth maximization in the post–graduation labor market, would imply that educational debt has no effect on post-graduation career choices.

3.3 Solution and Estimation Method

Individuals are assumed to maximize expected lifetime utility by choosing in each period, until a known terminal period T, one of the feasible discrete alternatives in the time-dependent choice sets, K^{ls} and K^{ml}. The maximized objective function at any time t, $V_t(\Omega_t)$, is given by

$$V_t(\Omega_t) = \max_{\{d_k(t)\}} E\left[\sum_{\tau=t}^{T}\sum_{K^{ls},K^{ml}} \delta_{A_j}^{\tau-t} u_t^k d_k(\tau)|\Omega_t\right] \tag{17}$$

where E is the expectations operator, Ω_t is the state space at time t and δ_{A_j}, $j = 0,1,2$, is the subjective discount factor. The discount factor is allowed to differ by unobserved type in order to incorporate heterogeneity in rates of time preference.[35] The elements of Ω_t are: F_0, F_1, F_2, Ivy, MA, $I(age > 24)$, OS, $I(LSAT > 737)$, A_0, A_1, A_2, $I(tr_t^p > 0)$, $I(tr_t^a > 0)$, lr, $t20$, hr_t, db_t, x_{1t}, x_{2t}, $d_k(t-1)$, ε_{ut}, ε_{wt}, and ε_{kt}.[36] The maximization of the objective function is achieved by choice of the optimal sequence of feasible control variables $\{d_k(t)\}$, $k \in K^{ls}, K^{ml}$, given current realizations of the stochastic elements of the model.

The maximization problem can be recast in a dynamic programming framework by specifying the value function, $V_t(\Omega_t)$, as the maximum over alternative-specific value functions, $V_t^k(\Omega_t)$, that satisfy the Bellman (1957) equation. That is,

$$\begin{aligned} V_t(\Omega_t) &= \max\left[V_t^1(\Omega_t), ..., V_t^{K^i}(\Omega_t)\right],\ i = ls, ml \\ V_t^k(\Omega_t) &= u_t^k + \delta_{A_j} E\left(V_{t+1}(\Omega_{t+1})|d_k(t)|\Omega_t\right) \end{aligned} \tag{18}$$

where the expectation is taken over the joint distribution of the random elements of the model.

Since it is difficult, in general, to find analytic solutions to dynamic programs of this type, the model is solved numerically by backward recursion. The solution consists of generating $E(V_t(\Omega_t))$, or the $E\max_t$ function, for every combination of state space elements and choices at time t. The terminal period, T, is fixed at 15 years after graduation from law school for each individual and the terminal period alternative-specific $E\max_T$ is assumed to be proportional to u_T^k. The proportionality constant, α_T is estimated along with the other parameters of the model.

Calculation of the multivariate integrals in the $E\max_t$ function is accomplished by Monte-Carlo integration.[37] The state space is not too large as to necessitate interpolation and/or regression techniques (see Keane and Wolpin (1994)) to recover the $E\max_t$ function. That is, a full numerical solution to the dynamic program is

[35] For reasons of identification, the subjective discount factor for a type 0 individual, δ_{A_0}, is fixed at .95.

[36] F_0, F_1, F_2, Ivy, MA, $I(age > 24)$, OS, $I(LSAT > 737)$, $I(tr_t^p > 0)$, and $I(tr_t^a > 0)$ are part of the state space because they are initial conditions. This will be discussed in detail below.

[37] The Monte-Carlo integration calculates averages over 50 draws.

employed. Given $E\max_t$, the alternative-specific value functions are known up to the random shocks in the model.

The model is estimated by simulated maximum likelihood (SML) with an assumed classification error process in observed discrete outcomes.[38] The estimation technique is based on matching a common set simulated event histories with each individual's reported event history.[39] Each simulated event history is, with positive probability, the individual's true event history when admitting classification error. Assuming unbiased classification error, i.e., that any individual in the data may misreport a discrete outcome but the proportion of reported outcomes in the sample is an unbiased estimate of the true proportion, yields the classification error rates,

$$\begin{aligned} \pi_{kkt} &= E + (1-E)\Pr\left(d_k\left(t\right)=1\right) \\ \pi_{\widetilde{k}kt} &= (1-E)\Pr\left(d_k\left(t\right)=1\right). \end{aligned} \tag{19}$$

π_{kkt} is the classification error rate when choice k is simulated and choice k is reported by the individual in period t. When choice $\widetilde{k}$ is simulated and choice k is reported, the relevant classification error rate is $\pi_{\widetilde{k}kt}$. E is an estimable parameter and is interpreted as the base classification error rate in the sample. $\Pr\left(d_k\left(t\right)=1\right)$ is computed via a kernel-smoothed frequency simulator over simulated choices in period t.[40]

The likelihood contribution for each individual is constructed by averaging the product of classification error rates over the total number of simulations.[41] In order to incorporate into the likelihood function the observed continuous data on parental cash transfers, initial assets, educational debt, in-school employment earnings, and post-graduation accepted wages, the classification error rates in each period t are multiplied by measurement error densities.[42] Measurement error in observed continuous outcomes is assumed to be lognormally distributed.

The likelihood contributions also incorporate the joint probability of observed and unobserved initial conditions. The observed initial conditions in the model are F_0, F_1, F_2, Ivy, MA, $I\left(age>24\right)$, OS and $I\left(LSAT>737\right)$. The values of these variables are simulated together with the event histories. The probabilities of the observed initial conditions are denoted as λ_{f_0}, λ_{f_1}, λ_{f_2}, λ_{ivy}, λ_{ma}, λ_{age}, λ_{os} and λ_{lsat}, and are estimated.

[38] The estimation method was recently introduced by Keane and Wolpin (2001) and is further developed in Keane and Sauer (2001) . The method is particularly useful when there are only partially observed choice histories in the data.

[39] The same 3000 simulated event histories are matched to each of the 658 individuals in the estimation sample.

