

## 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 strength of the relationship diminishes with age, more so for women than for men. At the median age for the sample (24 years at test registration), the estimated decrease over a seven-year period is between 3 and 4 percentage points per \$10,000 in student debt for men and a percentage point lower in absolute value for women. I use information on reported marriage expectations to show evidence that education expenditures and the amount of debt are correlated with anticipated marital status, but borrowers may not have perfect foresight about the long-term consequences of accumulating student debt.

**Keywords:** Student loans | Timing of marriage | Education expenditures

### **Article:**

“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 \$9470 in the 1997–98 academic year to \$16,240 in 2012–13, while the corresponding change for undergraduate students was from \$3220 to \$4900.<sup>1</sup> Among Master’s degree recipients in 2012, 27% had accumulated between \$40,000 and \$79,999 in undergraduate and graduate loans, while 17% borrowed more for their postsecondary education.<sup>2</sup> The increase in borrowing is to a large extent due to rising costs; inflation-adjusted tuition and fees at Master of Business

Administration (MBA) programs 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 & Soo, 2013).

In light of the increasing debt burdens of postsecondary students, there has been an onset of a discussion about the long-term implications of debt accumulated for postsecondary education.<sup>3</sup> 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 (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 (2015), 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 is 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.<sup>4</sup> 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 (MBA). I find a negative relationship between student loans and marriage outcomes. The strength of the relationship diminishes with age, more so for women than for men. At the median age for the sample (24 years at test registration), the estimated decrease over a seven-year period is between 3 and 4 percentage points per \$10,000 in student debt for men and a percentage point lower in absolute value for women. Among younger respondents – those who were 21 years old at test registration – the corresponding decrease in the probability of marriage is 5 percentage points for men and 7 percentage points for women. 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. I also find that education expenditures and the amount of debt are correlated with anticipated marital status prior to enrollment, even when program quality and alternative funding are held constant, which suggests that decisions about marriage and education investments are most likely 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.<sup>5</sup> Finally, the data used in this study allow me to investigate a borrowing decision that is fairly uniform across the sample.

## **2. Conceptual framework**

There are several mechanisms that can generate a relationship between student loans and marital status. This relationship can operate through education. Better educated individuals may fare better in the marriage market due to increased earnings potential or differences in preferences.<sup>6</sup> Educational attainment and marriage decisions may jointly reflect exogenous changes in the cost of investing in human capital.<sup>7</sup> Particularly for women, some researchers observe a negative correlation between entry into marriage and educational attainment (Isen, Stevenson, 2010, Long, 2010) or school enrollment (Thornton, Axinn, & Teachman, 1995), but using compulsory schooling laws to instrument for educational attainment, Lefgren and McIntyre (2006) and Anderberg and Zhu (2014) do not find a strong effect of educational attainment on the probability of marriage among women, respectively, in the U.S. or in England and Wales. However, the connection between the timing of marriage and graduate or professional education has not been explored much in the literature.

Conditional on education, post-graduation liquidity constraints can explain the delay in marriage 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.<sup>8</sup> 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.<sup>9</sup> 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 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.

Omitted variable bias will play a role for the relationship between student loans and marital status when unobserved individual heterogeneity is correlated with both marriage outcomes and debt accumulation. Consider the observed outcome of interest  $y_{it}$ , marital status in

this study. It is determined by an underlying latent index  $m_{it}$ , which is a function of educational attainment  $S_{it}$  and accumulated student debt  $D_{it}$ :

$$y_{it} = \begin{cases} 0 & \text{if } m_{it} \leq 0; \\ 1 & \text{if } m_{it} > 0 \end{cases} \quad (1)$$

and

$$m_{it} = g_1(S_{it}) + g_2(D_{it}) + u_{it}.$$

$$g_1'(\cdot)$$

$$g_2'(\cdot) < 0$$

$$S_{it} = f(D_{it}); \quad f'(\cdot) > 0$$

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

$$\frac{\partial m_{it}}{\partial D_{it}} = g_1'(S_{it}) f'(D_{it}) + g_2'(D_{it}),$$

$$g_1'(\cdot)$$

$$\left. \frac{\partial m_{it}}{\partial D_{it}} \right|_{S_{it}=\bar{S}} = g_2'(D_{it}) < 0.$$

$$\text{Cov}(S_{it}, z_i) \neq 0$$

$$\text{Cov}(D_{it}, z_i | S_{it} = \bar{S}) \neq 0$$

$$g_2'(D_{it})$$

$$|\text{Cov}(D_{it}, z_i)| > |\text{Cov}(D_{it}, z_i | S_{it} = \bar{S})|$$

$$m_{i,t-1}^e$$

$$\text{Cov}(D_{it}, m_{i,t-1}^e | S_i = \bar{S}) = \phi \quad m_{i,t-1}^e$$

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.

