In Debt and Alone? Examining the Causal Link between Student Loans and Marriage

Dora Gicheva*

June 2013

Abstract

I examine the relationship between student debt and marital status. I use exogenous variations in the availability of education loans to address the endogeneity of debt. The life-cycle consumption smoothing model with perfect credit markets predicts that student loans should not affect the timing of family formation. I show that the amount of debt is negatively related to the probability of marriage. Data on reported marriage expectations suggest that student borrowers may not have perfect foresight. The results are consistent with the presence of liquidity constraints for recent postsecondary graduates.

Keywords: Student Loans, Borrowing Constraints, Timing of Marriage

JEL Classification Codes: D12, I22, J12

*Department of Economics, University of North Carolina at Greensboro, PO Box 26170, Greensboro, NC 27402, USA. E-mail: d_gichev@uncg.edu. Phone: +1 (336) 334-4865. Fax: +1 (336) 334-5580.

"*The debt load keeps [Dr. Bisutti] up at night. Her damaged credit has prevented her from buying a home or a new car. She says she and her boyfriend of three years have put off marriage and having children because of the debt.*"

– *The $555,000 Student-Loan Burden*, The Wall Street Journal, February 13, 2010

1 Introduction

The importance of student loans has been growing over the past four decades. In the 2008-2009 academic year, total student loans amounted to almost $98 billion. This number, adjusted for inflation, is more than twice as large as it was ten years earlier and 15 times larger than the total amount of student loans in the 1970-1971 academic year, when subsidized Stafford loans were introduced. This number is also considerably above the $26 billion in federal grants and $30 billion in institutional grants awarded in the 2008-2009 academic year. Of Bachelor's degree recipients in 2008-2009, 55% of those at public colleges and universities and 65% at private nonprofit institutions borrowed for their education; the average borrower accumulated over $20,000 in debt. Two-thirds of graduate degrees are financed through loans; the average graduate loan debt is currently over $40,000.[1]

In light of the increasing debt burdens of undergraduate and graduate students, there has been an onset of a discussion about the long-term implications of debt accumulated for postsecondary education. Several recent studies have examined the impact of student loans on the career choices that young people make. Minicozzi (2005) finds that education debt is correlated with higher earnings right after college but lower four-year wage growth and attributes the observed difference to borrowers making different

[1] All data are from the College Board (2010).

career choices when faced with higher post-graduation interest rates compared to non-borrowers. Using an experiment involving financial aid assignment at a top school, Field (2009) finds that law students' career choices are also sensitive to accumulated education debt. She argues that the most likely reason for the observed outcomes is the psychic or social cost of debt. Similarly, Rothstein and Rouse (2011) find that undergraduate student borrowers from a highly selective university are less likely to choose jobs in lower-paying sectors like government, nonprofit and education. They argue that both credit constraints and psychic costs can explain the observed difference and present some evidence in favor of the former.

In this paper I present further evidence that loans for postsecondary education impose constraints on recent graduates, and show that the impact of such constraints is not limited to career choices. Little academic research has been done on the role of student debt on the decision to start a family.[2] However, popular media sources such as *The New York Times* and *The Wall Street Journal* have turned their attention to this issue (e.g. Chaker 2009, Pilon 2010, Lieber 2010, Mitchell 2012). I find a causal relationship between student loans and marriage outcomes, which is in line with previous studies such as Minicozzi (2005), Field (2009) and Rothstein and Rouse (2011), as well as with other existing research that suggests the presence of fairly strong liquidity constraints unrelated to student borrowing but with an observable effect on consumption patterns.[3]

[2]Two studies whose findings relate to this topic are Choy and Carroll (2000) and Chiteji (2007). Based on descriptive statistics from the *Baccalaureate and Beyond* longitudinal study of 1992-1993 college graduates and the PSID, respectively, both studies find that student or other types of debt are not correlated with the timing of marriage. My results suggest that the apparent lack of an effect may be due to simultaneity bias.

[3]Zeldes (1989) presents evidence from the PSID that borrowing constraints are an important source of observed deviations from the permanent income hypothesis. Jappelli (1990) reports that 20 percent of respondents in the SCF between the ages of 20 and 35 have been turned down by creditors recently. Gross and Souleles (2002) find evidence that credit card limits are binding as borrowing constraints because credit limit increases are associated with increased debt accumulation. Other examples include Souleles (1999), Warner and Pleeter (2001), and Johnson, Parker and Souleles (2006).

Some of my results are representative of a much broader population of postsecondary students compared to Field (2009) and Rothstein and Rouse (2011). I am also able to draw some inferences about the persistence of liquidity constraints related to student debt and the degree to which future constraints are anticipated by borrowers.

The main empirical challenge in investigating the relationship between student debt and marriage is the likely endogeneity of education loans. If anticipated or realized marriage outcomes affect students' borrowing decisions, this would lead to simultaneity bias. I employ two different identification strategies to address the endogeneity problem. First, I use the Survey of Consumer Finances (SCF), a repeated cross-sectional data set that allows me to instrument for the amount borrowed using exogenous temporal variations in the availability of federal and private student loans. This instrumental variable approach relies on changes in the limits and eligibility for federal loans, in particular after the 1992 reauthorization of the Higher Education Act, and the emergence of the private education lending market after 1995. Second, I address the potential endogeneity by using a much more homogeneous sample and removing a large portion of the unobserved heterogeneity. I use a panel survey of men and women who registered to take the Graduate Management Admission Test (GMAT) between 1990 and 1991. All student loans in these data are accrued for the same type of education (Master's of Business Administration).

I find that borrowing an additional $10,000 for education decreases the probability of marriage by about 7 percentage points for men and women in the SCF born after 1964 and 29 years of age or older. This relationship is similar but somewhat weaker when the sample is restricted to college graduates, which ignores the effect of student loan availability on the extensive margin of educational attainment. It is important to account for the endogeneity of student debt because otherwise the relationship is

statistically and economically indistinguishable from zero. The results are specific to legal marital status and do not apply to cohabitation. The corresponding decrease in the probability of marriage in the GMAT Registrant Survey sample is 3 to 4 percentage points per $10,000 in student debt when age is below the median of the sample and smaller in absolute value for older respondents. In this data set the estimated effect is somewhat larger for women. I use information from the GMAT Registrant Survey on marriage expectations to show evidence that borrowers anticipate part but not all of this effect and that education expenditures and the amount of debt are weakly correlated with anticipated marital status. The main results conflict with the traditional life-cycle model with perfect credit markets, which predicts that student loans should have little effect on consumption at any given point in time.

The rest of the paper proceeds as follows. In the next section I present the conceptual framework behind the relationship between student loans and marriage outcomes. Next, I describe in more detail the data, empirical models and results, first for the SCF (Section 3) and then for the GMAT Registrant Survey (Section 4). I offer a discussion of the results in Section 5.

2 Conceptual Framework

I focus on student loans, rather than other common forms of debt such as credit card borrowing or mortgages, for several reasons. The timing of student loans is appropriate for the investigation of the relationship between debt and family formation because it is common for the accumulation of student debt to precede marriage. The reasons for accumulating other types of debt may be related to marriage outcomes in multiple ways so it would be harder to disentangle all of the confounding factors. For example, credit

card debt may be used to pay for wedding expenditures, which would result in a positive relationship between debt and the probability of being married. Medical bills are another common source of debt, and health problems may also have a direct effect on marriage. Changes in the federally mandated limits on student loans, the availability of nonfederal loans, and the cost of undergraduate and graduate education offer exogenous variations in the amount borrowed by a typical student. Additionally, in most cases these loans cannot be discharged in personal bankruptcy.[4]

Under the permanent income hypothesis with no credit constraints, student borrowing should not induce a dip in consumption for recent graduates because loan repayment will be distributed over the life cycle. Rothstein and Rouse (2011) calculate that $10,000 in student debt represents less than 1% of the present value of the typical college graduate's lifetime income. As a result, student loans should not produce a noticeable change in observable consumption patterns for most borrowers, in particular the timing or probability of marriage.

