Student Loans or Marriage? A Look at the Highly Educated

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Abstract

I examine the relationship between student loans and marital status among individuals considering or pursuing graduate management education. Using data from a panel survey of registrants for the Graduate Management Admission Test, I show that the amount of accumulated student debt is negatively related to the probability of first marriage; the estimated decrease is between 3 and 4 percentage points per $10,000 in student debt for both men and women. The strength of the relationship diminishes with age for women but not for men. I use information on reported marriage expectations to show evidence that education expenditures and the amount of debt are correlated with anticipated marital status, especially for women, but borrowers may not have perfect foresight about the long-term consequences of accumulating student debt.

Keywords: Student Loans, Timing of Marriage, Education Expenditures

JEL Classification Codes: I22, J12, J24

"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 size of student debt has been growing over the past four decades, especially among graduate students. Two-thirds of graduate degrees are financed through loans. The average amount of federal loans per full-time equivalent graduate student in 2012 dollars increased from $9,470 in the 1997-98 academic year to $16,240 in 2012-12, while the corresponding change for undergraduate students was from $3,220 to $4,900.[1] Among Master's degree recipients in 2008, 20 percent owed between $20,000 and $39,999 upon graduation, while 18 percent graduated with more debt.[2] The increase in borrowing is to a large extent due to rising costs; inflation-adjusted tuition and fees at Master of Business Administration programs have increased more than two-fold between 1992 and 2010, a growth rate that has not been matched by the growth in average starting salaries (Elliott and Soo 2013).

In light of the increasing debt burdens of postsecondary students, there has been an on-set of a discussion about the long-term implications of debt accumulated for postsecondary education.[3] Several recent studies have examined the impact of student loans on the career choices that graduates 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 career choices when faced with higher post-graduation interest rates compared to non-borrowers. Similarly, Rothstein and Rouse

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[1]All data are from the College Board (2013).

[2]http://trends.collegeboard.org/student-aid/figures-tables/distribution-graduate-school-debt-levels-2007-08-graduate-degree-recipients-2007-08 (Accessed February 28, 2014).

[3]A related less recent strand of the literature finds an impact of education loans on physicians' choice of specialty (e.g. Bazzoli 1985, Colquitt, Zeh, Killian and Cultice 1996, Woodworth, Chang and Helmer 2000)

(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. Using an experiment involving financial aid assignment at a top program, Field (2009) finds that law students' career choices are also sensitive to holding education debt in a way that is consistent with a psychic or social cost of debt. A negative relationship between student debt and household financial stability is found in Gicheva and Thompson (2014), while Brown and Caldwell (2013) use descriptive statistics from the Federal Reserve Bank of New York Consumer Credit Panel/Equifax data set to show that between 2008 and 2012 homeownership rates fell faster for 30-year olds with student debt compared to similarly aged individuals without education loans. In addition, during the same time period holding student loans is associated with lower Equifax credit scores for 25 and 30 year-old individuals.

In this paper I investigate further the ways in which loans for postsecondary degrees affect recent graduates beyond the direct effect of education, and show that the impact not limited to career choices or observable measures of financial status. Little academic research has been done on the role of student debt on the decision to start a family, in part because the relationship between student debt and marriage is complex.[4] Selection and unobserved heterogeneity are likely confounding factors. I avoid many of the existing empirical issues by using a very homogeneous sample in terms of background and the type of programs respondents enrolled in or considered attending. 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 (MBA). I find a relationship between student loans

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[4]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. Popular media sources such as *The New York Times*, *The Wall Street Journal* and *National Public Radio* have turned their attention to the possible negative relationship between student debt and family formation (e.g. Pilon 2010, Lieber 2010, Ludden 2012).

and marriage outcomes. The decrease in the probability of marriage in the study sample is between 3 and 4 percentage points per $10,000 in student debt when age is equal to or below the median of the sample (24 years at the onset of the survey). The magnitude of the relationship decreases with age for women but not for men. The broad interpretation of these results is that, conditional on educational attainment, student loans appear to be associated with changes in borrowers' consumption and spending patterns after graduation.