[40] The kernel is a logistic function of the difference between each alternative-specific value function and the maximum over alternative-specific value functions in period t. The bandwidth parameter was fixed a-priori at 25.

[41] If a choice is not reported in period t, there is no contribution to the product of classification error rates in that period.

[42] For example, in the last year of law school the classification error rate is multiplied by the measurement error density for total in-school employment earnings.

The unobserved initial conditions in the model are A_0, A_1, and A_2. The unobserved type probabilities, denoted as π^{A_j}, $j = 0, 1, 2$, are the weights for the type-specific likelihood contributions. The type probabilities are specified to be multinomial logistic in the simulated observed initial conditions, i.e.,

$$\pi^{A_j} = \pi^{A_j}(F_1, F_2, Ivy, MA, I(age > 24), OS, I(LSAT > 737)),\ j = 0, 1, 2. \quad (20)$$

This specification of the type probabilities incorporates heteroscedasticity in the distribution of mass points (Heckman and Singer (1984)) and is the avenue through which family background and pre-law school human capital investments determine the rate of time preference, scholastic ability and earnings capacity of the individual during law school and in the post-graduation labor market. The effect of family background on lifetime outcomes, through the type probabilities, is net of its correlation with pre-law school human capital investments and its influence on short-term cash transfers and initial asset levels.

The positive amounts of parental cash transfers and initial assets are assumed to be (log-linear) functions of the initial conditions, i.e.,

$$\begin{aligned} tr_t^p &= tr_t^p\left(F_1, F_2, I(age > 24), OS, A_1, A_2\right) \quad (21) \\ tr_t^a &= tr_t^a\left(F_1, F_2, I(age > 24), OS, A_1, A_2\right). \end{aligned}$$

The probabilities of receiving parental transfers and having initial assets are denoted as λ_{tr^p} and λ_{tr^a}, respectively, and are also estimated. This latter system of equations represents the reduced form of a more general, possibly intra-family, optimization problem that jointly determines the amount of resources available to the student while in school.[43] The student is assumed to take parental cash transfers and initial assets as given when deciding among the feasible options in the choice set during law school. Parental transfers and initial assets are thus considered as endowments. It is further assumed that total parental transfers and initial assets are evenly divided over the three years of law school. This latter assumption is necessary since data on yearly contributions are not available.

Maximization of the log-likelihood function proceeds by updating the parameter space, re-solving the dynamic program and re-simulating initial conditions and event histories for each iteration of the optimization algorithm. Standard errors are obtained by computing numerical derivatives and the outer product approximation to the Hessian.

4 Estimation Results

This section discusses specific parameter estimates of interest and model fit.[44] The parameter estimates and their t-values are reported in Appendix Table C.

[43] The reduced form system is similar in form to a selection-corrected, nonparametric multivariate Tobit.

[44] There are 149 estimated parameters.

4.1 Initial Conditions

The estimated parameters of the unobserved type probabilities reveal a significant relationship between family background and unobserved type. Table 2 presents the estimated average type probabilities by father's occupation at the time of entry to law school. Among individuals with a father that is an attorney or other professional, the probability of being type 2 is .50. The probability of being type 2 is .45 among those that have a father that is a manager, business owner or teacher and .27 among individuals with a blue-collar or other occupation father. The ordering of the type 0 probability by father's occupation is reversed. The probability of being type 0 is only .14 among those with an attorney or other professional father, .34 among those with a manager, business owner or teacher father, and .41 among those with a blue-collar or other occupation father. The heteroscedasticity in the distribution of mass points by father's occupation is thus quite evident. It will also be shown later that the individual's unobserved type is a strong determinant of lifetime earnings. Type 2 individuals have significantly higher lifetime earnings than type 1 individuals and type 1 individuals have significantly higher lifetime earnings than type 0 individuals. Selection on unobservables is an important feature of the data and this selection is significantly related to family background.

The influence of family background, pre-law school human capital investments and other observable characteristics on the type probabilities can be usefully summarized by their marginal effects on the combined probability of being either type 1 or type 2. The estimated marginal effects are .27 for individuals with an attorney or other professional father, .06 for individuals with a manager, business owner or teacher father, .12 for individuals with an ivy league BA, .09 for individuals with an MA, .04 for individuals that are older upon entry to law school, $-.08$ for out-of-state students and .06 for individuals that scored in the top quintile of the $LSAT$.[45]

The estimates of the parental cash transfer function indicate that type 1 and type 2 individuals receive 1.5 percent more and 10 percent more transfers than type 0 individuals, respectively. This can be interpreted as parents investing more in offspring with higher lifetime earnings potential. Resources available to parents, as proxied by the father's occupation at the time of entry to law school, strongly determine the level of parental cash transfers. An individual with an attorney or other professional father receives 92 percent more transfers and an individual with a manager, business owner or teacher father receives 42 percent more transfers than an individual with a blue-collar or other occupation father, respectively. Out-of-state students that are subject to higher tuition costs receive 13 percent more transfers from their parents. Students that are older upon entry to law school receive 57 percent less transfers. This latter result suggests a partial substitution of financing resources between parents and

[45] Identification problems arose when attempting to enter family background and other observable characteristics, as well as unobserved type, into the various functions in the model. The full set of observable characteristics do appear in the type probabilities.

offspring.

The partial substitution of resources becomes more evident when examining the effects of age at entry to law school on initial assets. Initial assets are 70 percent higher among older students. This is expected since older students are more likely to be married upon entry to law school, and thus may receive spousal support, and older students may have worked and saved for re-entry to school. Individuals with an attorney or other professional father have 13 percent higher initial assets but individuals with a manager, business owner or teacher father have 1.3 percent less initial assets than individuals with a blue-collar or other occupation father, respectively. Out-of-state students have higher initial assets by 2.4 percent suggesting greater savings in anticipation of higher tuition costs. Type 1 and type 2 individuals have higher initial assets than type 0 individuals by 5.8 percent and 6.4 percent, respectively.