Post-graduation liquidity constraints can explain the delay in family formation associated with student debt when combined with a fixed cost of marriage. Mira and Ahn (2001) point out that fixed costs, such as housing and household equipment expenditures, may be part of the reason for the negative relationship they find between unemployment and age at marriage.[5] The fixed cost can be interpreted more broadly: for example, it can represent a certain buffer amount of wealth that people seek to accumulate before starting a family. Hotz, Klerman and Willis (1993) allude to the presence

[4]Under Title 11, Section 523 of the United States Code.

[5]Wedding expenditures often constitute another component of the fixed cost. A recent article in *The Wall Street Journal* on student debt provides an example: "Zack Leshetz, a 30-year-old lawyer in Fort Lauderdale, Fla., has $175,000 in student loans from his seven years in college and law school. [...] He has also been engaged since March, but has held off on marriage. "There's no way I can pay for a dream wedding, or even just a regular wedding," Mr. Leshetz says" (Chaker 2009).

of precautionary savings motives in decisions about the timing of childbearing.[6] Another interpretation of the cost comes from search models of the marriage market, in which the probability of meeting a potential spouse is increasing in the cost of search.[7] To translate this theory into a more specific example, a liquidity constrained young college graduate may need to work longer hours in order to make the required loan payments and have less time to spend on social activities that may lead to meeting a spouse. In a world in which perfect consumption smoothing is possible, it could be optimal for this worker to delay the payments until after starting a family.

Student loans may have an impact on the likelihood of finding a partner or the likelihood of transitioning into marriage. The latter is more consistent with the idea of borrowing constraints combined with a fixed cost of marriage. If loans have an impact on the probability of finding a partner, this could mean that debt acts as an undesirable characteristic in the matching process. To address this issue, I explore whether marriage and cohabitation can be treated similarly or if they are distinct outcomes in the context of this study.

The delay or decrease in the lifetime probability of marriage is one unintended policy effect of student loans. Its association with liquidity constraints has broader implications about the credit constraints faced by consumers in their 20s and 30s and is important for policy considerations, for example evaluating the potential effects of stimulus payments distributed through the tax code. Given that student borrowing is common, the treated population is fairly large. Another problem, discussed in Avery and Turner (2012), is the need to learn more about and educate students how to make more efficient borrowing

[6] My study focuses on the relationship between student debt and marriage; a preliminary investigation of the relationship between education loans and fertility produced similar findings. The interpretation of the fertility results is not as straightforward because the amount of accumulated debt can affect the timing and number of births directly or through changes in the probability of marriage.

[7] Montgomery and Trussell (1986) offer a survey of these models.

decisions. If student borrowers do not anticipate the post-graduation credit constraints at the time when education investment decisions are made, the amount they borrow may not be optimal. This could be a source of inefficiency in their long-term schooling and consumption decisions. If borrowers foresee at least part of the negative impact of educational debt on borrowing constraints later in life, my results can account for some of the possibly excessive debt aversion that studies of education loans (e.g. Heller 2008, Field 2009, Oosterbeek and van den Broek 2009, Linsenmeier, Rosen and Rouse 2006) have encountered. Pinpointing one of the reasons for the aversion to education debt – concern about the access to credit markets after graduation – would be helpful in developing initiatives to increase enrollment and completion rates among students who need financial assistance.

3 Empirical Evidence: Survey of Consumer Finances

The first data set used in the analysis is the Survey of Consumer Finances, sponsored by the Federal Reserve Board in cooperation with the Department of the Treasury. The survey, conducted triennially, collects detailed information about households' six most recent student loans, including their amounts and the years in which these loans were taken out. This allows me to use student debt data that cover a long time period. I use the six surveys conducted between 1995 and 2010, for which the marital status variable is consistent.

I use survey respondents, rather than the household heads, in the estimation; the respondent is the household head two thirds of the time. Some variables in the SCF, such as race, are not available for household heads. I use the first of the five imputations

provided in the public use data.[8] The estimation sample consists of respondents who were born after 1964; this ensures that they turned 18 after 1982, so they made their education borrowing decisions once the federal student loan program was well-established. A minimum age cutoff of 29 years is imposed in order to limit the estimation sample to individuals who are "at risk" of marriage.[9] The final sample consists of 2,230 men (466 of whom have students loans) and 2,565 women (635 with student loans).

The dependent variable I use is constructed from the survey question asking about legal marital status; this variable equals 0 if a respondent has never been married and 1 otherwise. I also estimate a version of the model in which a value of 1 indicates marriage or cohabitation in order to understand better the mechanism through which student debt works. The main independent variable in the analysis is the amount borrowed for education. I use the available information about a respondent's six most recent student loans. I use the CPI for all urban consumers to convert the amounts to 2011 dollars and sum the resulting values for each individual to construct an inflation-adjusted measure of the total amount borrowed. Other explanatory variables include race and age. To control for the highest level of education completed, I include indicators for Bachelor's, Master's and Doctorate degrees.

Table 1 shows summary statistics for the SCF variables I use in the analysis. The sample is divided by gender and zero or positive amount borrowed for education. Borrowers tend to be younger, which is consistent with the aggregate trends toward increasing debt burdens. This can account in part for why fewer of them have been married, but as the more formal analysis in Section 3.2 shows, age differences do not account for all of the gap. It is not surprising that respondents who have student loans tend to be higher

[8] Appendix A shows coefficient estimates for the main variable of interest, the amount of student loans, using the other four imputations. The results are almost identical.

[9] While this age cutoff is somewhat arbitrary, changing it slightly does not change the results substantially.

educated: they are more than 10 percentage points more likely to have a Bachelor's degree or higher.[10] The average amount borrowed, conditional on having any student debt, is $44,000 for men and $33,000 for women. Table 1 also shows the distribution of responses by survey wave. Later survey years have higher representation because of the age restriction I impose on the sample, but the distribution does not differ much for borrowers and non-borrowers.

3.1 Empirical Specification and Assumptions

The baseline specification I estimate is a probit model in which marital status m_i is determined by the unobserved continuous variable

$$m_i^* = \beta L_i + X_i\delta + u_i, \tag{1}$$

where X_i is a vector of exogenous explanatory variables and L_i measures the total amount borrowed for education. The outcome observed in the data is $m_i = 1$ if $m_i^* \geq 0$ and $m_i = 0$ otherwise. The results are likely to be affected by simultaneity bias if current or anticipated marital status affects borrowing. To correct for this, I also estimate an instrumental variable probit model by maximum likelihood.[11] The reduced form relationship between loan size L_i and the exogenous regressors, including the instrument Z_i, is

$$L_i = Z_i\pi_1 + X_i\Pi_2 + \nu_i.$$

The instrument for the size of accumulated student debt exploits the exogenous

[10]The proportion of SCF respondents with a postsecondary degree is somewhat higher than the average for the U.S. population, which is consistent with the fact that the SCF slightly oversamples high-asset households.

[11]The result patterns are similar but slightly noisier when using linear probability models or a two-step IV probit estimator.

variations in the availability and take-up of student loans. Using aggregate loan data from the College Board (2012), I construct a variable that equals the average amount (in real dollars) borrowed per full-time student in the year when the respondent was 17 years old.[12] I use take-up rates rather than the federal limits on student loans for several reasons. A few of the changes in the student loan program, including the 1992 reauthorization of the Higher Education Act, involved both an increase in the maximum loan limits and an expansion of the pool of eligible students, so the limits alone would understate the increase in debt burdens. If more information about federal and private loans is available to later cohorts, this can also play a role in the amount borrowed by the average student. Last but not least, take-up rates account for the increasing cost of postsecondary education.

Figure 1 illustrates the annual fluctuations in the average amount borrowed by full-time students between the 1971-72 and 2009-10 academic years. The amounts are adjusted for inflation, and the calculations include students who did not borrow. The first notable jump in student debt occurred in the late 1970s and early 1980s with the passage of the Middle Income Student Assistance Act of 1978, which made subsidized loans available to more students by removing the family income cap. Additionally, in 1979 Congress passed an amendment that provided more capital for the guaranteed loan program from private lenders, and the 1980 reauthorization of the Higher Education Act (HEA) of 1965 provided more borrowing sources for the parents of dependent college students and for financially independent undergraduates. There was a small spike after the 1986 reauthorization of the HEA, which provided a slight increase in the limits on borrowing. The most pronounced increase in student loans occurred after the 1992 reauthorization of the HEA. Under the Stafford loan program, the upper limit on the

[12]This could be the year when respondents turned 17 or 18, depending on whether they were interviewed before or after their birthday.

cumulative amount borrowed increased from $17,250 to $23,000 for dependent undergraduates. The limits on annual borrowing also went up. As a result, the total volume of federal loans increased from $16,222 million to $22,551 million between the 1992-1993 and 1993-1994 academic years: a 39% increase. The amount borrowed per full-time student went up by 32 percent (College Board 2012). The other important step in the development of the student loan program was the emergence of private loans starting with the 1995-1996 school year. The 2006-07 and 2007-08 academic years marked the highest point for nonfederal loans, when they accounted for a quarter of all debt. Figure 1 also shows the average amount borrowed from the SCF data divided by the number of SCF respondents who were at least 17 years old in a given year. The trends in the SCF data are similar to the aggregate student borrowing trends, including a gradual increase over time with a slightly steeper slope after the 1992 reauthorization of the HEA.