Another policy-relevant aspect of the issue is whether students who borrow for their education are fully aware of the long-term implications of accumulating debt, and whether they tend to adjust spending on education and other categories accordingly. If borrowers' anticipated probability of marriage is unrelated to accumulated student debt when loans are actually a factor, their choices may not be efficient. I use information on reported marriage expectations at the onset of the panel survey to show evidence that borrowers anticipate part but not all of the link between debt and marriage. I also find that education expenditures and the amount of debt are correlated with anticipated marital status, even when program quality and alternative funding are held constant, which suggests that decisions about family formation and education investments are likely to be made jointly.

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 even more complex 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. Additionally, in most cases these loans cannot be discharged in personal bankruptcy.[5] Finally, the data used in this study allow me to investigate a borrowing decision that is fairly uniform across the sample.

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

2 Conceptual Framework

There are several mechanisms that can generate a relationship between student loans and marital status. Better educated individuals may fare better in the marriage market due to increased earnings potential or differences in preferences.[6] Omitted variable bias will play a role when unobserved individual heterogeneity is correlated with both marriage outcomes and debt accumulation. Furthermore, 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.[7] 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. 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.[8] 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.

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

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[6]See for example Oreopoulos and Salvanes (2011). However, using compulsory schooling laws to instrument for educational attainment, Lefgren and McIntyre (2006) and Anderberg and Zhu (2014) do not find a strong relationship between educational attainment and the probability of marriage among women, respectively, in the U.S. or in England and Whales.

[7]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).

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

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, for most borrowers student loans should not produce a noticeable change in observable consumption patterns, in particular the timing or probability of marriage.

Formally, the observed outcome of interest y_i, marital status in this study, is based on an underlying latent index m_i:

$$
y_i = \begin{cases} 0 & \text{if } m_i \leq 0; \\ 1 & \text{if } m_i > 0. \end{cases}
$$

The latent variable m_i is a function of educational attainment S_i and accumulated student debt D_i:

$$
m_i = m_1(S_i) + m_2(D_i) + u_i. \tag{1}
$$

The sign of $m_1'(\cdot)$ is ambiguous, while $m_2'(\cdot) < 0$ under the liquidity constraints and fixed cost of marriage hypothesis. In addition, educational attainment is an increasing function of student debt:

$$
S_i = f(D_i); \quad f'(\cdot) > 0
$$

The relationship between marital status and student loans depends on the sign of

$$
\frac{\partial m}{\partial D} = m_1'(S_i)f'(D_i) + m_2'(D_i),
$$

which may be positive or negative depending on the sign and magnitude of $m_1'(\cdot)$. However, keeping educational attainment constant,

$$
\left. \frac{\partial m}{\partial D} \right|_{S_i = \bar{S}} = m_2'(D_i) < 0.
$$

An empirical challenge in the estimation of (1) is that the results may be affected by omitted variable bias if unobserved individual characteristics are correlated with marital

status and educational or borrowing choices. Then the error term has an additional component z_i such that $\operatorname{Cov}(S_i, z_i) \neq 0$ and possibly $\operatorname{Cov}(D_i, z_i | S_i = \bar{S}) \neq 0$. The problem is less severe but still likely to exist in a data set such as the GMAT Registrant Survey, in which the degree of individual heterogeneity is lower. Furthermore, conditioning on educational attainment should also lead to lower bias in the estimate of $m_2'(D_i)$ if $|\operatorname{Cov}(D_i, z_i)| > |\operatorname{Cov}(D_i, z_i | S_i = \bar{S})|$. The bias will not be eliminated if the unobserved heterogeneity term z_i is correlated with individuals' propensity to accumulate student debt keeping education constant,. As a way of addressing this issue, I use the fact that the GMAT Registrant Survey collects information on expected marital status m_i^e at the time of the first interview. Including these expectations as variables in the model should ideally eliminate, or at least greatly reduce, any omitted variable bias.

Expectations about future marital status will be correlated with z_i when individuals are aware of the relationship between graduate school loans and the probability of marriage and also observe part of z_i. Conditional on educational attainment, m_i can be written as a linear projection of expected marital status m_i^e:

$$m_i | \bar{S} = \gamma_1 + \gamma_2 m_i^e + \delta_i,$$

where δ_i may be correlated with z_i. When $\operatorname{Cov}(D_i, z_i | S_i = \bar{S}) \neq 0$, δ_i would also be correlated with the amount borrowed D_i: $\delta_i = \beta D_i + \varepsilon_i$. Consider the linear projection of m_i^e on D_i:

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

There are three cases to consider. If individuals do not anticipate any post-graduation liquidity constraints and believe that student debt is not related to their 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 z_i and D_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 value when m_i^e is excluded from the regression, again due to omitted variable bias.