4.2 Law School

Unobserved assets during the law school year, that may derive from previous summer savings, appear to be an important source of educational financing. The estimated mean value of unobserved assets is $2,342$ dollars per year. Total mean unobserved assets over three years thus constitute more than 20 percent of total out-of-state attendance costs.

The estimated parameters of the annual in-school wage offer function indicate substantial heterogeneity in part-time earnings capacity. Type 1 individuals earn a wage premium over type 0 individuals of 46 percent. The wage premium for being a type 2 individual is 15 percent. Individuals that choose to work also receive a return to accumulated in-school work experience while in school of 3.5 percent per year worked.

The estimated probabilities of making law review after the first year of law school and graduating in the top 20 percent of the class at the end of law school also vary significantly by unobserved type. The marginal effects on the law review probability are .13 and .25 for type 1 and type 2 individuals, respectively. Working while in school during the first year significantly decreases the probability of making law review by 5 percent. The marginal effects on the probability of graduating in the top 20 percent of the class are also quite strong, .23 and .41, for type 1 and type 2 individuals, respectively. However, accumulated in-school work experience does not significantly decrease the probability of this latter measure of scholastic achievement.[46]

Table 3 displays the borrowing and work decisions in each year of law school, in the actual data and predicted by the model. The actual choice proportions can be calculated only for the total number of individuals in the No Work and Work options. The model can, however, predict the proportions of individuals in the different debt subcategories in each year. The figures show that 21 percent of the sample work during

[46] Significant negative effects of accumulated in-school work experience may, however, exist at lower graduating percentiles.

the first year of law school. In the second year of law school there is a 16 percent increase in the proportion of law school students working. In the third year of law school an additional 6 percent choose to work. The model is capable of reproducing the sharp increase in the proportion working between years 1 and 2 and the more moderate increase in year 3.

The model explains the sharp increase in the proportion working from year 1 to year 2 by the high future value of making law review and the significant negative effect of working on the probability of making law review. Making law review has strong positive effects in the post-graduation wage offer functions and job offer arrival rates. Therefore, once the first year law review constraint is relaxed, there is a large increase in the proportion working.[47] The more moderate increase in the proportion working from year 2 to year 3 is due to positively correlated negative productivity and unobserved asset shocks. That is, individuals that began working in year 2 and that receive negative productivity and unobserved asset shocks in year 3, can no longer fully finance attendance costs by working and not borrowing. They, instead, choose to work and borrow rather than only borrow. It is the investment value of in-school work experience in the post-graduation labor market, and not current consumption levels, that generates the persistence in the in-school working decisions among these latter individuals. The ability of the model to reproduce the general pattern of transitions between the No Work and Work options is illustrated in Table 4. Unobserved asset and productivity shocks are important determinants of these transitions.

Examining the probability of working in each year by unobserved type, parental cash transfer and initial asset levels reveals some additional interesting patterns. Type 1 individuals are most likely to work in each year because of their high part-time earnings capacity and high scholastic ability. Type 2 individuals are less likely than type 1 individuals to work in each year but are more likely to work than type 0 individuals. Type 2 individuals have lower part-time earnings capacity than type 1 individuals but have a higher starting probability of making law review and a considerably lower discount factor. The estimated discount factors are .95 and .86 for types 1 and 2, respectively. Selection into in-school work is thus positively related to part-time earnings capacity, scholastic ability and relative impatience in consumption.

The level of parental cash transfers, initial assets and the disutility of work effort are also important factors in the in-school work decision. The receipt of parental cash transfers and the availability of initial assets significantly increase the proportion of all types that work. This perverse income effect arises since working is the only avenue through which individuals can increase consumption over the minimum consumption that is achievable through borrowing. Parental cash transfers serve as a wage subsidy that enables students to earn enough income while working to cover attendance costs, the disutility of work effort and achieve more than minimum consumption.

Table 5 presents some additional dimensions of model fit. The first panel illustrates

[47] It is also possible that the first year of law school is more demanding in terms of time and energy than subsequent years. This effect is not captured by the model.

the fit of the model to the distribution of educational debt upon graduation from law school. The mean positive debt level in the sample is reproduced quite well. The middle of the distribution of debt is also fit well but there are misses in the tails. The proportion with zero debt is overpredicted and the proportion with very high levels of debt is underpredicted. The model is also capable of reproducing the proportion of individuals with positive labor earnings over three years of law school but somewhat overpredicts mean positive earnings. The proportion of individuals that make law review and graduate in the top 20 percent of the class is reproduced quite accurately.

4.3 The Market for Lawyers

The estimated parameters of the post-graduation job offer arrival rates indicate that being type 1, being type 2 and having made law review significantly increase the probability of getting job offers in the private law firm sectors of the market for lawyers. The marginal effects on the combined probability of getting a job offer in either the nonelite or elite sector are .09, .12 and .12 for being type 1, being type 2 and having made law review, respectively. Having graduated in the top 20 percent of the class and accumulated in-school work experience mainly have effects on the probability of getting an offer in the nonprofit sector. The marginal effects of these latter variables on the nonprofit sector offer probability are .01 and .005 per year worked, respectively.

Unobserved type and both measures of scholastic achievement in law school are important elements of the partnership probabilities. The marginal effects on the combined probability of making partner in either a nonelite or elite sector law firm are .05 and .09 for being type 1 and being type 2, respectively. The marginal effects for having made law review and graduating in the top 20 percent of the class are .12 and .04, respectively.

The estimated parameters of the post-graduation wage offer functions indicate that having made law review considerably increases wage offers in the private law firm sectors by 10.5 percent. The returns in the private law firm sectors for having graduated in the top 20 percent, being type 1 and being type 2 are 3.1 percent, 2.6 percent and 5.4 percent, respectively.[48] The estimated coefficients for accumulated in-school work experience in the post-graduation wage offer functions are .007, .005 and .005 per year in the nonprofit, nonelite and elite sectors, respectively.[49]

The estimated wage offer functions also indicate that there is considerable investment value in elite sector experience in the other sectors of the post-graduation labor market. The investment value is relatively highest in the business and nonelite sectors. Elite experience is also highly transferable to the nonprofit sector. It is the high

[48] The returns to scholastic achievement and unobserved type could not be identified in the nonprofit, business and solo sectors due to relatively few accepted wage observations.