Using variations in the availability of federal student aid is similar to the approach that other studies, such as Dynarski (2003), Abraham and Clark (2006), Cornwell, Mustard and Sridhar (2006), Kane (2007) and the papers reviewed in Dynarski (2002), use to deal with the endogeneity of schooling outcomes. The instrument used here, which is strongly related to the propensity to borrow for postsecondary education, should be exogenous in the marriage regressions because, holding education constant, administrative changes in federal student aid have no direct effect on marital status. I include a polynomial in age that would absorb most cohort effects, and in addition I focus on a time period when marriage rates for college graduates did not change much over time (Figure 2). A necessary condition for the instrument to have predictive power is that the limits on student loans are a binding constraint for many individuals.[13] The aggre-

[13]The evidence on the extent to which there exist binding constraints on student borrowing is mixed, which may in part be due to an increase over time in the degree to which education borrowing constraints bind (Belley and Lochner 2007). Keane and Wolpin (2001) and Cameron and Taber's (2004) studies find that borrowing constraints do not affect education outcomes, but there may be an effect on consumption

gate student loan data that I present below suggest that the total amount borrowed by students in the U.S. is sensitive to changes in the federally mandated borrowing limits, which is indicative of binding constraints for a nonnegligible fraction of students.

One potential problem that may be caused by variations in the eligibility requirements and cost-induced changes in the pool of student borrowers would arise if the composition of borrowers changes in a way that is related to marriage outcomes. For example, if students from higher-income families are precluded from holding education debt prior to but not after the expansion of the student loan program, and family wealth is positively correlated with the probability of marriage, then one may see a positive correlation between student debt and the probability of marriage, without this relationship being causal. Such a relationship between the composition of borrowers and the probability of marriage would have to operate independent of education levels, which I control for in the estimation, and would have to not apply to cohabitation because the results I present are specific to marriage. As one robustness check I replicate the main estimation results on a restricted sample of Bachelor's degree recipients, which confirms that the results are not fully driven by the changing demographics of college students.

Another empirical issue is that the student loan variable in the SCF combines the amount borrowed by respondents and their spouses, so this variable is subject to nonrandom measurement error. Such measurement error is likely to lead to an underestimation of the true magnitude of the relationship of interest, as the example below demonstrates.

while in school. Carneiro and Heckman (2002) estimate that no more than 8 percent of college students in the U.S. are affected by liquidity constraints in their schooling outcomes. Lochner and Monge-Naranjo (2011) find that the borrowing constraints imposed by federal student loans are in part relaxed by the emerging private loan industry. Stinebrickner and Stinebrickner (2008) find that borrowing constraints affect the dropout decision for some low-income students. Horowitz, Lee and Trivitt (2009) find that the sisters of men eligible for the Vietnam Draft have lower college enrollment rates, which the authors interpret as evidence that household borrowing constraints have an impact on educational attainment. Ionescu and Simpson (2010) demonstrate that credit scores are related to postsecondary educational attainment, especially among low-income students.

Thus, the absolute value of the results I report can be treated as a lower bound for the true magnitude of the effect of student debt.

Consider a simple linear probability model in which the outcome variable m_i equals 0 if never married and 1 otherwise. If L_i^* denotes the true amount borrowed by individual i, the population equation of interest is

$$m_i = \alpha + \beta L_i^* + \varepsilon_i.$$

Suppose that instead of L_i^* the data include the variable L_i, which for married individuals is the sum of own and spousal loans (L_j^*):

$$L_i = L_i^* + m_i L_j^*.$$

With this measurement error the estimated equation is

$$y_i = \alpha^{ME} + \beta^{ME} L_i^* + \beta^{ME} m_i L_j^* + e_i$$

and

$$\text{plim}\hat{\beta}^{ME} = \beta \left(\frac{\text{Var}(L_i^*) + \text{Cov}(m_i L_j^*, L_i^*)}{\text{Var}(L_i)} \right).$$

For the part of the sample that has never been married ($m_i = 0$), it is clear that $\text{plim}\,\hat{\beta}^{ME} = \beta$ because there is no measurement error in the amount borrowed. Consider the observations for which $m_i = 1$. There are three general cases.

1. $\text{Cov}(L_i^*, L_j^*) = 0$: the marriage matching process is independent of the amount

borrowed by each spouse. Then

$$\operatorname{plim} \hat{\beta}^{ME} = \beta \left(\frac{\operatorname{Var}(L_i^*)}{\operatorname{Var}(L_i^*) + \operatorname{Var}(L_j^*)} \right),$$

which is the usual classical measurement error attenuation bias. If we assume that $\operatorname{Var}(L_i^*) = \operatorname{Var}(L_j^*)$, which can be interpreted as men and women having similarly distributed loan amounts[14], the bias equals 0.5β.[15]

2. $\operatorname{Cov}(L_i^*, L_j^*) < 0$ and

3. $\operatorname{Cov}(L_i^*, L_j^*) > 0$.

The estimate of β is attenuated also by a factor of 0.5 in cases 2 and 3 when $\operatorname{Var}(L_i^*) = \operatorname{Var}(L_j^*)$ since

$$\operatorname{plim} \hat{\beta}^{ME} = \beta \left(\frac{\operatorname{Var}(L_i^*) + \operatorname{Cov}(L_j^*, L_i^*)}{\operatorname{Var}(L_i^*) + \operatorname{Var}(L_j^*) + 2\operatorname{Cov}(L_i^*, L_j^*)} \right).$$

When $\operatorname{Var}(L_i^*) \neq \operatorname{Var}(L_j^*)$, the term in the parentheses is always smaller than 1 in case 3. The bias term will be grater than 1 in case 2 only if $\operatorname{Var}(L_j^*) < |\operatorname{Cov}(L_i^*, L_j^*)|$, which can only happen if L_i^* is consistently larger or more dispersed than L_j^*, that is, if there is consistent asymmetry in spouses' borrowing.

The exclusion of cohort effects from the empirical model is an important assumption that is necessary for identification given the nature of the instrument. This assumption may be violated if business cycle or other aggregate fluctuations impact the probability

[14] Among never married respondents in the SCF sample, who are a selected group but whose total borrowing should be measured with less error, the variance in the amount borrowed by females (in thousands of dollars) is 628, and the variance of males' loans is almost the same: 615. The respective means are 9.0 and 8.4, and the difference is not statistically significant.

[15] The overall bias in $\hat{\beta}^{ME}$ would be smaller because the estimate is unbiased for the never married portion of the sample.

of marriage, or if the average age at marriage has been changing over time. To address the latter, Figure 2 shows the fraction of respondents in the March Current Population Survey who have never been married. To make the CPS sample comparable, it is restricted to individuals between the ages of 29 and 45 who hold a Bachelor's degree.[16] Figure 2 shows that the marriage rate for college-educated women in the specified age group remained fairly constant after 1991. Marriage rates increased slightly for men during the same period, particularly between 1991 and 1996, but leveled off starting in 1999. Using SCF surveys conducted between 1995 and 2010 and restricting the sample to individuals who turn 29 after 1993 places the focus of the analysis on the flat regions depicted on Figure 2. I also include a cubic in age, which is important because marriage rates are highly dependent on age, regardless of an individual's year of birth. Loan recipients in the sample tend to be younger than people who did not borrow for their education, most likely due to the increasing use of student loans. This can bias the results without age controls. To address the potential impact of business cycle fluctuations, I reestimated the baseline models including the annual U.S. unemployment rate in the years when respondents were 22 and 27 years old. The relationship between student debt and marital status remained negative and statistically significant, while both unemployment rates were found to be negatively correlated with the probability of marriage for men, and the unemployment rate at age 27 was positively correlated with females' marriage outcomes.