The magnitude of $\text{Cov}(D_i, z_i)$ is unobserved in the data, but the empirical investigation in Section 4.2 considers in more depth the relationship between m_i^e and D_i. A nonzero covariance between the two variables can arise through differences in the educational investments made by individuals who expect to be married and those who do not, through differences in the availability of other funding sources such as employer or family contributions, or through different spending on non-education categories. The latter is not measured in the data, but I estimate models of the relationship between expected marital status and MBA attainment, accumulated student debt, MBA tuition conditional on attendance, and other MBA-related expenditures.

3   Data

The data set used in this study is a four-wave panel survey of registrants for the Graduate Management Admission Test.[9] It is typical for MBA students to graduate with large amounts of student debt.[10] Other than the wide use of loans observed in the data, an important advantage of the survey of GMAT registrants is that all respondents are college-educated and tend to hold similar occupations. Students in the sample borrowed for the same type of education. This eliminates much of the heterogeneity present in other data sets. Other panel studies, such as the *Baccalaureate and Beyond*, collect responses from students enrolled in

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[9]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).

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

a wide range of postsecondary programs, which yields small cell sizes when the sample is divided by type of education. The relative homogeneity of the sample is also a potential pitfall of the data because the results may not be fully generalizable. 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.[11]

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 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).[12] In addition, only single respondents were asked about expected marital status in the first wave of the survey. 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.[13]

As a measure of the main regressor of interest, the size of graduate debt, I use the

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[11]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.

[12]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. 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.

[13]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 1 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. I only show results for the unrestricted sample in the specifications that model the transition into marriage.

reported total amount borrowed for business school by the time of the last interview. The variable equals zero if the reported amount is zero and for respondents who 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 approximately five years, so inflation should not be a driving force. 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 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."[14] 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 binary variables corresponding to each response.

Table 1 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.

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[14]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).

The survey slightly oversamples women and oversamples minorities to a larger extent.[15] Among individuals who started off unmarried, male and female respondents are similar in age (the average at the time of the first interview is between 24 and 25 years), 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 men and 43 percent 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. Men are more likely to attend a top-ranked MBA program. Over a third of MBA students in the sample borrow for their graduate management education, and the average level of accumulated debt 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.

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[15]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*).

4 Results

4.1 Student Loans and Family Formation

The conceptual framework outlined in Section 2 suggests that, conditional on educational attainment, we should see a decline in the probability of transitioning into marriage associated with holding more student debt. The relationship between borrowing and marital status is investigated in Table 2 for men and Table 3 for women. The reported results are average marginal effects from probit models with heteroskedasticity-robus standard errors, in which the dependent variable is an indicator for transition into marriage at some point between the first and last interviews. Results are shown for the full sample of unmarried GMAT registrants, as well as for a younger subsample comprised of respondents whose reported age from the first survey is 24 years (the sample median) or less. This restriction is aimed at providing a closer look at whether any observed trend may represent a delay in marriage or an overall decrease in the lifetime probability of marriage. If this relationship is present only among younger individuals, this can mean that liquidity constraints are temporary and debt holders delay marriage but do not experience a decrease in the lifetime probability of this event. If, on the other hand, the relationship is similar across age groups, we can interpret this as a long-lasting effect that may persist after repayment.

As discussed in Section 2, the models are estimated both with and without the expected marital status indicators in order to gain insight about the degree to which borrowers anticipate the long-term implications of debt. The excluded category in this specification is "no expectation". The models also include indicators for Asian, Black and Hispanic background and a quadratic in age at the first interview, as well as controls for completion of an MBA program by attendance intensity (part-time, full-time or executive), school enrollment status at the time of the last survey, and indicators for attendance of a program ranked among the top 25 or top 10 by the *U.S. News & World Report* in 1992.