$$\phi = 0$$

$$\begin{array}{ccc}
 & m_{i,t-1}^e & \\
 & & m_{i,t-1}^e \\
 & & m_{i,t-1}^e \\
 m_{i,t-1}^e & & \\
 \text{Cov}(D_{it}, z_i) & \text{Cov}(m_{i,t-1}^e, z_i) & \\
 & & m_{i,t-1}^e
 \end{array}$$

### 3. Data

The data set used in this study is a four-wave panel survey of registrants for the Graduate Management Admission Test.<sup>10</sup> It is typical for MBA students to graduate with large amounts of student debt.<sup>11</sup> 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 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.<sup>12</sup>

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% (5853 responses out of 7006 randomly selected test registrants). The final interviews took place between January 1997 and November 1998 and 3771 of the 5853 initial respondents returned completed questionnaires. The marriage variable I use equals 1 if a respondent was married at the time of the second, third or fourth interviews and 0 otherwise and is only defined on the subset of respondents who are not married when first interviewed (1392 men and 1266 women).<sup>13</sup> 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 1357 men and 1140

women. There are 869 males and 650 females in the sample who enrolled in an MBA program by the last installment of the survey.<sup>14</sup> In the sample used for this study, MBA enrollment tends to occur before marriage, as shown in Table 1. Sixty-one percent of the transitions into MBA enrollment occur between the first and second waves of the survey, with only 17% of marriages occurring during the same period. Furthermore, 46% of observed marriages and 16% of observed transitions into MBA enrollment take place between the third and fourth waves of the survey.

**Table 1** Timing of marriage and MBA enrollment.

	Wave 2	Wave 3	Wave 4
Probability of transition into <sup>a</sup>			
Marriage	0.101	0.258	0.373
	(237)	(526)	(647)
MBA enrollment	0.394	0.223	0.198
	(926)	(351)	(242)

<sup>a</sup> Conditional on not being married or not having enrolled at the time of the previous interview. Number of transitions in parentheses.

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 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. In the main empirical model the amount borrowed is interacted with reported age from the first survey. This 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 the relationship is stronger 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.

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."<sup>15</sup> 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 answer. Respondents who expect not to marry in the two years following the first interview are on average about a year younger than those who expect to marry or report no expectation, but there is no age difference between the latter two groups.<sup>16</sup> Cohabitation in period 1 is somewhat correlated with expected marital status: 16% of men and 15% of women who expect to be married within two years were living with a partner at the time, compared to about 3% of other respondents. The link between initial marriage expectations and cohabitation later on weakens in period 2 and is nonexistent thereafter. Marital status is much more strongly correlated with respondents' reported expectations: 36% of men and 27% of women who expect to marry do so by the time of their second interview, while only 1–4% of those who expect not to marry or have no expectation are married at that point. The relationship weakens slightly over time, when marriage rates start increasing at more comparable rates for all groups. This is consistent with the phrasing of the expectations question on the survey questionnaire, which asks about marriage over the course of the following two years.

A table of 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 is available in an online appendix. The survey slightly oversamples women and oversamples minorities to a larger extent.<sup>17</sup> 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% do, compared to 54% 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% of women in the sample expect to remain single in the two-year period.

There are more full-time (556 individuals) than part-time (412 respondents) 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% of females and 2% 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% of men and 14% of women assign less than high importance to their family, but career is not a main priority for 39% of men and 30% 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. Married respondents are also less likely to take out loans and spend less on their education.

## **4. Results**

### **4.1. Student loans and marriage**

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. The reported results are average marginal effects from probit models

with heteroskedasticity-robust 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 separately for men (Panel A) and women (Panel B).

