

# **Postponing the Family? The Relationship between Student Debt and Lifecycle Transitions**

**Philip Anderson, University of Notre Dame\***

**April 2013**

## **Abstract**

This paper uses the Survey of Consumer Finances and an estimation strategy developed by Gicheva (2012) to estimate the relationships between student loans and lifecycle transitions. I use probit models and an instrumental variables strategy to address concerns about endogenous student loan amounts. First, I replicate the primary results of Gicheva (2012) using an updated data set, and find that student loans decrease the probability that both men and women have ever been married. Then, I show that student debt is correlated with a lower probability of having had a child by a particular age for both men and women. When an instrument is used, however, this relationship does not hold; in fact, student loans increase fertility at younger ages. I discuss possible channels for this effect.

---

\* I would like to thank my advisor, Professor Kasey Buckles, for her invaluable assistance in the completion of this paper. I would also like to thank Professor Richard Jensen, Roisin McCord, and Neil O'Dougherty for their helpful feedback in the 2012-13 Honors Thesis Seminar.

## I. Introduction

In 2012, student loan debt exceeded \$1 trillion for the first time, surpassing the total amount of consumer credit card debt in the process.<sup>1</sup> The magnitude of this amount, when viewed in the context of the Great Recession, has forced a reevaluation of the value of many college degrees, and brought attention to the way in which student loans could impact the timing of family formation later in life.<sup>2</sup> A November 2012 article from *Time* discusses the relationship in question, arguing that college graduates with student debt “tend to delay life-cycle events such as buying a car or house, getting married, [or] having kids.”<sup>3</sup> Furthermore, two March 2012 articles featured in *Bloomberg Businessweek* and the *Huffington Post* suggest that marriage and fertility rates may have fallen as a result of such debt.<sup>4,5</sup>

Despite the growing popular interest in this topic, relatively little empirical work exists on the subject. Gicheva (2012) stands as perhaps the only example, and explores the relationship between student debt and the probability of marriage. In this paper, I corroborate Gicheva’s findings through the replication of her primary results, and extend her model to apply to fertility timing. I use data from the Survey of Consumer Finances that contains respondents’ demographic information (including marital status and number of children), along with detailed information about their six most recent student loans. To estimate the relationship between the amount of student loan debt and marriage and fertility timing, I utilize a probit model with controls for demographic characteristics such

---

<sup>1</sup> <http://www.bloomberg.com/news/2012-03-22/student-loan-debt-reaches-record-1-trillion-u-s-report-says.html>.

<sup>2</sup> Aggregate student loans by 2012 equaled 7% of 2011 GDP - <http://data.worldbank.org/indicator/NY.GDP.MKTP.CD>.

<sup>3</sup> <http://business.time.com/2012/11/29/is-the-student-loan-debt-crisis-worse-than-we-thought/>.

<sup>4</sup> <http://www.businessweek.com/articles/2012-03-28/will-you-marry-me-after-i-pay-off-my-student-loans>.

<sup>5</sup> [http://www.huffingtonpost.com/2012/03/28/study-college-debt-marriage-loans-rates-rising\\_n\\_1385548.html](http://www.huffingtonpost.com/2012/03/28/study-college-debt-marriage-loans-rates-rising_n_1385548.html).

as age, race, and education level. I also employ an instrumental variables strategy that uses the availability of federal student loans as a source of exogenous variation in loan amounts for the respondents in my sample.

Like Gicheva (2012), I find that increases in student loan amounts reduce the probability of ever marrying. My results for men indicate that an additional \$10,000 in student loans reduces the probability of marriage by 7.4 percentage points. For women, I find that an additional \$10,000 in student loans reduces this probability by 9.3 percentage points. I then turn to estimates of the effect of student loan debt on fertility timing. Using the probit model, I find that student loans are correlated with increasingly negative probabilities of fertility as an individual ages, for both men and women; these results are robust to controlling for whether or not the individual has ever been married. Using the probit model with an instrumental variable, however, nullifies this relationship; I find that student loans cause a statistically significant increase in fertility by ages 25 and 30 for both men and women. When I add a control for whether or not the individual has ever been married, the coefficients increase in magnitude. These results, along with possible explanations, will be discussed in Sections V and VI.