The results in column (1) of Table 2 suggest that without controls for expected marital

status, there exists a negative correlation for men between MBA student loans and the probability of transitioning into marriage by the last survey wave. The estimated marginal effect is -0.0036, significant at the 1 percent level. The specification in column (2) includes 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 to -0.0031 but remains significant at the 1 percent level. The results are consistent with the hypothesis that men anticipate some of the the borrowing constraints they face after graduation and adjust their marriage expectations or borrowing decisions accordingly.

I next estimate the model using only respondents whose age is equal to or below the sample median (24 years at the time of the first survey); these results are shown in columns (3) and (4). I find that the relationship between MBA loans and marital status is overall not too different for the younger subsample of men, but the estimated marginal effect changes only by 0.1 percentage point when expected marital status is included in the regressions, compared to the 0.5 percentage point change in the full sample. The estimated marginal effect is -0.0034 without controlling for marriage expectations and -0.0033 in column (4), with both estimates significant at the 5 percent level, even though the sample size is fairly small (803). It appears that younger men are likely to treat student borrowing and family formation as unrelated events.

The corresponding results for women are shown in Table 3. The estimated marginal effect of the loan amount in column (1) is slightly smaller in absolute value (-0.0031) and noisier (significant at the 10 percent level) compared to the corresponding coefficient in Table 2. Adding the expected marital status indicators, which again are highly significant and have the anticipated signs, has a considerable impact on this coefficient, reducing its absolute value by ten percentage points. Furthermore, age is a much more important factor for women than it was found to be for men. Restricting the sample to those age 24 or less when first interviewed increases the size of marginal effect of MBA loans to -0.0044 when marriage expectation are excluded and -0.0039 otherwise. Both estimates are significant at the ten

percent level, even though there are only 735 women in the restricted sample. These results are consistent with two hypotheses: first, accumulating education loans is associated with a delay of marriage for women but as age increases, the relationship weakens; and second, women are much more likely than men to take into account the link between education debt and family formation.

For men, the estimated marginal effect of the *Values family* variable is positive and statistically significant in all specifications, while the estimate for *Values career* is negative, smaller in absolute value, and only significant at the ten percent level in the model in column (3). For women, the marginal effects associated with the family variable are also all positive but smaller and only significant when expected marital status is excluded. The coefficient estimate for the career valuation variable is close to zero for the full sample and positive but not significant for the younger subsample.[16]

4.2   Marriage Expectations and Investments in Education

If individuals considering graduate education take into account the long-term consequences of accumulating student debt, so that $\text{Cov}(D_i, m_i^e) \neq 0$, it is useful to take a closer look at the relationship between expected marital status and educational investments. Based on the results in Section 4.1, this relationship is expected to be stronger for women, for whom the difference in the estimated marginal effects of student loans was found to be larger depending on whether marriage expectations are included in the model. The most straightforward way to measure investments in education is through attendance status and, conditional on attending, the quality of the program because top-ranked programs are costlier on average. These outcomes are investigated in Table 4.

As implied by the findings in Tables 2 and 3, it is natural to divide the sample by gender because it is likely that the relationship between student loans and family formation operates through different channels for men and women. Thus, columns (1) and (2) of Table 4 show

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[16]All results in the paper change very slightly if the *Values family* and *Values career* variables are excluded from the regressions.

results for men, while columns (3) and (4) show results for women. In each case, the first specification estimates a probit model in which the dependent variable is an indicator for attendance of any MBA program during the sample period (conditional on registering for the GMAT) and the full sample is used in the estimation, while the second column estimates a probit model of the likelihood of attending a top 25 program[17] on the subsample of MBA students. In addition to expected marital status, the models include controls for attitudes toward family and career, race and Hispanic ethnicity, and a quadratic in age at the first interview. The excluded category for expected marital status is "not married" in order to compare more easily respondents who expect to marry within the two years following the first survey to those who do not.

The results in columns (1) and (2) suggest that for men there is no observable connection between marriage expectations and graduate management educational attainment. In fact, the coefficient that is largest in absolute value and closest to begin statistically significant (p-value of 0.12) is in the attendance model and suggests that men who expect to marry are 5 percentage points more likely to attend an MBA program compared to men who expect not to be married at the end of the two-year period following the first survey. Conversely, women who expect to remain single are 7.5 percentage points more likely to attend an MBA program than those who report no expectation and 5 percentage points more likely to attend than women who expect to be married, although the latter estimate has a p-value of 0.15. In addition, female MBA students who expect to be married are about 7.4 percentage points less likely to attend a top MBA program compared to female students who report a different expected status. The family and career attitude variables are not significant in any of the specifications in Table 4.