**Table 2** Student loans and the probability of marriage.

	(1)	(2)	(3)
<b>A. Results for men</b>			
Amount borrowed (\$1000s)	-0.0183**	-0.0175**	-0.0167**
	(0.0083)	(0.0081)	(0.0081)
Initial age/10 x amount borrowed	0.0061*	0.0059*	0.0056*
	(0.0034)	(0.0034)	(0.0034)
Values family (t = 1)	0.1503***	0.0865**	0.0880**
	(0.0358)	(0.0344)	(0.0342)
Values career (t = 1)	-0.0358	-0.0225	-0.0182
	(0.0268)	(0.0256)	(0.0255)
Do you expect to be married in 2 years – Yes		0.2631***	0.2391***
		(0.0360)	(0.0367)
Do you expect to be married in 2 years -- No		-0.1098***	-0.1120***
		(0.0297)	(0.0295)
Cohabiting with partner (t = 1)			0.2228***
			(0.0644)
N	1357	1357	1357
<b>B. Results for women</b>			
Amount borrowed (\$1000s)	-0.0339**	-0.0348**	-0.0333**
	(0.0145)	(0.0137)	(0.0133)
Initial age/10 x amount borrowed	0.0128**	0.0136**	0.0129**
	(0.0059)	(0.0056)	(0.0054)
Values family (t = 1)	0.0901**	0.0342	0.0368
	(0.0424)	(0.0407)	(0.0408)
Values career (t = 1)	-0.0089	-0.0022	-0.0006
	(0.0314)	(0.0302)	(0.0302)
Do you expect to be married in 2 years – Yes		0.2344***	0.2190***
		(0.0355)	(0.0363)



Do you expect to be married in 2 years – No		-0.1257***	-0.1248***
		(0.0315)	(0.0315)
Cohabiting with partner (t =1)			0.1501**
			(0.0629)
N	1140	1140	1140

\*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.

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 models also include indicators for race (Asian or black) and Hispanic ethnicity 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.<sup>18</sup> Finally, the model in column (3) controls for cohabitation in period 1.

The results in columns (1) and (2) of Panel A suggest that there exists a negative correlation for men between MBA student loans and the probability of transitioning into marriage by the last survey wave, and including expected marital status does not alter the results much even though both marriage expectation variables are highly significant and have the expected signs.<sup>19</sup> This is consistent with the hypothesis that men do not anticipate most of the borrowing constraints they face after graduation or that marital status and student debt are not jointly correlated with some variable unobserved in the data but known to survey respondents.

Using the results in column (2), the estimated marginal effect of \$10,000 in student debt for a male respondent who was 21 years old when he registered for the GMAT is -0.05, or a five percentage point reduction in the probability of marriage, with a p-Value of 0.001. The marginal effect diminishes in magnitude to -0.033 and the p-Value increases to 0.004 for a 24-year-old test registrant. The estimated effect is essentially zero (p-Value equal to 0.99) when age at the first interview is 30. Only 7% of male respondents are older than 30 at the onset of the survey so the results should not be extrapolated into the positive range of marginal effects.

The corresponding results for women are shown in Panel B, where we also observe a negative relationship between the amount borrowed and the probability of marriage but the relationship is more strongly associated with younger respondents. The marginal effect of \$10,000 in debt is -0.07 for a 21-year-old woman (-0.06 when controlling for marriage expectations) with a p-Value of 0.009, and it is -0.03 with a p-Value of 0.07 at the age of 24 (-0.02 holding expected marital status constant). Controlling for expected marital status makes slightly bigger difference for women, suggesting that they may be more mindful of the relationship between education debt and the rates of marriage. The expected marital status indicators are again highly significant and have the anticipated signs.

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 not significant. 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.<sup>20</sup>

Finally, the specifications in column (3) include an additional control for whether the respondent was cohabiting with a partner in period 1. The interpretation of the results could change if marriage is largely predetermined by relationship status at the onset of the survey. Cohabitation is used as an indicator of relationship status. This variable is a fairly strong predictor of marriage, particularly for men, but including it has little impact on any other coefficient estimates.

Descriptive evidence using a different measure of marital status expectations largely confirms the findings in Table 2. The first wave of the GMAT Registrant Survey asks respondents to evaluate the statement “A graduate management education will require me to postpone marriage, having a child or other important plans” on a 7-point scale ranging from -3 (False) to 3 (True). Respondents also evaluate the statement “A graduate management education will require me to take on large financial debts” on a similar scale. I construct two dummy variables based on these responses; both are equal to 1 when the chosen response is 2 or 3 (corresponding to fairly strong agreement with the respective statement) and to 0 otherwise. Table 3 shows the relationship between these two variables. Both men and women who think that an MBA degree is likely to be linked to delayed marriage are relatively more likely to also think that an MBA degree would require large amounts of debt. Of respondents who are not concerned about delays in marriage, 26% do expect graduate management education to lead to debt, compared to 44% of GMAT registrants who express concern about having to postpone marriage or children. Furthermore, Table 3 shows that while there is no difference in attendance rates between those who link graduate education to delayed marital union formation and those who do not, MBA students who are concerned about having to postpone marriage or children end up borrowing less and spending less on tuition. This could indicate heterogeneity in individuals’ preferences for the timing of family formation, or could mean that some borrowers anticipate debt and marital rates to be linked and act accordingly, while others do not. The following section considers in more detail the relationship between marriage expectations (using the expected marital status variables from Table 2) and the amount students invest in their graduate education.