If married individuals who pursue postsecondary education are consistently less likely to borrow than unmarried students in similar programs, the SCF results may overstate the strength of the relationship between debt and marital status given that a sufficient

[16]Prior to 1992 the CPS education variable records the number of years of completed schooling rather than the highest degree attained. Figure 2 uses individuals who have completed at least 4 years of college.

number of respondents attended college or graduate school after getting married. Using an instrument for loans is one approach for dealing with this issue. Furthermore, according to the 2007-08 National Postsecondary Student Aid Study, almost all (90.3 percent) first-year undergraduate students are single, divorced or widowed. A higher proportion, 60.4% or graduate students who began their graduate degree in 2007 or 2008 reported the same marital status. The estimated relationship between student loans and marital status does not weaken if the SCF sample is restricted to respondents with no graduate degree (results available on request).

All estimation is performed separately for men and women to account for potential gender differences in the correlates of the probability of marriage. The coefficients I report are average marginal effects. The standard errors are clustered by year of birth, which is not perfectly correlated with age because of the repeated cross-section structure of the data.

3.2 Results

Table 2 shows the estimation results for the SCF samples of men (first three columns) and women (last three columns). Columns (1) and (4) show results for the probit model without instrumenting for the amount borrowed. The estimated marginal effect is close to zero; this result is similar to the findings in Choy and Carroll (2000) and Chiteji (2007). However, columns (2) and (5) show that when I instrument for the size of student debt, loans have a fairly strong impact on the probability of marriage, with the magnitude being similar for men and women. A $10,000 increase in student debt on average decreases the probability of marriage by 7.6 percentage points for men and 6.9 percentage points for women. The IV results in Table 2 suggest that, holding student loans constant, acquiring more education increases the probability of marriage for both

genders. The negative coefficient on the amount of student loans in Table 2 could be indicative of a delay in the timing of marriage, or a decrease in the overall lifetime probability of this event. It is hard to distinguish between the two in the absence of information on the exact timing of marriage.[17]

The descriptive statistics in Table 1 show that 5 to 6 percent of respondents without loans have never been married but live with a partner, while 8 to 9 percent of borrowers are in this situation. To account for the endogeneity of loans and the confounding effects of other variables, age in particular, I reestimate the models in columns (2) and (5) of Table 2 using an indicator for ever married or currently living with a partner as the dependent variable. The results for men and women are shown in columns (3) and (6) respectively. The outcome variable in these models is not an ideal measure of the propensity to find a partner, but the SCF offers no information on previous cohabitation relationships. The results suggest that the relationship between student loans and finding a partner is not as strong as the relationship between education-related debt and marriage. The IV probit marginal effect is much lower in absolute value for (-0.0037 for men and -0.0031 for women) compared to the specifications in columns (2) and (5).

Table 2 also shows the reduced form, or "first stage," regression results. The maximum likelihood approach estimates both equations jointly, so this is not a true first stage. The instrument is the average amount of debt per full-time student in the year when respondents were 17 years old. It has the expected sign and is highly significant, with an F statistic (from a liner probability model) of 34.54 for men and 109.47 for

[17]The most informative empirical strategy would be to conduct survival analysis using the exact timing of debt accumulation and marriage. However, as part of the effort to ensure the privacy of respondents, the public use SCF data do not contain the date of first marriage for respondents who have multiple marriages. Thus, I am unable to estimate a hazard model without encountering a serious sample selection problem.

women. A $1,000 increase in average loans per full-time student increases the amount borrowed by $430 for men and $630 for women in the sample.

4 GMAT Registrant Survey

The second data set used in this study is a four-wave panel survey of registrants for the Graduate Management Admission Test.[18] It is typical for MBA students to graduate with large amounts of student debt.[19] Other than the wide use of loans observed in the data, a big advantage of the survey of GMAT registrants is that students in the sample borrowed for the same type of education and tend to hold similar occupations, which eliminates much of the heterogeneity present in other data sets. This is also a potential pitfall of the data because the results may not be fully generalizable, which is why it is important to consider both the SCF and GMAT Survey results. An additional benefit of the GMAT Survey is that the age at which most MBA students graduate is close to the median age at first marriage for the highly educated.[20]

The universe for the survey consists of everyone who registered to take the GMAT between June 1990 and March 1991 and was living in the U.S. at the time of registration. The GMAT Registrant Survey was conducted in four waves. The first one was sent out shortly after test registration and had a response rate of 84 percent (5,853 responses out of 7,006 randomly selected test registrants). The final interviews took place between

[18]The survey was conducted by the Batelle Memorial Institute on behalf of the Graduate Management Admission Council. For examples of other studies using this survey, see Montgomery and Powell (2003) and Arcidiacono, Cooley and Hussey (2008).

[19]According to data from the National Center for Education Statistics' *Baccalaureate and Beyond Longitudinal Study*, 47.3 percent of the students in the study who completed an MBA degree between 1997 and 2003 borrowed money for their graduate education. Among those with loans, the average amount borrowed was around $33,600.

[20]Goldin and Katz (2008) find that for men and women who graduated from Harvard in 1990, the median age at first marriage is 30 years. The median MBA graduation age in the GMAT Registrant Survey is 29 years.

January 1997 and November 1998 and 3,771 of the 5,853 initial respondents returned completed questionnaires. The marriage variable I use equals 1 if a respondent was married at the time of the second, third of fourth interviews and 0 otherwise and is only defined on the subset of respondents who are not married when first interviewed (1,392 men and 1,266 women).[21]

Eliminating observations with missing values on key variables leaves an estimation sample consisting of 1,357 men and 1,140 women. There are 819 males and 632 females in the sample who enrolled in an MBA program by the last installment of the survey.[22]

As a measure of the main regressor of interest, the size of graduate debt, I use the reported total amount borrowed for business school by the time of the last interview. The variable equals zero if the reported amount is zero or if a respondent did not attend a graduate management program. The amount borrowed is censored at $99,999, but this affects only one observation. I use the nominal amounts reported in the survey. I do not have information on the exact timing of the loan, but the time period over which all debt was accumulated covers about five years, so inflation should not play a big role. The GMAT Registrant Survey also asks respondents who have attended business school to report their expenditures on two main categories: the first is tuition and fees, and the second is books and supplies. I use these variables to examine the relationship between education expenditures and marriage expectations.

The empirical model that I estimate includes two variables designed to measure

[21]There are 38 observations for which marital status is reported as single at the first and last interviews but married at the second or third interviews. It is possible that a very small number of respondents married and divorced between two consecutive interviews, in which case their status would be coded as never married. It is unlikely that the number of such cases is large enough to affect the results.

[22]It can be argued that those who did not attend business school either never intended to, so they are inherently different from MBA students and do not belong in the sample, or self-selected into the zero-loans group, in which case I should include them in the estimation. The summary statistics in Table 4 show that MBA students are similar in most respects to non-enrollees, and all estimation results are almost identical regardless of whether I use the unrestricted or restricted sample. In the marriage regressions I only show results for the unrestricted sample.

respondents' attitudes towards their career and family. I include them because they are likely to be related to the decision to start a family and possibly to the decision to borrow. To construct these variables, I use a question from the first wave of the GMAT Registrant Survey that asks about the importance attributed to "One's own family and children" and "Career and work."[23] The *Values family* variable is set to equal one for respondents who indicate that family and children are "very important" and zero for those who select "somewhat important", "not very important" or "not at all important." Similarly, *Values career* equals 1 if the respondent selected "very important" and 0 otherwise.

Marriage expectations at the onset of the survey are based on a question from the first wave, when respondents are asked whether they expect to marry within the next two years. There are three possible answers: "Yes," "No" and "Don't know." I use this question to construct two binary variables, *Expect to be married* and *Expect not to be married*, with the excluded category being *Don't know*.