To provide a closer look at the relationship between education investments in the form of graduate school expenditures and student debt on the one hand, and expected marital status on the other, Tables 5 and 6 show tobit estimates of the determinants of the amount

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[17]The results are similar for attendance of a top 10 program and are not shown here.

borrowed and OLS estimates of the amounts spent on tuition and books or other supplies by, respectively, male and female MBA students. In each table the dependent variable in columns (1) and (2) is the amount borrowed, in columns (3) and (4) - the amount spent on tuition and fees, and in columns (5) and (6) - cumulative expenditures on books and other supplies. I estimate two versions of each model, the more sparse one including controls for expected marital status, career and family attitudes, and the demographic variables used in previous specifications. The results from these specifications are shown in the odd-numbered columns. The rest of the models include this set of controls as well as additional controls for MBA program quality and the availability of alternative financing. In particular, I include indicators for programs ranked among the top 10 and top 25 and the amount of graduate management education funding from a respondent's employer.

The results suggest that there is a well-pronounced correlation for both genders between marriage expectations on the one hand and business school expenditures and debt on the other, and this correlation persists when program quality and employer assistance are held constant. MBA students who expect to be married two years after their first interview spend less on their business school education and borrow less compared to students who expect not to be married. The estimates are significant at least at the ten percent level for both genders. The coefficients on the *No marital status expectation* variable are negative but not significant in all specifications. Men who expect to be married borrow on average $6,000 less for their graduate management education ($5,500 when controlling for program quality and the employer's contribution), while for women the corresponding decrease in borrowing is $8,600 ($7,000 with the additional controls). The corresponding reduction in tuition expenditures is between $3,000 and $5,000 for both genders, while spending on books and other supplies is on average $400-$600 lower for these respondents. Both sets of estimates are slightly higher for women than for men. The absolute value of the reduction in expenditures decreases slightly when controls for program quality and employer assistance are included but the change is not substantial in any of the specifications.

The *Values career* variable is positively correlated with business school expenditures: men who indicate high career valuation are expected to spend $3,100 more on MBA tuition and $300 more on books and supplies. For women, a positive response to the *Values family* measure is associated with a $7,000 increase in borrowing, while for men there is a corresponding decrease in spending on books and supplies. Higher employer contributions are associated with less borrowing for men but not for women and higher spending for both genders. MBA students at top programs borrow and spend more. Not surprisingly, accumulated loans and expenditures are lower for respondents who have not completed their graduate education by the last installment of the survey.

These findings support the hypothesis that family formation and student borrowing are inversely related, as are family formation and investments in education. The fact that the relationship between borrowing and expected marital status remains negative after controlling for the quality of the MBA program and one major source of alternative financing suggests that students, particularly women, may make tradeoffs elsewhere, for example in day-to-day expenditures, or that respondents may rely on spousal financial support. However, the latter is not in line with the negative coefficients on tuition and other expenditures.

5   Conclusion

This study provides a partial look at the complex relationship between the choice of educational investment, the amount of accumulated student debt, and the timing of family formation. The many ways in which these variables can interact complicates the empirical analysis. The analysis in this paper is focused on one type of graduate education, Master of Business Administration, which reduces the complexity. Incorporating respondents' reported marriage expectations and taking alternative funding sources into consideration are also unique aspects of my approach.

The results offer strong evidence that student loans have a negative and significant, both

statistically and economically, link to the probability of first marriage. Controlling for age and education, both men and women are less likely to marry if they hold student loans. This result is consistent with the presence of borrowing constraints when there is a relatively large fixed cost of marriage. Not conditioning on education could explain why other studies, such as Choy and Carroll (2000) and Chiteji (2007), do not find a relationship between student debt and marriage.

Another important observation is that marriage expectations are correlated with the amount of accumulated student debt and the amount invested in education. 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, especially for women. 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. One plausible explanation is that borrowers do not plan for all post-graduation consequences of holding student debt. 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.