[49] The returns to accumulated in-school work experience could not be identified in the business and solo sectors.

degree of transferability of elite sector experience to these latter sectors that explains the early exits from this sector. In anticipation of being denied partnership and being dismissed, individuals with poor promotion prospects in the elite sector increasingly exit to the business, nonprofit and nonelite sectors before the up-or-out employment structure becomes binding. The value of remaining in the elite sector decreases over time as the probability of being dismissed and having no other employment opportunity but to work in the solo sector increases. There is very little payoff to elite experience in the solo sector. Early exits are most common among type 0 individuals that did not make law review.[50]

The estimated job offer arrival rates, promotion probabilities and wage offer functions generate considerable selection into different employment sectors. Of the individuals that are still working in the elite sector (mostly as partners) in year 15, 12 percent are type 0, 23 percent are type 1 and 65 percent are type 2. Thus, 88 percent of the individuals in the elite sector in year 15 are either type 1 or type 2. Types 1 and 2 constitute only 67 percent of the sample. Examining the selection by scholastic achievement in law school reveals that 53 percent made law review and 58 percent graduated in the top 20 percent of the class. These latter types constitute 25 and 39 percent of the sample, respectively. Of those working in the nonprofit sector in year 15, 70 percent are type 0, 19 percent are type 1 and 11 percent are type 2. Only .4 and 25 percent of individuals in the nonprofit sector in year 15 made law review and graduated in the top 20 percent of the class, respectively.

Table 6 displays the fit of the model to the actual choice distribution in years 1, 5 and 15 after graduation. The model is able to reproduce, fairly accurately, the declining proportion of individuals in the nonelite and elite private law firm sectors over time. The declining proportion is due to dismissals and voluntary exits in anticipation of dismissal. The model also reproduces the rising proportions working in the solo and business sectors. The rising proportions are due to entry from the nonelite and elite sectors. The proportion working in the nonprofit sector is, however, somewhat overpredicted in years 1 and 5 and underpredicted in year 15. The model is capable of reproducing quite well the average yearly transitions and the timing of transitions.[51]

Table 7 displays the fit of the model to the observed wage data in years 1, 5 and 15 after graduation. The figures show that mean first year accepted wages are highest in the elite and business sectors and quite close in the nonprofit and nonelite sectors. The model reproduces this pattern. The mean accepted wages in year 15 are highest in the elite, nonelite and business sectors and quite similar in the solo and nonprofit sectors. The model underpredicts mean accepted wages in the elite and business sectors in year 15 but generally captures the changed ordering of mean wages over

[50] The differential transferability of elite sector experience and the up-or-out employment structure explain the observed nonmonotonic separation hazard rates from the elite sector (see Sauer (1998)).

[51] These results, which are similar to those reported in Sauer (1998) , are available from the author upon request.

the five sectors.[52]

5 Discussion

5.1 The Relative Importance of Short-Term Parental Cash Transfers

The relative importance of short-term parental cash transfers can be approximated by computing linear projections of predicted lifetime earnings and consumption on the various factors that influence lifetime outcomes according to the estimated dynamic optimization model. The linear projections use, as data, the $3,000$ simulated event histories that were generated at the maximum point of the simulated maximum likelihood procedure.

The first column of Table 8 displays the results of an OLS regression of the natural log of lifetime earnings on the model's observed initial conditions. The dependent variable is constructed by discounting, using a discount factor of .95, the simulated accepted wages in each year back to the first year after graduation from law school. The results indicate that having an attorney or other professional father increases lifetime earnings by 5.2 percent and having a manager, business owner or teacher father increases lifetime earnings by 2.9 percent over the lifetime earnings of an individual with a blue-collar or other occupation father. It is worth emphasizing that these returns are computed controlling for pre-law school human capital investments, the receipt of parental cash transfers and the availability of initial assets.

The returns to pre-law school human capital investments are relatively weaker than the returns to family background. The returns are 1.9 percent, 1 percent and 1.2 percent for having an Ivy League BA, having an MA and being older upon entry to law school, respectively. The returns to receiving parental cash transfers and the availability of initial assets are similar in magnitude and equal to less than one half of one percent.[53] The weak return to parental cash transfers arises because parental cash transfers encourage in-school work. In-school work lowers lifetime earnings by reducing the proportion of individuals making law review. However, in-school work also increases lifetime earnings through the accumulation of in-school work experience. The return to in-school work experience fully compensates for the loss in lifetime earnings due to lower scholastic achievement.

The second column of Table 8 adds the unobserved type dummies. Given the strong correlation between family background and unobserved type, the effect of family background on lifetime earnings is substantially reduced. The returns to parental cash transfers and initial assets are also further reduced in magnitude. The effect

[52] There are very few wage observations in the solo sector, especially in year one.

[53] The results are not substantially changed by increasing the number of simulations. The standard errors in the linear regressions are not adjusted for the variances of the parameter estimates of the model.

of unobserved type, however, is quite substantial. Type 1 individuals have 11.6 percent higher lifetime earnings and type 2 individuals have 19.4 percent higher lifetime earnings than type 0 individuals.

The third column of Table 8 adds the scholastic achievement measures and accumulated in-school work experience to the observed and unobserved initial conditions. The introduction of these latter variables substantially reduces the returns to unobserved type to 7.8 percent and 13.2 percent for types 1 and 2, respectively. The return to making law review, 18.8 percent, is quite high. The return to graduating in the top 20 percent of the class, 3.9 percent, is relatively weaker but also substantial. The return to accumulated in-school work experience is .6 percent per year and significant.