Table 4 shows summary statistics for the GMAT Survey sample and for respondents who were dropped from the sample because of being married at the time of the first interview. The survey slightly oversamples women and oversamples minorities to a larger extent.[24] Among individuals who started off unmarried, male and female respondents are similar in their ages (the average age at the time of the first interview is between 24 and 25), but men are slightly more likely to marry by the end of the survey period: 59 percent do, compared to 54 percent of women. About a quarter of all respondents used in the estimation expect to marry within two years of their first interview, while half of all

[23]The exact wording used in the survey is "Here is a list of various aspects of life. We would like to know how important each of these aspects of life is for you." Responses can vary from 1 (Very) to 4 (Not at all).

[24]In the 1990-1991 testing cycle, women constituted 36.8 percent of test takers, while the proportion reporting their race as something other than white (non-Hispanic) was 16.3 percent (*Profile of Graduate Management Admission Test Candidates, 1990-91 to 1994-95* n.d.).

men and slightly fewer than half of women in the sample expect to remain single in the two-year period. There are more full-time than part-time MBA graduates in the sample because a large proportion of part-time MBA students are still attending school at the time of the last interview. Only 1 percent of females and 2 percent of males graduate from an executive program. Over a third of MBA students in the sample borrow for their graduate management education, and the average loan is around $22,000 for men and $18,000 for women (conditional on this amount being positive). Men are likely to attend MBA programs with higher tuition costs and spend more on books and supplies. Only about 15 percent of men and 14 percent of women assign less than high importance to their family, but career is not a main priority for 39 percent of men and 30 percent of women in the sample.

As expected, survey respondents who were dropped due to first-period marital status are about 6 years older on average. They are about half as likely to attend a full-time MBA program and slightly more likely to complete a part-time degree. Gicheva (2012) links this pattern to the higher job mobility costs of married individuals. Relatedly, married respondents are also less likely to take out loans and spend less on their education.

4.1 Empirical Specification and Assumptions

The GMAT Survey data call for a somewhat different empirical strategy. The instrument used in Section 3 is not available for the GMAT Registrant Survey since there is not enough variation in the year of loan accumulation. On the other hand, the GMAT Survey sample is much less heterogeneous than the group of SCF respondents, particularly in terms of individuals' education investment choices, so it is reasonable to expect that simultaneity bias will not have as strong of an impact on the results. For instance,

marital status may affect college completion rates or the type of graduate degree pursued by an individual in the SCF, but all GMAT registrants complete college and are likely to pursue the same type of graduate degree. Thus, I estimate a probit model similar to (1) with heteroskedasticity robust standard errors.

The indicator variables for expected marital status are likely to be correlated with any part of the error term that varies with the amount borrowed. Including these variables in the model should ideally eliminate, or at least greatly reduce, any remaining endogeneity bias. Expected marital status can also offer an insight as to whether men and women in the sample can predict well the relationship between graduate school loans and the probability of marriage. I estimate two sets of specifications: the first one excluding expected marital status, and a second one in which marriage expectations are included.

Observed marital status m_i can be written as a linear projection of expected marital status m_i^e:

$$m_i = \gamma_1 + \gamma_2 m_i^e + \delta_i,$$

where δ_i may be correlated with the amount borrowed L_i: $\delta_i = \beta L_i + \varepsilon_i$. Consider the linear projection of m_i^e on L_i:

$$m_i^e = \phi_1 + \phi_2 L_i + e_i.$$

There are three cases to consider. If individuals do not anticipate any post-graduation liquidity constraints and believe that student debt will have no impact on marital status, then $\phi_2 = 0$ and the estimated $\hat{\beta}$ will be similar in the specifications with and without m_i^e. If borrowers are aware of the full extent of the liquidity constraints they face and extract all possible information from L_i regarding future marriage outcomes, the true β will be zero, but $\hat{\beta}$ will be zero only when expected marital status is included due to

omitted variable bias otherwise. Finally, in the case when students borrowing for their education are aware of some but not all of the effects of debt on future consumption, both ϕ_2 and β are negative, and $\hat{\beta}$ will be larger in absolute when m_i^e is excluded from the regression, again due to omitted variable bias.

4.2 Results

Table 5 reports probit results for the sample of GMAT registrants, broken down by gender. The results in columns (1) and (4) suggest that without controls for expected marital status, there exists a negative correlation between MBA student loans and the probability of transitioning into marriage by the last survey wave. The estimated marginal effects are -0.0033 for men and -0.0031 for women, significant at the 5 and 10 percent levels, respectively. The marginal effects are smaller in absolute value than the SCF estimates, but the two sets of results are not directly comparable because the samples are drawn from different populations, the time horizon is not the same, and the loans were used to finance different types of education resulting in different earnings profiles after graduation. The marginal effect of the *Values family* variable is positive and statistically significant for both genders, while the estimate for *Values career* is negative, smaller in absolute value, and noisy.[25]

The specifications in columns (2) and (5) of Table 5 include the controls for expected marital status. Both are highly significant and have the expected signs. The marginal effect of the amount borrowed for MBA education decreases in absolute value in both cases. It is -0.0028 for men, significant at the 5 percent level. The corresponding marginal effect is -0.0020 for women, with a p-value of 0.2. This is consistent with the hypothesis

[25]The other estimates change very slightly if the *Values family* and *Values career* variables are excluded from the regressions.

that people anticipate some of the the borrowing constraints they face after graduation and adjust their marriage expectations or borrowing decisions accordingly.

I next estimate the models with expected marital status using only respondents whose age is below the sample median (31 years); these results are shown in columns (3) and (6). I find that the relationship between MBA loans and marital status is stronger for the younger subsample. The estimated marginal effect is -0.0032 for men under the age of 31, while the marginal effect is -0.0042 for women age 30 and younger. These estimates are significant at the 10 percent level, even though the sample sizes are fairly small: 548 for males and 560 for females. The results are consistent with stronger liquidity constraints faced by younger individuals.

To provide a closer look at the relationship between graduate school expenditures, student loans and expected marital status, Table 6 shows tobit estimates of the determinants of the amount borrowed and amounts spent on tuition and books by MBA students. The results in columns (1)-(3) are for men in the sample of MBA students, and columns (4)-(6) show results for female MBA students. The dependent variable in columns (1) and (4) is the amount borrowed, in columns (2) and (5): the amount spent on tuition and fees, and in columns (3) and (6): cumulative expenditures on books and other supplies. The results suggest that there is some correlation between marriage expectations on the one hand and business school expenditures and debt on the other, but this correlation is not very strong. The point estimates suggest that MBA students who expect to be married two years after their first interview spend less on their business school education and borrow less. The estimates are significant in columns (2), (3) and (4). The coefficients on the *Expect not to be married* variable are positive but not significant in all specifications.

The *Values career* variable is positively correlated with business school expenditures:

men who indicate high career valuation are expected to spend $3,600 more on MBA tuition and $300 more on books and supplies. Women who value their career borrow on average $4,600 more. The *Values family* variable is significant only in the column (4) specification; the coefficient estimate indicates that for women high valuation for family is associated with more student loans. The sample sizes for these regressions are small: about 800 men and 600 women. This may be part of the reason why the results are noisy.

5 Conclusion

The main question posed in this study is whether there exists a causal relationship between the amount of accumulated student debt and the timing of family formation. Data on student debt are publicly available from sources like the Survey of Consumer Finances, but the main empirical problem is the likely endogeneity of school loans. The empirical estimates would be biased if, for example, marital status affects schooling decisions.