## **II. Background**

### *a. Student Debt and Family Formation Statistics*

The most recent student loan statistics reveal the extent to which American students rely on this form of debt to finance their post-secondary education. Indeed, the total volume of student loans disbursed doubled from \$55.7 billion in 2001-02 to \$113.4 billion in 2011-12, while the total funds borrowed (including federal and private loans)

grew 110% over this same period. The federal loans per full-time equivalent (FTE) undergraduate student have grown at an increasing rate over the past fifteen years. Such loans increased 0.3% per year from 1996-97 to 2001-02, 3.5% per year from 2001-02 to 2006-07, and 6.2% per year from 2006-07 to 2011-12. Moreover, these loans are not limited to a small portion of the population - over half (57%) of the 2011 graduates who earned bachelor's degrees from the public four-year colleges at which they started, did so with debt.

Additional concern lies not only with the mental burden associated with bearing any amount of debt, but also with the ability of students to repay that which they have borrowed. After falling for the majority of the 1990s, the federal student loan two-year default rate began to rise halfway through the 2000s. By September 30, 2011, 9.1% of borrowers who had begun to repay their federal student loans in the 2009-10 academic year defaulted. This figure represented the highest such rate since 1996, and one that was up 54% from 2000.

In the same period that the total amount of student debt has been increasing, a key indicator of family formation has been changing as well. Over the past thirty years, the average age at first birth amongst women has been steadily increasing. This number, provided by the Center for Disease Control, rose from 21.4 in 1970, to 25.4 in 2010.<sup>6</sup> Both this trend and the average federal loans per FTE student are presented visually in Figure 1.<sup>7</sup> It should be clear from the figure that both trends are positive throughout the period evaluated.

*b. The Higher Education Act*

---

<sup>6</sup> I calculate the average ages at first birth using data from the CDC's National Vital Statistics Reports Vol. 51 No. 1 and Vol. 61 No. 1.

<sup>7</sup> Figures 1 and 2 are partial replications of Figure 1 of Gicheva (2012), included for comparison purposes.

The solid lines in Figures 1 and 2, representing the average federal loan per FTE student, have been fundamentally influenced by the piece of legislation that made the current volume of federal loans possible – Lyndon Johnson’s Higher Education Act of 1965.<sup>8,9</sup> Title IV of this bill, the Student Assistance Act, stands as the first program to make aid generally available to postsecondary students. It was this legislation that created the modern subsidized federal loan, and removed many of the financial barriers that prevented students from obtaining a college education. Since its initial authorization in 1965, this act has undergone a series of reauthorizations that have expanded the role of the Federal Government in increasing educational accessibility. While a thorough investigation of the terms of all eight reauthorizations is beyond the scope of this paper, the most important, in terms of expanding the amount of aid available to students, occurred in 1976, 1992, and 2008. The immediate impacts that these changes had on the average amount of aid are visible within Figures 1 and 2, in the forms of the increases that take place after each. These acts, created and passed independently of the students they affected, provide the exogenous variation for the instrumental variables strategy that I describe in Section IV.

*c. Related Research*

A growing body of economic literature has examined the financial conditions that must be in place before individuals initiate lifecycle transitions; many of these studies have focused on how assets or income can be used to predict the probability of marriage or divorce. Ahn and Mira (2001) stands as an early example of such work, and uses data from Spain to show that unemployment can lead to marriage delays. Gibson-Davis

---

<sup>8</sup> All information for the HEA taken from <http://www.finaid.org/educators/reauthorization.phtml> and [http://www.tgslc.org/pdf/hea\\_history.pdf](http://www.tgslc.org/pdf/hea_history.pdf).

<sup>9</sup> See Section 3.1 of Gicheva (2012) for additional information on the HEA.