The sample used in the study is selected and not representative of all postsecondary students in the U.S. so the results may not be directly generalizable to other treated populations, but the fact that the relationship is strong for graduate management students indicates strong likelihood that it exists for others and should be investigated further. The results presented here have important policy implications. The delay or decrease in the lifetime

probability of marriage is one unintended policy effect of student loans. Avery and Turner (2012) discuss the need to learn more about and educate students how to make more efficient borrowing decisions. If student borrowers do not anticipate their 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 consumption 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.

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Table 1: 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
Attend top 25 MBA	0.0936	0.0667	0.1490	0.1203	0.0544	0.0323
Attend top 10 MBA	0.0464	0.0316	0.0769	0.0570	0.0324	0.0099
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 ($1,000s)	22.45	17.56	22.45	17.56	14.92	13.61
	(18.08)	(15.23)	(18.08)	(15.23)	(13.98)	(10.92)
Percent with employer contribution	0.1975	0.1868	0.3272	0.3370	0.3471	0.3002
Amount from employer ($1,000s)	3.837	3.737	3.837	3.737	4.531	3.356
	(5.169)	(6.670)	(5.169)	(6.670)	(8.406)	(5.402)
Total spending - tuition	7.608	5.398	12.40	9.980	4.829	3.956
	(13.82)	(11.61)	(15.99)	(14.32)	(9.83)	(8.42)
Total spending - books/supplies	1.110	0.8533	1.804	1.565	0.9546	0.7229
	(2.016)	(1.783)	(2.342)	(2.183)	(1.945)	(1.649)
Values family ($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 and employer contribution include only MBA enrollees with positive amounts.

Table 2: Student Loans and the Probability of Marriage: Results for Men

	(1)	(2)	(3)	(4)
	Full Sample		Age (t=1) < 25	
Amount borrowed ($1,000s)	-0.0036***	-0.0031***	-0.0034**	-0.0033**
	(0.0013)	(0.0012)	(0.0016)	(0.0016)
Values family (t=1)	0.1493***	0.0853**	0.1758***	0.1149**
	(0.0359)	(0.0345)	(0.0487)	(0.0463)
Values career (t=1)	-0.0353	-0.0220	-0.0593*	-0.0380
	(0.0269)	(0.0257)	(0.0347)	(0.0333)
Expect to be married in 2 years		0.2629***		0.2785***
		(0.0360)		(0.0542)
Expect not to be married in 2 years		-0.1102***		-0.1175***
		(0.0297)		(0.0396)
N	1357	1357	803	803

* p<0.1, ** p<0.05, *** p<0.01. 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 and rank of MBA program, whether enrolled in school at $t = 4$, and a quadratic in age.

Table 3: Student Loans and the Probability of Marriage: Results for Women

	(1)	(2)	(3)	(4)
	Full Sample		Age (t=1) < 25	
Amount borrowed ($1,000s)	-0.0031*	-0.0021	-0.0044*	-0.0039*
	(0.0017)	(0.0016)	(0.0023)	(0.0021)
Values family (t=1)	0.0948**	0.0394	0.1050*	0.0564
	(0.0424)	(0.0408)	(0.0557)	(0.0539)
Values career (t=1)	-0.0045	0.0024	0.0205	0.0255
	(0.0313)	(0.0301)	(0.0394)	(0.0381)
Expect to be married in 2 years		0.2369***		0.2396***
		(0.0355)		(0.0485)
Expect not to be married in 2 years		-0.1213***		-0.1103***
		(0.0316)		(0.0392)
N	1140	1140	735	735

* p<0.1, ** p<0.05, *** p<0.01. 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 and rank of MBA program, whether enrolled in school at $t = 4$, and a quadratic in age.

Table 4: Marriage Expectations and Attendance Status

	(1)	(2)	(3)	(4)
	Male		Female	
	Attend MBA	Top 25 MBA	Attend MBA	Top 25 MBA
Expect to be married in 2 years	0.0530	-0.0278	-0.0535	-0.0740**
	(0.0340)	(0.0325)	(0.0371)	(0.0344)
No marital status expectation	0.0226	0.0168	-0.0748**	0.0010
	(0.0331)	(0.0305)	(0.0350)	(0.0297)
Values family (t=1)	-0.0224	0.0367	-0.0462	0.0025
	(0.0378)	(0.0372)	(0.0439)	(0.0364)
Values career (t=1)	0.0250	0.0388	-0.0178	0.0377
	(0.0272)	(0.0257)	(0.0320)	(0.0291)
Sample	All	MBAs	All	MBAs
N	1357	819	1140	632

* $p<0.1$, ** $p<0.05$, *** $p<0.01$. Probit estimation results. The reported coefficients are average marginal effects. The standard errors are robust. All regressions include controls for race and a quadratic in age.