The fourth column of Table 8 repeats the specification in column 3 but uses the natural log of lifetime consumption, discounted back to the first year of law school, as the dependent variable. The estimated coefficients reveal that parental cash transfers significantly increase the lifetime consumption of offspring by 3.9 percent even when controlling for unobserved type, scholastic achievement and in-school work experience. Each year of in-school work experience increases lifetime consumption by 1.8 percent. The strong effects of parental cash transfers and in-school work experience on lifetime consumption are due to the perverse income effect on in-school labor supply and the lower post-graduation debt burdens among individuals that continue to borrow.

The fifth column of Table 8 replaces the log of lifetime consumption with its level, and replaces the receipt of parental cash transfers and the availability of initial assets with their levels, but otherwise uses the same independent variables as in column 4. The estimated coefficient on parental cash transfers 1.76. Every extra dollar transferred from parent to offspring increases the lifetime consumption of offspring by 1 dollar and 76 cents. The "additionality effect" of parental cash transfers on lifetime consumption is thus 76 cents. An additional regression, not shown in the table, replaces the level of lifetime consumption with the level of post-graduation lifetime consumption only. The estimated coefficient on parental cash transfers is 1.62. The additionality effect can thus be decomposed to 14 cents of increased in-school consumption and 62 cents of increased post-graduation consumption.

5.2 The Effect of Educational Debt on Career Choices

In this subsection a counterfactual loan-forgiveness program is simulated in order to examine the hypothesis, underlying many loan-forgiveness programs, that educational indebtedness affects career choices. Loan-forgiveness programs in many elite law schools in the United States generally provide subsidies to law school graduates that have educational debt and that choose employment in the nonprofit sector.[54] The

[54]The University of Chicago, Columbia University, Cornell University , Georgetown University, Northwestern University, The University of Pennsylvania, Stanford University, The University of Southern California, The University of Virginia, and Yale University all require employment in the nonprofit sector for loan-forgiveness program eligibility. The programs at Harvard University, The

loan-forgiveness program simulated here grants a subsidy, equal in amount to the individual's yearly debt service obligation, whenever a job in the nonprofit sector within the first ten years of graduation is accepted. The yearly subsidies do not have to be repaid if the individual decides to subsequently leave the sector.[55]

The results of the simulation are reported in Table 9. The figures show that the program induces a substitution effect of more borrowing during law school. This is a sensible result considering that the loan-forgiveness program reduces the price of borrowing to the extent that the student expects to work in the nonprofit sector after graduation. The effect is most pronounced on those students that previously worked and did not borrow. These students are now more likely to not work and borrow half of the attendance costs in each year of law school. As a result, average positive indebtedness in the sample increases by 5 percent.

The figures also show that loan-forgiveness has no effect on the first job choice distribution. Individuals that previously entered the nonprofit sector continue to do so under loan-forgiveness. However, they enter the nonprofit sector with higher debt levels. Similarly, individuals with poor promotion prospects in the private law firm sectors, mainly type 0 individuals that did not make law review, continue to enter the private law firm sectors immediately after graduation. The loan-forgiveness subsidies are not enough of an incentive to forgo the considerable investment value of private law firm experience. There are, however, more job transitions to the nonprofit sector by year five after graduation. Individuals with poor promotion prospects in the private law firm sectors exit their jobs earlier and transit to the nonprofit sector more often as the partnership review period approaches and the up-or-out employment structure becomes binding. The figures indicate that entry into the nonprofit sector is mostly from the nonelite sector.

By year fifteen after graduation, participation in the nonprofit sector is higher by 1.2 percent as a result of the loan-forgiveness program. In terms of the baseline percentage of those in the nonprofit sector, participation increases by 13.6 percent. It is important to note, however, that this is most probably a lower bound effect. Educational loan-forgiveness programs should differentially attract more "nonprofit" types of individuals to apply for law school, enter law school, incur educational debt and enter the nonprofit sector.

The results of the counterfactual loan-forgiveness program also suggest that studies that examine the influence of loan-forgiveness, or educational debt, on first job choices only, will bias the program's effect towards zero.[56] The effect of educational debt on later job transitions is an important factor that should be taken into consideration.

University of Michigan and New York University are slightly more general in that they provide assistance on the basis of income level only (Vernon (1989)).

[55] Actual loan-forgiveness programs are generally more restrictive.

[56] See Chambers(1992) and Kornhauser and Revesz (1995) for studies of the effect of loan-forgiveness on the first job choices of law school graduates.

6 Conclusion

In this paper a dynamic programming model of the optimal educational financing decisions and post-graduation career choices of law school graduates is formulated and estimated. The study measures the effect of short-term parental cash transfers, received during school, on in-school work and borrowing decisions and post-graduation lifetime outcomes. The effect of short-term parental cash transfers is assessed relative to the effects of long-term factors such as family background and pre-law school human capital investments. The relative importance of parental cash transfers is analyzed on a different margin than previous studies and a direct measure of parental financial support is incorporated into the analysis. The estimated behavioral model is also used to simulate a counterfactual loan-forgiveness program in order to examine the related hypothesis that educational debt affects post-graduation career choices. Examination of the effects of parental cash transfers on lifetime outcomes and the influence of educational debt on post-graduation career choices is motivated by recent changes in education policy.

The estimated parameters of the model imply that short-term parental cash transfers do not significantly influence post-graduation lifetime earnings. Parental cash transfers encourage in-school work thus hurting scholastic achievement and post-graduation lifetime earnings. However, accumulated in-school work experience has a significant payoff in the post-graduation labor market thus increasing post-graduation lifetime earnings. The negligible overall effect implies that accumulated in-school work experience fully compensates for the loss in lifetime earnings due to lower scholastic achievement.

Parental cash transfers do, however, have a significant effect on lifetime consumption. Some individuals use parental cash transfers as a wage subsidy in order to achieve high levels of consumption while in school. Other individuals that continue to borrow with the receipt of parental cash transfers have lower post-graduation educational debt burdens and thus higher lifetime consumption. An extra dollar transferred from parent to offspring is estimated to increase the lifetime consumption of offspring by 1 dollar and 76 cents. The additionality effect of 76 cents can be decomposed into 14 cents of increased in-school consumption and 62 cents of increased post-graduation consumption.