(2009) finds that positive changes in earnings are associated with an increase in the odds of marriage, but not fertility amongst low-income couples. Mamun (2006) and Schneider (2011) find positive relationships between the assets of individuals and their probability of marriage, while Dew and Price (2011) find that car values and various employment factors can also act as predictors of this event.<sup>10</sup> Finally, Dew (2011) shows that consumer debt is positively associated with divorce.

But while each of these studies looks at the impact of some form of assets or income on lifecycle transitions, none looks at how negative assets, specifically in the form of student debt, affect marriage or fertility. To my knowledge, only one paper enters this territory: Dora Gicheva's 2012 working paper, "In Debt and Alone? Examining the Causal Link between Student Loans and Marriage." In this paper, Gicheva uses two data sets to show that, quoting the abstract, "the amount of [student] debt is negatively related to the probability of marriage." In examining the first of these sets, the publicly available Survey of Consumer Finances, Gicheva uses a probit model and an instrumental variables strategy to prove that the aforementioned relationship is causal. She finds that for men, a \$10,000 increase in student loans causes a 7.2 percentage point decrease in the probability of marriage; this probability rises to 14.2 percentage points for women. In her analysis of the second data set, a survey of students taking the Graduate Management Admissions Test, she finds a similar, but weaker, relationship.

While Gicheva (2012) thoroughly explores the connection between student loans and marriage, it does not examine that between student loans and fertility. In this paper, I utilize the Survey of Consumer Finances and the empirical framework of Gicheva (2012) to corroborate the marriage findings of that paper with additional data and an expanded

---

<sup>10</sup> See Smock et al. (2005) for a qualitative study with similar findings.

set of data modifications. I then apply this estimation strategy to an evaluation of fertility timing that uses the same data set. This is the first study of the causal effect of student loans on fertility.

### **III. Data**

#### *A. Sample and Key Variables*

The data set used in this paper is taken from the Survey of Consumer Finances (SCF), a triennial, cross-sectional survey sponsored by the Board of Governors of the Federal Reserve, in cooperation with the Department of the Treasury. This nationally representative survey is valuable to this study because it contains the respondents' demographic information and detailed information about their six most recent student loans; this data includes loan amount and the year in which each was taken out.

First, I use the methods in Gicheva (2012) to construct a data set that will allow me to closely replicate the marriage results in that paper. The data from the 5 survey waves conducted between 1995 and 2007 are combined to form a pooled cross-section.<sup>11</sup> I drop all individuals born prior to 1954; this ensures that all respondents reach 17 years of age by 1971, the first year for which I have national student loan information. Each SCF data set contains 5 imputations for each respondent in order to account for any missing points; I use the first of these imputations in my analysis. SCF administrators can classify survey takers as either "heads of households" or simply as "respondents." I use survey respondents for two reasons: first, gender is more equally distributed amongst those receiving "respondent" classification than it is amongst those designated "head of

---

<sup>11</sup> Beginning in 1995, survey information was collected using computer-assisted personal interviewing that brought the available data into its present form.

household.” Second, racial information is always available for respondents, but not necessarily available for heads of households.

For my main results, I modify Gicheva’s approach in several ways. First, I am able to update the data set by adding the 2010 wave of the SCF, which adds 2,029 observations. I also drop all individuals who have not completed high school - since this study focuses on the effects of college loans, such individuals are not germane to my analysis. Finally, loan information is collected for the household as a unit; this is not an ideal collection method for my purposes, as loans belonging to any individual within the household may appear to be loans belonging to the respondent. To mitigate the potential effects of the endogeneity issues associated with this, I calculate the age at which the respondent took out his or her first loan, and eliminate responses for which this age was less than 16 or greater than 35. This range should leave only those who took out loans at traditional times, and remove those who co-signed loans with family members, such as college-aged children or grandchildren.