The instrumental variable probit results in Section 3.2 and the probit results in Section 4.2 offer strong evidence that student loans have a negative and significant, both statistically and economically, impact on the probability of marriage. Controlling for age and education, both men and women are less likely to marry if they hold student loans. This result is interesting because it is consistent with the presence of borrowing constraints and points to an unintended policy effect of student loans. My findings are in line with other studies that present evidence that graduates' choices of career paths are more sensitive to the amount of accumulated student debt than life-cycle consumption smoothing with perfect credit markets would imply (Bazzoli 1985, Minicozzi 2005, Field

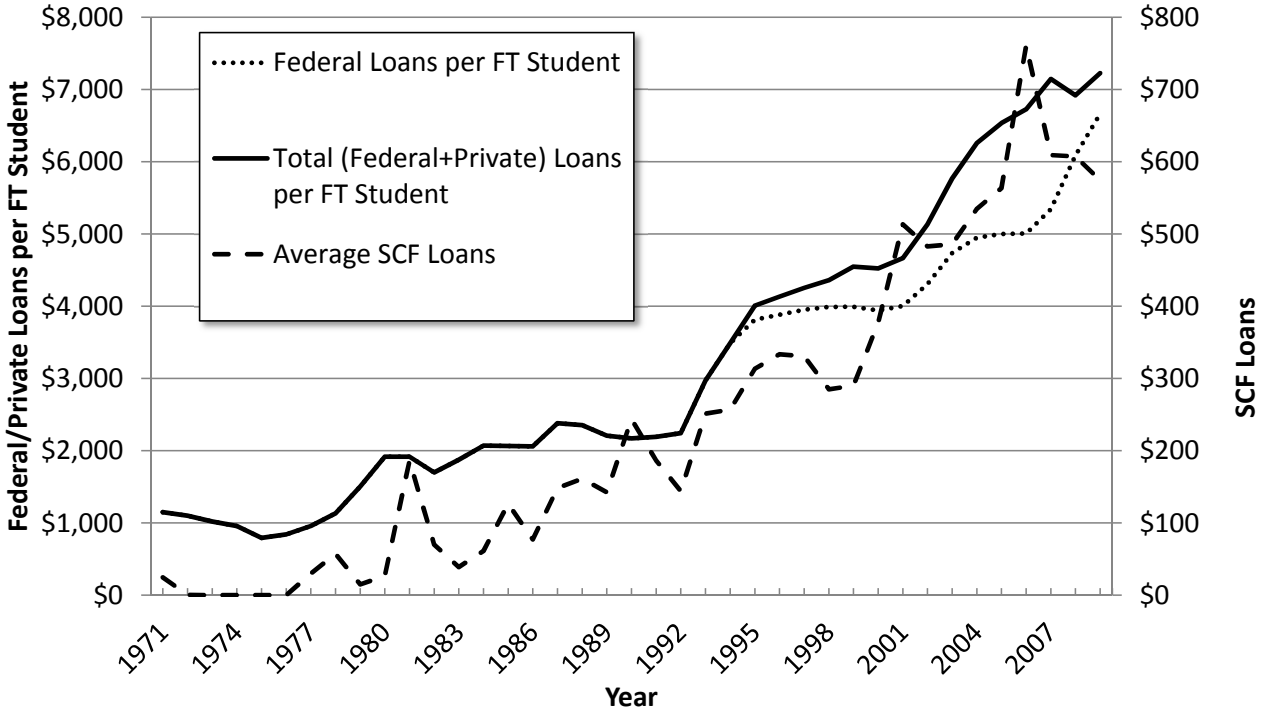
2009, Rothstein and Rouse 2011). I argue that incorporating a fixed cost of marriage and binding borrowing constraints after the completion of schooling can reconcile the observed trends with lifetime consumption theory.

The SCF results also reveal that the magnitude of the estimated impact of student debt is considerably lower when borrowing is treated as exogenous. The estimated marginal effects are essentially zero. If anticipated or realized marriage outcomes affect students' borrowing decisions, which was shown to be the case to some degree for MBA students, the non-IV SCF specifications would be subject to simultaneity bias. Hence, it is important to treat debt as endogenous in the estimation. Not doing so could explain why other studies, such as Choy and Carroll (2000) and Chiteji (2007), do not find a relationship between student debt and marriage. The trends depicted in Figure 1 reveal the presence of substantial exogenous variations in the availability of student loans, which drive observed borrowing behavior in the SCF. Using these variations as an instrument for student debt is another contribution of this paper.

Another important observation is that marriage expectations are weakly correlated with the amount of accumulated student debt. Respondents in the GMAT Registrant Survey are asked about their anticipated marital status, and the panel aspect of the data allows me to compare these predictions with the actual outcomes. Including marriage expectations in the regressions decreases the absolute value of the estimated effect of loans. This is consistent with the hypothesis that, first, marriage expectations are somewhat accurate so they are correlated with future marital status, and second, that people anticipate to some degree the borrowing constraints they are faced with after graduation. The latter would result in a correlation between student debt and expected marital status, evidence of which I observe in the data. Interestingly, the effect of student debt does not disappear completely when marriage expectations are included

and the sample is restricted to younger respondents. One plausible explanation is that borrowers do not plan for all post-graduation liquidity constraints. If this is indeed the case, then the findings in this paper would carry policy implications beyond concerns about the decrease in marriage rates. Potential student borrowers would need to be educated better about the long-term implications of education loans and other types of credit in order to make efficient life-cycle consumption decisions.

Figure 1: Average Loans per Full-Time Student



Source: The College Board (2012) and author's calculations using Survey of Consumer Finances data. The calculations include nonrecipients. All amounts are in 2011 dollars. The SCF averages are calculated as the total amount borrowed reported for each year divided by the number of respondents who were at least 17 years old in that year.

Figure 2: Marriage Rates for College Graduates

Source: author's calculations using the March Current Population Survey. The sample consists of respondents age 29-45 with at least 4 years of college (pre-1992 data) or a Bachelor's degree or higher (post-1992 data).

Table 1: SCF Summary Statistics

	School Loans = 0		School Loans > 0	
	Male	Female	Male	Female
White	0.6650	0.6461	0.7511	0.6409
Black	0.1003	0.1637	0.1266	0.2425
Hispanic	0.1565	0.1523	0.0880	0.0803
Age	35.99	35.57	32.97	34.62
	(4.716)	(4.633)	(4.354)	(4.64)
Has been married	0.7619	0.7720	0.7167	0.6961
Never married, living with partner	0.0624	0.0498	0.0902	0.0819
College degree	0.2500	0.1829	0.3412	0.3150
Master's degree	0.0856	0.0601	0.1309	0.1543
Doctorate (includes PhD, MD, JD)	0.0431	0.0155	0.1116	0.0331
Amount borrowed/1000			43.58	32.86
			(47.85)	(42.20)
N	1764	1930	466	635
Survey year		Percent of sample		
1995	2.72%	3.58%	2.79%	3.94%
1998	6.24	7.56	8.58	4.72
2001	11.05	12.95	8.37	10.08
2004	16.95	16.84	14.81	12.76
2007	22.22	21.30	17.81	17.95
2010	40.82	37.77	47.64	50.55

Standard errors in parentheses.

Table 2: SCF Estimation Results

	Male (N = 2,230)			Female (N = 2,565)		
	(1) Probit	(2) IV Probit	(3) IV Probit	(4) Probit	(5) IV Probit	(6) IV Probit
Amount borrowed / 1000	0.0000	-0.0076**	-0.0037	-0.0003	-0.0069**	-0.0031
	(0.0004)	(0.0019)	(0.0023)	(0.0004)	(0.0022)	(0.0027)
College Degree	0.0315	0.0782**	0.0218	0.0156	0.0873**	0.0257
	(0.0283)	(0.0281)	(0.0315)	(0.0210)	(0.0213)	(0.0243)
Master's Degree	0.1123**	0.1941**	0.1146**	0.0251	0.2013**	0.0705
	(0.0378)	(0.0394)	(0.0536)	(0.0414)	(0.0559)	(0.0694)
Doctorate	0.0912*	0.4190**	0.2385**	0.0299	0.2199**	0.0686
	(0.0472)	(0.1060)	(0.1126)	(0.0554)	(0.0846)	(0.0911)
"First stage" results:						
Average loans per FT student		0.0043**			0.0063**	
		(0.0007)			(0.0006)	
F statistic		34.54			109.47	

* p<0.10, ** p<0.05. Dependent variable: whether respondent has ever been married (columns (1), (2), (4) and (5)) or whether respondent has ever been married or is currently living with a partner (columns (3) and (6)). The sample is limited to respondents born after 1964 and older than 28. The reported coefficients are average marginal effects. The IV coefficients are estimated by maximum likelihood, hence there is no actual "first stage". The F statistics are from a linear probability model. All specifications include controls for race and a cubic in age. The standard errors are clustered by year of birth.