The estimated parameters of the model also suggest that educational debt has only a modest influence on post-graduation career choices. The outcome of a simulated counterfactual loan-forgiveness program that subsidizes debt payments in return for accepting a job in the nonprofit sector indicates that law school graduates that would have entered the nonprofit sector without loan-forgiveness continue to do so. However, they enter the nonprofit sector with more debt. Individuals with generally poor promotion prospects in private law firms also continue to enter the private law firm sectors immediately after graduation. However, these latter individuals exit their jobs earlier and more often transit to the nonprofit sector under loan-forgiveness. The loan-

forgiveness program thus succeeds in increasing participation in the nonprofit sector, fifteen years after graduation, by 1.2 percent.

Due to data and computational limitations, the model in this paper could not explicitly take into account the decision to optimally allocate resources over the three years of law school nor the decision to save summer earnings. A more complete model would incorporate these decisions. In addition, further extensions could model the decision of parents to contribute resources in reaction to the work decisions of offspring. Future research could also examine the effect of parental cash transfers on the decision to acquire a legal education and the extent to which differences in parental cash transfers by gender explain the large gender gap in lawyers' salaries.[57]

[57]Wood, Corcoran and Courant (1993) use the UMLS data to study the gender earnings gap. Spurr and Sueyoshi (1994) look at gender differences in promotion to partner in private law firms. Biddle and Hamermesh (1998) examine the role of beauty and discrimination in explaining gender differences in the market for lawyers.

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Table 1
Descriptive Statistics

Variables	Symbol	Mean	Std. Dev.	N
Father's Occupation at Entry to Law School:				658
Blue Collar or Other Occupation	F_0	.415	-	
Attorney or Other Professional	F_1	.173	-	
Mgr., Business Owner or Teacher	F_2	.412	-	
Ivy League BA	Ivy	.120	-	658
Masters Degree	MA	.090	-	658
Age	age	22.9	2.3	658
LSAT	$LSAT$	707	41.7	658
Out-of-State Student	OS	.602	-	658
Law Review	lr	.246	-	658
Top 20% of Law School Class	$t20$	.391	-	658
Parental Cash Transfers:	tr_t^p			
>0		.606	-	650
3 Year Total		16,934	10,156	394
Initial Assets:	tr_t^a			
>0		.48	-	658
3 Year Total		12,643	8,574	311
Educational Debt:	D_3			
>0		.612	-	645
Total		21,021	14,930	395
Earnings:	$\overline{w}_t e^{\varepsilon_{wt}}$			
>0		.465	-	658
3 Year Total		9,637	6,639	302

Table 2
Average Type Probabilities
by Father's Occupation

	Average Type Probabilities		
	$Pr(Type0)$	$Pr(Type1)$	$Pr(Type2)$
Father Blue Collar	.405	.326	.269
Father Attorney/Prof.	.138	.358	.504
Father Mgr./Teacher	.340	.212	.448

Table 3
Actual and Predicted
Law School Choice Distribution

	No Work Don't Borrow	No Work Borrow Half	No Work Borrow Full	Total	Work Don't Borrow	Work Borrow Half	Total
Year 1							
Actual	-	-	-	.790	-	-	.210
Predicted	.274	.302	.218	.794	.206	.000	.206
Year 2							
Actual	-	-	-	.629	-	-	.371
Predicted	.193	.249	.215	.657	.343	.000	.343
Year 3							
Actual	-	-	-	.569	-	-	.431
Predicted	.191	.137	.219	.547	.368	.085	.453

Table 4
Actual and Predicted
Law School Transition Matrix

	No Work	Work
No Work		
Actual	.782	.218
Predicted	.792	.208
Work		
Actual	.134	.866
Predicted	.100	.900

Table 5
Actual and Predicted
Educational Debts, Law School Earnings
and Law School Scholastic Achievement

	No Debt	Less Than $15,000	$15,000-$30,000	More Than $30,000	Mean Debt >0
Actual	.388	.226	.273	.113	21,021
Predicted	.479	.218	.256	.047	20,165

	Earnings > 0	Mean Earnings	Law Review	Top 20
Actual	.465	9,637	.246	.391
Predicted	.508	11,242	.242	.432

Table 6
Actual and Predicted
Post-Graduation Choice Distribution

	Solo	Business	Nonprofit	Nonelite	Elite
Year 1					
Actual	.005	.044	.096	.403	.452
Predicted	.010	.026	.117	.398	.450
Year 5					
Actual	.018	.114	.119	.396	.355
Predicted	.022	.102	.134	.360	.382
Year 15					
Actual	.047	.188	.119	.368	.278
Predicted	.054	.170	.088	.374	.313

Table 7
Actual and Predicted
Post-Graduation Mean Accepted Wages
($1992)

	Solo	Business	Nonprofit	Nonelite	Elite
Year 1					
Actual	19,432	46,559	35,006	36,826	49,252
Predicted	30,643	43,011	37,791	37,187	47,088
Year 5					
Actual	43,680	55,546	40,309	53,337	62,427
Predicted	44,449	65,806	46,229	55,679	70,147
Year 15					
Actual	65,642	138,859	69,850	136,358	200,331
Predicted	54,774	128,865	64,044	138,314	171,404