Table 5: Do Marriage Expectations Affect Men's Education Investments and the Amount Borrowed?

	(1)	(2)	(3)	(4)	(5)	(6)
	Loans		Tuition		Books	
Expect to be married in 2 years	-6.2376*	-5.4647*	-3.6085***	-3.2675**	-0.4753**	-0.4396**
	(3.4881)	(3.1962)	(1.3760)	(1.2990)	(0.1896)	(0.1856)
No marital status expectation	-4.1888	-4.8026	-0.5986	-0.6529	-0.0812	-0.1053
	(3.4153)	(3.2143)	(1.3805)	(1.3254)	(0.2084)	(0.1982)
In school (t=4)	-17.5940***	-13.5188***	-4.9549***	-4.0911***	-0.9019***	-0.7877***
	(4.5246)	(4.3596)	(1.3936)	(1.3482)	(0.1744)	(0.1720)
Values family (t=1)	0.4137	-0.5130	-0.9423	-1.4388	-0.4523	-0.4991*
	(3.6999)	(3.3943)	(1.5495)	(1.4453)	(0.2925)	(0.2804)
Values career (t=1)	2.0598	0.7461	3.1037***	2.3750**	0.2931*	0.2342
	(2.6289)	(2.4615)	(1.0487)	(1.0018)	(0.1527)	(0.1491)
Amount from employer		-1.0064**		0.3332**		0.0090
		(0.4552)		(0.1301)		(0.0173)
Top 25 MBA		19.7287***		9.7834***		1.3302***
		(3.7685)		(2.3966)		(0.4280)
Top 10 MBA		12.3448**		9.2954***		0.3564
		(5.4471)		(3.5008)		(0.5890)
N	819	819	796	796	784	784

* p<0.1, ** p<0.05, *** p<0.01. Tobit (columns (1) and (2)) and OLS (columns (3)-(6)) estimation results for the subsample of male MBA students. The reported standard errors are robust. All regressions include controls for race and a quadratic 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.

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

	(1)	(2)	(3)	(4)	(5)	(6)
	Loans		Tuition		Books	
Expect to be married in 2 years	-8.5601***	-6.9547**	-5.1609***	-4.2215***	-0.6095***	-0.5312**
	(3.1461)	(2.9355)	(1.2911)	(1.1281)	(0.2176)	(0.2109)
No marital status expectation	-3.0581	-2.6740	-2.1405	-1.6151	-0.1961	-0.1554
	(2.9372)	(2.8250)	(1.5010)	(1.4194)	(0.2403)	(0.2390)
In school (t=4)	-11.0595***	-10.3192***	-4.5501***	-4.3122***	-0.2089	-0.1850
	(3.8897)	(3.6434)	(1.3328)	(1.2850)	(0.2621)	(0.2477)
Values family (t=1)	7.1118*	7.2153*	0.7179	0.7875	0.2804	0.2975
	(3.9627)	(3.7971)	(1.6189)	(1.3702)	(0.2007)	(0.1942)
Values career (t=1)	4.4974	3.4112	1.8310	0.8858	0.2906	0.2077
	(2.7500)	(2.5983)	(1.3065)	(1.2006)	(0.1949)	(0.1871)
Amount from employer		0.2544		0.7359***		0.0572**
		(0.3690)		(0.0908)		(0.0263)
Top 25 MBA		9.8319**		2.3071		0.1439
		(4.8949)		(2.5049)		(0.3384)
Top 10 MBA		13.0116*		18.6979***		1.6851***
		(7.0893)		(4.6200)		(0.6061)
N	632	632	587	587	584	584

* $p<0.1$, ** $p<0.05$, *** $p<0.01$. Tobit (columns (1) and (2)) and OLS (columns (3)-(6)) estimation results for the subsample of female MBA students. The reported standard errors are robust. All regressions include controls for race and a quadratic 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.