Table 3: SCF Estimation Results: College Graduates

	Male (N = 940)		Female (N = 818)	
	(1)	(2)	(3)	(4)
	Probit	IV Probit	Probit	IV Probit
Amount borrowed / 1000	-0.0003	-0.0052**	-0.0001	-0.0021*
	(0.0004)	(0.0011)	(0.0004)	(0.0011)
Masters Degree	0.0718**	0.0966**	-0.0027	0.0295
	(0.0289)	(0.0246)	(0.0320)	(0.0358)
Doctorate	0.0591	0.2472**	0.0020	0.0410
	(0.0408)	(0.0588)	(0.0587)	(0.0565)
"First stage" results:				
Average loans per FT student		0.0076**		0.0159**
		(0.0014)		(0.0024)
F statistic		28.59		43.80

* p<0.10, ** p<0.05. Dependent variable: whether respondent has ever been married. The sample is limited to respondents born after 1964 and older than 28 who have completed a Bachelor's degree. The reported coefficients are average marginal effects. The IV coefficients are estimated by maximum likelihood, hence there is no actual "first stage". The F statistics are from a linear probability model. All specifications include controls for race and a cubic in age. The standard errors are clustered by year of birth.

Table 4: GMAT Registrant Survey Summary Statistics

	Full Sample		MBA Students		Married at $t = 0$	
	Male	Female	Male	Female	Male	Female
Asian	0.1621	0.1482	0.1697	0.1392	0.0809	0.1092
Black	0.0803	0.1895	0.0744	0.1915	0.0926	0.1365
Hispanic	0.1555	0.1263	0.1514	0.1377	0.1735	0.1836
Age at $t = 1$	24.70	24.31	24.68	24.38	31.69	30.39
	(3.664)	(3.779)	(3.618)	(3.955)	(6.707)	(6.278)
Married by $t = 4$	0.5851	0.5404	0.5922	0.5301	1	1
Expect to be married in 2 years	0.2417	0.2675	0.2540	0.2579	-	-
Expect not married in 2 years	0.5041	0.4254	0.4908	0.4557	-	-
Obtained FT MBA	0.2469	0.1939	0.4017	0.3481	0.1176	0.0968
Obtained PT MBA	0.1658	0.1640	0.2686	0.2927	0.2838	0.2283
Obtained Executive MBA	0.0206	0.0132	0.0317	0.0237	0.0676	0.0372
In school at $t = 4$	0.1054	0.0842	0.1306	0.1187	0.1000	0.0918
Percent who borrowed	0.2248	0.1974	0.3724	0.3560	0.1368	0.1017
Amount borrowed / 1000	22.45	17.56	22.45	17.56	14.92	13.61
	(18.08)	(15.23)	(18.08)	(15.23)	(13.98)	(10.92)
Total spending - tuition	7.608	5.398	12.40	9.980	4.829	3.956
	(13.82)	(11.61)	(15.99)	(14.32)	(9.83)	(8.42)
Total spending - books/supplies	1.110	0.8533	1.804	1.565	0.9546	0.7229
	(2.016)	(1.783)	(2.342)	(2.183)	(1.945)	(1.649)
Values family ($t = 1$)	0.8497	0.8640	0.8474	0.8528	0.9497	0.9601
Values career ($t = 1$)	0.6065	0.6991	0.6154	0.6946	0.6252	0.6110
N	1357	1140	819	632	680	403

Standard errors in parentheses. The calculations for the average amount borrowed include only MBA enrollees with positive amount borrowed.

Table 5: GMAT Survey Estimation Results

	Male			Female		
	(1)	(2)	(3)	(4)	(5)	(6)
	Full Sample		Age < 31	Full Sample		Age < 31
Amount borrowed/1000	-0.0033**	-0.0028**	-0.0032*	-0.0031*	-0.0020	-0.0042*
	(0.0012)	(0.0012)	(0.0017)	(0.0017)	(0.0016)	(0.0025)
Values family (t=1)	0.1482**	0.0848**	0.0754	0.0918**	0.0368	0.0933
	(0.0358)	(0.0343)	(0.0549)	(0.0425)	(0.0410)	(0.0599)
Values career (t=1)	-0.0323	-0.0193	-0.0197	-0.0060	0.0018	0.0156
	(0.0268)	(0.0257)	(0.0407)	(0.0313)	(0.0301)	(0.0437)
Expect to be married in 2 years		0.2645**	0.3071**		0.2370**	0.2370**
		(0.0362)	(0.0666)		(0.0356)	(0.0583)
Expect not to be married in 2 years		-0.1088**	-0.1341**		-0.1205**	-0.1409**
		(0.0296)	(0.0466)		(0.0316)	(0.0441)
N	1357	1357	548	1140	1140	560

* p<0.10, ** p<0.05. Probit estimation results. The dependent variable is whether respondent was married at $t = 2, 3$ or 4. The reported coefficients are average marginal effects. The standard errors are robust. All regressions include controls for race, type of MBA degree, whether enrolled in school at $t = 4$, and a cubic in age.

Table 6: Do Marriage Expectations Affect Education Investments and the Amount Borrowed?

	Male			Female		
	(1) Loans	(2) Tuition	(3) Books	(4) Loans	(5) Tuition	(6) Books
Expect to be married in 2 years	-2.0567	-4.3252**	-0.5117**	-5.5219*	-2.8533	-0.3942
	(3.7472)	(1.9408)	(0.2418)	(3.2091)	(1.7699)	(0.2439)
Expect not to be married in 2 years	4.1852	0.8965	0.0913	3.0433	2.1412	0.2141
	(3.4100)	(1.7189)	(0.2288)	(2.9376)	(1.8585)	(0.2712)
In school (t=4)	-17.5862**	-6.6869**	-0.9851**	-11.1310**	-6.5297**	-0.2622
	(4.5393)	(1.9599)	(0.2131)	(3.8992)	(2.0561)	(0.3098)
Values family (t=1)	0.4072	-1.5101	-0.4098	7.1777*	0.5479	0.3000
	(3.6961)	(1.8961)	(0.3208)	(3.9564)	(2.0243)	(0.2402)
Values career (t=1)	2.1441	3.6261**	0.3107*	4.5560*	2.3199	0.2562
	(2.6383)	(1.3594)	(0.1730)	(2.7567)	(1.6286)	(0.2241)
N	819	796	784	632	587	584

* p<0.10, ** p<0.05. Tobit estimation results for the subsample of MBA students. The reported standard errors are robust. All regressions include controls for race and a cubic in age. All dependent variables are measured in thousands of nominal dollars. The sample sizes vary with the number of available observations for each dependent variable.

Appendix

A SCF Results Using Alternative Data Imputations

Table 7: SCF Estimation Results: Imputations 2-5

	Imputation 2					
	(1)	(2)	(3)	(4)	(5)	(6)
Table 2	0.0000	-0.0074**	-0.0036	-0.0003	-0.0070**	-0.0032
	(0.0004)	(0.0020)	(0.0022)	(0.0004)	(0.0022)	(0.0027)
Table 3	-0.0003	-0.0048**	-0.0001	-0.0021*		
	(0.0004)	(0.0012)	(0.0003)	(0.0011)		
	Imputation 3					
	(1)	(2)	(3)	(4)	(5)	(6)
Table 2	0.0000	-0.0074**	-0.0036	-0.0003	-0.0071**	-0.0033
	(0.0004)	(0.0020)	(0.0022)	(0.0004)	(0.0022)	(0.0027)
Table 3	-0.0002	-0.0049**	-0.0001	-0.0022**		
	(0.0004)	(0.0011)	(0.0003)	(0.0011)		
	Imputation 4					
	(1)	(2)	(3)	(4)	(5)	(6)
Table 2	0.0000	-0.0077**	-0.0038*	-0.0003	-0.0071**	-0.0032
	(0.0003)	(0.0019)	(0.0023)	(0.0004)	(0.0022)	(0.0027)
Table 3	-0.0002	-0.0053**	-0.0001	-0.0022**		
	(0.0004)	(0.0011)	(0.0003)	(0.0011)		
	Imputation 5					
	(1)	(2)	(3)	(4)	(5)	(6)
Table 2	-0.0001	-0.0075**	-0.0036	-0.0003	-0.0070**	-0.0032
	(0.0003)	(0.0020)	(0.0023)	(0.0004)	(0.0022)	(0.0027)
Table 3	-0.0003	-0.0051**	-0.0001	-0.0021**		
	(0.0004)	(0.0011)	(0.0003)	(0.0011)		

* p<0.10, ** p<0.05. The results shown are coefficient estimates for *Amount borrowed/1000*. The specifications are identical to the models in the specified tables.