Table 8
Lifetime Earnings and Consumption Regressions

Variable	Log of Lifetime Earnings (1)	(2)	(3)	Log and Level of Lifetime Consumption (4)	(5)
Cons.	13.571	13.485	13.453	13.253	582,406
	(.010)	(.010)	(.009)	(.009)	(5,479)
F_1	.052	.002	.001	.025	−3,667
	(.010)	(.010)	(.009)	(.009)	(6,160)
F_2	.029	.008	.002	.010	111
	(.008)	(.007)	(.007)	(.007)	(4,353)
Ivy	.019	−.006	−.000	.001	−5
	(.011)	(.010)	(.009)	(.009)	(5,696)
MA	.010	.011	.006	.005	2,202
	(.013)	(.012)	(.011)	(.011)	(6,887)
$I\,(age > 24)$	.012	−.003	−.005	−.004	−2,834
	(.010)	(.009)	(.008)	(.008)	(5,691)
OS	−.012	.003	.001	−.012	−11,194
	(.007)	(.007)	(.006)	(.006)	(3,950)
$I\,(LSAT > 737)$	.020	.010	.009	.009	5,784
	(.008)	(.008)	(.007)	(.007)	(4,390)
tr_t^p	.003	−.001	.002	.039	1.76
	(.007)	(.007)	(.006)	(.006)	(.22)
tr_t^a	.004	−.001	−.001	.029	1.63
	(.007)	(.007)	(.006)	(.006)	(.29)
A_1		.116	.078	.084	52,664
		(.009)	(.008)	(.008)	(5,449)
A_2		.194	.132	.134	85,585
		(.008)	(.008)	(.008)	(5,185)
lr			.188	.186	132,917
			(.007)	(.007)	(4,621)
*t*20			.039	.039	27,948
			(.006)	(.006)	(4,115)
hr_t			.006	.018	12,097
			(.003)	(.003)	(1,883)

Note: Lifetime earnings are post-graduation only. Lifetime consumption includes consumption during law school. The linear projections are run on the 3,000 simulated event histories generated at the maximum of the simulated maximum likelihood procedure. Standard errors (in parentheses) are not adjusted for the variances of the estimated parameters of the model.

Table 9
Loan-Forgiveness Simulation
Choice Distributions

Law School

	No Work Don't Borrow	No Work Borrow Half	NoWork Borrow Full	Total	Work Don't Borrow	Work Borrow Half	Total
Year 1							
Baseline	.274	.302	.218	.794	.206	.000	.206
Forgive	.274	.334	.219	.827	.173	.000	.173
Year 2							
Baseline	.193	.249	.215	.657	.343	.000	.343
Forgive	.193	.284	.217	.693	.307	.000	.307
Year 3							
Baseline	.191	.137	.219	.547	.368	.085	.453
Forgive	.191	.145	.238	.575	.341	.085	.425

Post Graduation

	Solo	Business	Nonprofit	Nonelite	Elite
Year 1					
Baseline	.010	.026	.117	.398	.450
Forgive	.010	.026	.117	.398	.450
Year 5					
Baseline	.022	.102	.134	.360	.382
Forgive	.022	.101	.151	.347	.380
Year 15					
Baseline	.054	.170	.088	.374	.313
Forgive	.054	.169	.100	.365	.312

Appendix A
Survey Response Rates
by Class Year

Class Year	Class Size	Response Rate	Female Respondents	Male Respondents	White Male Respondents	Sample Size
1976	363	.680	58	189	181	122
1977	383	.635	56	187	168	108
1978	360	.625	52	173	156	101
1979	399	.576	58	172	159	96
1980	349	.653	65	163	155	113
1981	359	.643	59	172	163	118
Total	2213	.635	348	1056	982	658

Note: The response rates are for the more comprehensive fifteen year survey only.

Appendix B
UMLS Costs of Attendance
by Class Year
($1992)

Class Year	Out-of-State 3 year Costs of Attendance ($tc + c\min$)	In-State 3 year Costs of Attendance ($tc + c\min$)	3 year Living Expenses ($c\min$)
1976	31,495	26,771	14,919
1977	32,148	27,236	15,251
1978	32,519	27,642	15,332
1979	32,814	27,892	15,328
1980	35,314	30,008	15,891
1981	36,381	30,924	15,969

Note: Living expenses are equal to the total costs of attendance minus total tuition costs.

Appendix C
SML Parameter Estimates and t-Values
(Initial Conditions)

Unobserved Type Probability and Endowment Level Parameters

Variables	π^{A_1}	π^{A_2}	$\ln(tr_t^p)$	$\ln(tr_t^a)$
$Cons.$	-0.114	-0.434	8.150	8.134
	(-0.32)	(-1.24)	(53.98)	(45.78)
F_1	1.186	1.648	0.916	0.128
	(2.19)	(2.98)	(3.71)	(0.54)
F_2	-0.284	0.731	0.420	-0.013
	(-0.71)	(2.01)	(2.44)	(-0.08)
Ivy	0.035	0.592		
	(0.05)	(1.16)		
$I(age_0 > 24)$	-0.343	0.338	-0.572	0.703
	(-0.56)	(0.72)	(-2.29)	(2.13)
MA	-0.971	-0.061		
	(1.63)	(-0.09)		
OS	-0.334	-0.400	0.130	0.024
	(-0.92)	(-1.17)	(0.87)	(0.16)
$I\,(LSAT \geq 737)$	0.458	0.466		
	(1.10)	(1.21)		
A_1			0.015	0.058
			(0.07)	(0.28)
A_2			0.096	0.064
			(0.47)	(0.35)

Observed Type and Endowment Probability Parameters

λ_{f_1}	λ_{f_2}	λ_{ivy}	λ_{age}	λ_{ma}	λ_{os}	λ_{lsat}	λ_{tr^p}	λ_{tr^a}
-0.815	0.045	-1.800	-1.7299	-2.361	0.474	-1.117	0.444	-0.033
(-2.84)	(0.16)	(-6.56)	(-7.00)	(-7.95)	(1.65)	(-3.81)	(1.68)	(-0.12)

Note: t-Values are in parentheses. π^{A_j} and λ_{f_j} are multinomial logistic. λ_{ivy}, λ_{ma}, λ_{age}, λ_{os}, λ_{lsat} λ_{tr^p} and λ_{tr^a} are binomial logistic functions.