#### 4.2. Marriage expectations and investments in education

$$\text{Cov}(D_{it}, m_{i,t-1}^e) \neq 0$$

Columns (1) and (2) of Table 4 show 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 study 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<sup>21</sup> 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.

**Table 3** Expectations about marriage and student debt.

		MBA would require postponing family <sup>a</sup>			
		Men		Women	
		No	Yes	No	Yes
MBA would require large debt <sup>b</sup>	No	74.0%	55.2	74.0	55.6
	Yes	26.0%	44.8	26.0	44.4
Attend MBA program		0.63	0.65	0.57	0.57
Amount borrowed (\$1000s) if attend		8.70	6.77	7.23	4.67
		(15.88)	(14.04)	(13.79)	(9.88)
Total tuition (\$1000s) if attend		13.42	10.15	11.43	7.76
		(17.01)	(13.72)	(16.08)	(11.15)

<sup>a</sup> Based on responses to the statement “A graduate management education will require me to postpone marriage, having a child or other important plans.”

<sup>b</sup> Based on responses to the statement “A graduate management education will require me to take on large financial debts.”

The results in columns (1) and (2) suggest that for men we do not observe a negative correlation between marriage expectations and graduate management educational attainment. In fact, the coefficient in the attendance model is positive and statistically significant and suggests that men who expect to marry are 10 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 6.7 percentage points more likely to attend an MBA program than those who report no expectation and 3.5 percentage points more likely to attend than women who expect to be married, although the latter estimate is not statistically significant. In addition, female MBA students who expect to be married are about 7.6 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, Table 5 shows tobit estimates of the determinants of the amount borrowed and OLS estimates of the amounts spent on tuition and books or other supplies by male (first three columns) and female (last three columns) MBA students. In each table the dependent variable in columns (1) and (4) is the amount borrowed, in columns (2) and (5) – the total amount spent on tuition and fees, and in columns (3) and (6) – cumulative expenditures on books and other supplies. Each model includes controls for expected marital status, career and family attitudes, and the demographic variables used in previous specifications, 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.<sup>22</sup>

**Table 4.** Marriage expectations and attendance status.

	Male		Female	
	Attend MBA (1)	Top 25 MBA (2)	Attend MBA (3)	Top 25 MBA (4)
Do you expect to be married in 2 years – Yes	0.1035*** (0.0333)	-0.0225 (0.0308)	-0.0345 (0.0370)	-0.0763** (0.0334)
Do you expect to be married in 2 years – Don't know	0.0385 (0.0322)	0.0142 (0.0297)	-0.0666* (0.0349)	-0.0011 (0.0290)
Values family (t = 1)	-0.0119 (0.0367)	0.0286 (0.0358)	-0.0397 (0.0437)	0.0013 (0.0355)
Values career (t = 1)	0.0363 (0.0266)	0.0335 (0.0247)	-0.0226 (0.0319)	0.0376 (0.0283)
Sample N	All 1357	MBAs 869	All 1140	MBAs 650

\*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 education investments and the amount borrowed?