Acknowledgements

I thank Joseph Altonji, Kelly Bedard, Steven Bednar, Sandra Black, Fabian Lange, David Ribar, Nicole Simpson, Ken Snowden and participants in the UNC Greensboro Economics Department Seminar, the CSWEP 2012 CeMENT Mentoring Workshop, and the Federal Reserve Board Applied Microeconomics Seminar for helpful comments.

References

Abraham, Katharine G. and Melissa A. Clark, "Financial Aid and Students' College Decisions: Evidence from the Disctrict of Columbia Tuition Assistance Grant Program," *The Journal of Human Resources*, 2006, *41* (3), 578–610.

Arcidiacono, Peter, Jane Cooley, and Andrew C. Hussey, "The Economic Returns to an MBA," *International Economic Review*, August 2008, *49* (3), 873–899.

Avery, Christopher and Sarah Turner, "Student Loans: Do College Students Borrow Too Much–Or Not Enough?," *Journal of Economic Perspectives*, 2012, *26* (1), 165–92.

Bazzoli, Gloria J., "Does educational indebtedness affect physician specialty choice?," *Journal of Health Economics*, March 1985, *4* (1), 1–19.

Belley, Philippe and Lance Lochner, "The Changing Role of Family Income and Ability in Determining Educational Achievement," *Journal of Human Capital*, 2007, *1* (1), 37–89.

Cameron, Stephen V. and Christopher Taber, "Estimation of Educational Borrowing Constraints Using Returns to Schooling," *Journal of Political Economy*, February 2004, *112* (1), 132–182.

Carneiro, Pedro and James J. Heckman, "The Evidence on Credit Constraints in Post–secondary Schooling," *Economic Journal*, October 2002, *112* (482), 705–734.

Chaker, Anne Marie, "Students Borrow More Than Ever for College," *The Wall Street Journal*, September 4 2009.

Chiteji, Ngina S., "To have and to hold: an analysis of young adult debt," in Sheldon Danziger and Cecilia E. Rouse, eds., *The Price of Independence: The Economics of Early Adulthood*, New York: Russell Sage Foundation, 2007.

Choy, Susan P. and C. Dennis Carroll, *Debt Burden Four Years after College*, National Center for Education Statistics, August 2000.

College Board, *Trends in Student Aid 2010*, Washington, D.C., 2010.

___ , *Trends in Student Aid 2012*, Washington, D.C., 2012.

Cornwell, Christopher, David B. Mustard, and Deepa J. Sridhar, "The Enrollment Effects of Merit-Based Financial Aid: Evidence from Georgia's HOPE Program," *Journal of Labor Economics*, October 2006, *24* (4), 761–786.

Dynarski, Susan, "The Behavioral and Distributional Implications of Aid for College," *The American Economic Review*, 2002, *92* (2), pp. 279–285.

Dynarski, Susan M., "Does Aid Matter? Measuring the Effect of Student Aid on College Attendance and Completion," *American Economic Review*, March 2003, *93* (1), 279–288.

Field, Erica, "Educational Debt Burden and Career Choice: Evidence from a Financial Aid Experiment at NYU Law School," *American Economic Journal: Applied Economics*, January 2009, *1* (1), 1–21.

Gicheva, Dora, "Worker Mobility, Employer-Provided Tuition Assistance, and the Choice of Graduate Education," *Labour Economics*, April 2012, *19* (2), 232–240.

Goldin, Claudia and Lawrence F. Katz, "Transitions: Career and Family Life Cycles of the Educational Elite," *American Economic Review: Papers and Proceedings*, May 2008, *98* (2), 363–369.

Gross, David B. and Nicholas S. Souleles, "Do Liquidity Constraints And Interest Rates Matter For Consumer Behavior? Evidence From Credit Card Data," *The Quarterly Journal of Economics*, February 2002, *117* (1), 149–185.

Heller, Donald E., "The Impact of Student Loans on College Access," in Sandy Baum, Michael McPherson, and Patricia Steele, eds., *The Effectiveness of Student Aid Policies: What the Research Tells Us*, The College Board, 2008, chapter 3.

Horowitz, Andrew W., Jungmin Lee, and Julie R. Trivitt, "Household-Level Education Borrowing Constraints: Evidence Using the College Attendance of the Sisters of Vietnam Draft Avoiders," *Journal of Human Capital*, January 2009, *3* (3), 197–223.

Hotz, Joseph V., Jacob Alex Klerman, and Robert J. Willis, "The economics of fertility in developed countries," in M. R. Rosenzweig and O. Stark, eds., *Handbook of Population and Family Economics*, Vol. 1, Elsevier, December 1993, chapter 7, pp. 275–347.

Ionescu, Felicia and Nicole Simpson, "Credit Scores and College Investment," Working Papers 2010-07, Department of Economics, Colgate University 2010.

Jappelli, Tullio, "Who Is Credit Constrained in the U.S. Economy?," *The Quarterly Journal of Economics*, February 1990, *105* (1), 219–34.

Johnson, David S., Jonathan A. Parker, and Nicholas S. Souleles, "Household Expenditure and the Income Tax Rebates of 2001," *American Economic Review*, 2006, *96* (5), 1589–1610.

Kane, Thomas J., "Evaluating the Impact of the D.C. Tuition Assistance Grant Program," *The Journal of Human Resources*, 2007, *42* (3), 555–582.

Keane, Michael P. and Kenneth I. Wolpin, "The Effect of Parental Transfers and Borrowing Constraints on Educational Attainment," *International Economic Review*, 2001, *42* (4), pp. 1051–1103.

Lieber, Ron, "How Debt Can Destroy a Budding Relationship," *The New York Times*, September 3 2010.

Linsenmeier, David M., Harvey S. Rosen, and Cecilia Elena Rouse, "Financial Aid Packages and College Enrollment Decisions: An Econometric Case Study," *The Review of Economics and Statistics*, May 2006, *88* (1), 126–145.

Lochner, Lance J. and Alexander Monge-Naranjo, "The Nature of Credit Constraints and Human Capital," *American Economic Review*, 2011, *101* (6), 2487–2529.

Minicozzi, Alexandra, "The short term effect of educational debt on job decisions," *Economics of Education Review*, August 2005, *24* (4), 417–430.

Mira, Pedro and Namkee Ahn, "Job bust, baby bust?: Evidence from Spain," *Journal of Population Economics*, 2001, *14* (3), 505–521.

Mitchell, Josh, "Trying to Shed Student Debt," *The Wall Street Journal*, April 27 2012.

Montgomery, Mark and Irene Powell, "Does an Advanced Degree Reduce the Gender Wage Gap? Evidence from MBAs," *Industrial Relations*, July 2003, *42* (3), 396–418.

___ **and James Trussell**, "Chapter 3 Models of marital status and childbearing," in Orley C. Ashenfelter and Richard Layard, eds., , Vol. 1 of *Handbook of Labor Economics*, Elsevier, 1986, pp. 205 – 271.

Oosterbeek, Hessel and Anja van den Broek, "An empirical analysis of borrowing behaviour of higher education students in the Netherlands," *Economics of Education Review*, April 2009, *28* (2), 170–177.

Pilon, Mary, "The $555,000 Student-Loan Burden," *The Wall Street Journal*, February 13 2010.

Profile of Graduate Management Admission Test Candidates, 1990-91 to 1994-95, Graduate Management Admission Council.

Rothstein, Jesse and Cecilia Elena Rouse, "Constrained after college: Student loans and early-career occupational choices," *Journal of Public Economics*, 2011, *95* (1-2), 149 – 163.

Souleles, Nicholas S., "The Response of Household Consumption to Income Tax Refunds," *American Economic Review*, September 1999, *89* (4), 947–958.

Stinebrickner, Ralph and Todd Stinebrickner, "The Effect Of Credit Constraints On The College Drop-Out Decision: A Direct Approach Using A New Panel Study," *American Economic Review*, December 2008, *98* (5), 2163–84.

Warner, John T. and Saul Pleeter, "The Personal Discount Rate: Evidence from Military Downsizing Programs," *American Economic Review*, March 2001, *91* (1), 33–53.

Zeldes, Stephen P., "Consumption and Liquidity Constraints: An Empirical Investigation," *The Journal of Political Economy*, 1989, *97* (2), pp. 305–346.