Appendix C (cont'd)
SML Parameter Estimates and t-Values

Unobserved Asset, Law School Wage Offer and Scholastic Achievement Parameters

Variables	$\ln(tr_t^u)$	$\ln(\overline{w}_t)$	π^{lr}	π^{t20}
Intercept	7.759	8.315	−2.148	−1.301
	(2.50)	(48.17)	(−20.08)	(−1.90)
hr_t		0.035	−0.354	0.001
		(2.22)	(−3.15)	(0.53)
A_1		0.458	1.050	1.050
		(2.28)	(2.25)	(2.25)
A_2		0.152	1.524	1.524
		(1.60)	(2.97)	(2.97)

Law School Error Distribution, Utility Function and Discount Factor Parameters

$\ln(L_{11})$	L_{21}	$\ln(L_{22})$	$\ln(1-\mu_4)$	λ	δ_{A_1}	δ_{A_2}
−2.116	0.061	−2.694	−1.960	1.228	0.946	0.856
(−0.92)	(1.59)	(−1.50)	(−1.98)	(48.17)	(2.01)	(2.52)

Measurement Error, Classification Error and Terminal Value Function Parameters

$\ln(\sigma_{ls})$	$\ln(\alpha_{ls})$	$\ln(\sigma_{ml})$	$\ln(\alpha_{ml})$	E	α_T
−0.242	8.038	−0.976	0.108	0.821	2.859
(−9.50)	(108.58)	(−74.20)	(2.56)	(141.42)	(1.09)

Note: t-Values are in parentheses. π^{lr} and π^{t20} are logistic functions. The L_{ij}'s are the Cholesky elements for the bivariate normal distribution $(\varepsilon_{ut}, \varepsilon_{wt})$. σ_{ls}^2 is the measurement error variance for the observed continuous law school data. $\sigma_{ml.}^2$ is the measurement error variance for post-graduation accepted wage offers. α_{ls} and α_{ml} are shift parameters for misclassified continuous data and E is the base classification error rate for all discrete outcomes. α_T is the terminal value proportionality constant.

Appendix C (cont'd)
SML Parameter Estimates and t-Values

Post-Graduation Wage Offer, Error Distribution and Utility Function Parameters

Variable	Solo	Business	Nonprofit	Nonelite	Elite
Cons.	10.330	10.664	10.530	10.441	10.681
	(93.57)	(148.18)	(152.09)	(353.84)	(360.00)
A_1				0.026	0.026
				(0.52)	(0.52)
A_2				0.054	0.054
				(1.31)	(1.31)
lr				0.105	0.105
				(3.21)	(3.21)
$t20$				0.031	0.031
				(0.99)	(0.99)
hr_3			0.007	0.005	0.005
			(0.24)	(0.37)	(0.37)
x_{1t}	0.106	0.104	0.052	0.103	0.078
	(1.12)	(3.14)	(2.17)	(48.16)	(4.38)
x_{1t}^2	−0.005	−0.003	−0.001	−0.009	
	(−0.75)	(−1.30)	(−0.40)	(−3.37)	
x_{2t}	0.105	0.124	0.081	0.122	0.098
	(1.87)	(4.70)	(2.15)	(4.35)	(4.25)
x_{2t}^2	−0.011	−0.003	−0.001	−0.002	−0.001
	(−1.17)	(−0.92)	(−0.07)	(−0.43)	(−0.40)
Part.				0.080	0.070
				(353.53)	(106.59)
$\ln(L_{kk})$	−1.785	−1.785	−3.253	−4.191	−3.868
	(−12.97)	(−12.97)	(−1.89)	(−1.81)	(−2.14)
L_{2k}	−0.157				
	(−6.01)				
L_{3k}	0.034	0.054			
	(0.48)	(0.89)			
L_{4k}	−0.013	−0.006	−0.001		
	(−0.33)	(−0.16)	(−0.02)		
$\ln(1-\mu_k)$	−0.895	−2.862		−2.788	−2.881
	(−0.16)	(−0.40)		(−131.03)	(−1.31)

Note: t-Values are in parentheses. The L_{jk}'s are the Cholesky elements for the joint normal distribution ε_{kt}, $k = 1, ..., 7$.

Appendix C (cont'd)
SML Parameter Estimates and t-Values

Post-Graduation Offer Probability Parameters

Variables	Business	Nonprofit	Nonelite Associate	Elite Associate	Nonelite Partner	Elite Partner
Cons.	1.018	2.109	2.676	2.676	0.557	−1.970
	(1.51)	(1.37)	(2.15)	(2.15)	(1.75)	(−1.67)
A_1		−0.070	0.1643	0.5590	1.394	0.683
		(−0.95)	(1.26)	(1.89)	(2.15)	(1.79)
A_2		0.108	1.268	1.364	1.515	2.832
		(1.05)	(1.91)	(2.17)	(2.61)	(2.87)
lr		0.695	2.257	2.257	3.255	6.018
		(2.03)	(2.22)	(2.22)	(3.10)	(4.25)
*top*20		0.474	0.314	0.314	0.515	1.677
		(1.94)	(1.68)	(1.68)	(1.51)	(1.86)
hr_3	0.016	0.016	0.016	0.016		
	(1.20)	(1.20)	(1.20)	(1.20)		
$I\,(t \geq 4)$	−0.070	−0.070	−0.070	−0.070		
	(−0.34)	(−0.34)	(−0.34)	(−0.34)		
Solo	−7.190	−7.190	−7.190	−7.190		
	(−1.64)	(−1.64)	(−1.64)	(−1.64)		
Business		−8.185	−8.185	−8.185		
		(−1.75)	(−1.75)	(−1.75)		
Nonprofit	−3.521		−3.639	−5.735		
	(−1.35)		(−1.36)	(−1.61)		
Nonelite	−3.786	−3.638		−6.415		
	(−1.29)	(−1.32)		(−1.51)		
Elite	−2.673	−2.078	−1.997			
	(−1.89)	(−1.99)	(−2.05)			
x_{1t}					0.332	
					(1.05)	
x_{2t}						0.027
						(0.98)
P_{ck}					−2.931	−3.275
					(−2.01)	(−2.52)

Note: t-Values are in parentheses. The first job offer probabilities and on-the-job offer probabilities are multinomial logistic. The probability of coming up for review and the partnership probabilities are binomial logistic functions.