	Men			Women		
	Loans (1)	Tuition (2)	Books (3)	Loans (4)	Tuition (5)	Books (6)
Do you expect to be married in 2 years – Yes	-7.077** (3.215)	-3.239*** (1.243)	-0.462*** (0.178)	-7.717*** (2.949)	-4.311*** (1.109)	-0.564*** (0.208)
Do you expect to be married in 2 years – Don't know	-5.292 (3.246)	-0.776 (1.288)	-0.118 (0.192)	-2.959 (2.834)	-1.648 (1.396)	-0.153 (0.236)
In school (t = 4)	-12.416*** (4.443)	-3.864*** (1.336)	-0.765*** (0.170)	-9.830*** (3.657)	-4.174*** (1.277)	-0.172 (0.246)
Age (t = 1)	-0.047 (3.033)	0.602 (0.925)	0.064 (0.142)	0.239 (2.307)	1.001 (0.711)	0.205 (0.132)
Age squared	-0.015 (0.054)	-0.012 (0.016)	-0.001 (0.002)	-0.017 (0.040)	-0.019* (0.011)	-0.004* (0.002)
Values family (t = 1)	-0.931 (3.437)	-1.595 (1.408)	-0.487* (0.271)	7.100* (3.816)	0.657 (1.362)	0.292 (0.193)
Values career (t = 1)	0.216 (2.476)	2.192** (0.967)	0.205 (0.143)	3.575 (2.593)	0.918 (1.166)	0.205 (0.182)
Amount from employer	-0.882** (0.444)	0.357*** (0.128)	0.012 (0.017)	0.292 (0.375)	0.745*** (0.091)	0.058** (0.026)
Top 25 MBA	19.030*** (3.817)	9.117*** (2.340)	1.256** (0.410)	10.259** (4.917)	2.407 (2.501)	0.150 (0.338)
Top 10 MBA	14.790*** (5.518)	10.195*** (3.469)	0.454 (0.577)	13.091* (7.109)	18.719*** (4.619)	1.685*** (0.606)
N	869	835	823	650	602	599

\*p < 0.1, \*\*p < 0.05, \*\*\*p < 0.01. Tobit (columns (1) and (4)) and OLS (columns (2), (3), (5) and (6)) estimation results for the subsample of 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.

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 five percent level for both genders. The coefficients on the Do you expect to be married in 2 years – Don't know variable are negative but not significant in all specifications. Men who expect to be married borrow on average \$7077 less for their graduate management education compared to male MBA students who expect to remain single (p-Value of 0.028). The average decrease in borrowing is similar, \$7717 with a p-Value of 0.009, for single women who expect their marital status to change, relative to single female MBA students who find a change in marital status unlikely. The corresponding reduction in tuition expenditures is over \$3000 for men and \$4000 for women who expect to get married compared to their peers who do not expect to marry; both estimates are significant at the 1% level. Spending on books and other supplies is about \$500 lower (significant at the 1% level) for respondents who anticipate to marry compared to those who do not expect to do so. Both sets of estimates are slightly higher in magnitude for women than for men but the difference is not statistically significant.

The Values career variable is positively correlated with MBA tuition for men. For women, a positive response to the Values family measure is associated with a \$7100 increase in borrowing (p-Value of 0.06), while for men positive responses are associated with a \$487 decrease in spending on books and supplies (p-Value of 0.07). 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 are still attending the MBA program at the time of the last installment of the survey. Age at GMAT registration does not appear to be a strong predictor of the amount borrowed for graduate management education.

These findings support the hypothesis that the rate of marriage and student borrowing are inversely related, as are marriage rates 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 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 marriage. The analysis in this paper is focused on one type of graduate education, Master of Business

Administration, which reduces the complexity driven by the many ways in which these variables can interact. Incorporating respondents' reported marriage expectations and taking alternative funding and program quality into consideration are also unique aspects of my empirical approach.

The results offer strong evidence that student loans have a negative and significant, both statistically and economically, relationship with the probability of first marriage. Men and women entering an MBA program in their early to mid-twenties are less likely to marry over the next seven years if they accumulate 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. An important policy question that this paper does not address directly is whether other consumption patterns are affected by student debt. Furthermore, while limiting the analysis to unmarried GMAT registrants helps reduce heterogeneity in the sample, it also limits the generalizability of the results. The fact that the relationship between student debt and marriage rates is well-pronounced for graduate management students indicates strong likelihood that it exists for others and should be investigated further.

Another observation is that marriage expectations prior to graduate school enrollment are correlated with the amount of subsequently accumulated student debt and the amount invested in education. This is consistent with the hypothesis that people anticipate to some degree the borrowing constraints they are faced with after graduation. If borrowers foresee at least part of the negative impact of educational debt on consumption later in life, this can account for some of the possibly excessive debt aversion that studies of education loans (e.g. Heller, 2008, Field, 2009, Oosterbeek, van den Broek, 2009, Linsenmeier, Rosen, Rouse, 2006) have encountered. At the same time, the empirical relationship between student debt and the probability of marriage remains strong even when marriage expectations are held constant. One plausible explanation is that borrowers do not plan for all post-graduation consequences of holding student debt. As such, the findings in this paper relate to Avery and Turner (2012) discussion of the need to learn more about and educate students how to make more efficient borrowing decisions.

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