My primary dependent variable varies by model, but always measures some lifecycle transition, in binary form. For the results seen in Table 2, for example, I create a variable (“Ever Married”) that equals one if the respondent has ever been married, and zero otherwise.<sup>12</sup> For those in Table 3, I create four variables, each of which equals one if the respondent has a child by a particular age. The first of these, “Child by 25,” equals one if the respondent’s age at first birth occurs before or at the age of 25, and zero otherwise.<sup>13</sup> Potential for measurement error arises from the fashion in which the SCF records fertility information. Just as with loans, children of the entire household, rather than just those of

---

<sup>12</sup> The “Ever Married” variable includes those who are currently married, divorced, separated, or widowed.

<sup>13</sup> The earliest possible age at first birth that I allow is 16.



respondents, are reported.<sup>14</sup> Furthermore, I calculate the age at first birth as the difference between the age of the oldest child and the age of the respondent. For privacy purposes, the 2004-10 sets of the SCF group the ages of children into ranges rather than report the actual ages. In all years of the data, the average age at first birth hovers around 26 regardless of which surveys are evaluated.<sup>15</sup>

My primary independent variable is continuous and aggregates the initial amounts borrowed for up to six loans; I convert these loans to 2010 dollars, based on the year in which each was taken out.<sup>16</sup> Data for my instrument comes from the 2012 installment of a College Board annual report: “Trends in Student Aid.”

### *B. Summary Statistics*

Summary statistics are presented in Table 1. My final sample consists of 12,254 individuals, of which 6,007 (49.02%) are male, and 6,247 (50.98%) are female. My sample is 74% white, 13% black, 8% Hispanic, and 5% of another race. Of those who have no student debt, 76.65% report having ever been married; this number falls to 56.45% amongst those with loans. The percentage of the sample that reports having had a child by any particular age is typically higher amongst those without student debt, with the exception of the “Child by 25” category. In general, the percentage of the population with any type of college degree is higher amongst those with student loans. 888 males (7.25% of the entire sample) have at least some student loan debt, while 1,165 females (10.35%) fit this same description. Of those who have student loans, the mean amount

---

<sup>14</sup> For example, if the respondent has no children, but marries someone with two children, he will appear as having two children.

<sup>15</sup> This is higher than the average age at first birth reported in the CDC’s National Vital Statistics Reports (~24) because I have omitted high school dropouts. Mean age at first birth calculated using data from Vol. 51 No. 1 and Vol. 61 No. 1 of the National Vital Statistics Reports.

<sup>16</sup> All monetary values adjusted for inflation using the Bureau of Labor Statistics’ CPI for all Urban Consumers.

for males is approximately \$35,000, while that for females is approximately \$29,000. Each successive survey adds relatively more observations to the aggregate set than that which preceded it; as a result, the 2010 sample provides over 2.5 times as many observations to the final set as the 1995 sample.

#### IV. Estimation Strategy

##### *Probit Model and Instrumental Variables Estimation*<sup>17</sup>

Because each of the models estimated within this paper features a binary dependent variable, I use a probit model that takes the following form:

$$Y_i = BL_i + X_i\delta + u_i \quad (1)$$

where  $Y_i$  represents the predicted outcome,  $L_i$  measures the student loan amount,  $X_i$  represents a vector of exogenous personal characteristics, and the error is given by  $u_i$ , all for individuals  $i$ . Within the vector  $X_i$ , I include controls for amount of education obtained, including completion of some college, a bachelor's degree, a master's degree, or an advanced degree (in a variable that groups J.D.'s and M.D.'s with Ph.D.'s).<sup>18</sup> I also include a cubic polynomial in age, race variables (White, Black, Hispanic), and in some models, a control for whether or not the individual has ever been married.

I use a probit model to avoid the primary drawback of the linear probability model: the prediction of coefficient values outside of the binary ( $[0,1]$ ) range. This particular probit model, however, when estimated in its baseline form, introduces simultaneity bias. If the decision to have a child impacts the amount of student loans that an individual takes out

---

<sup>17</sup> This estimation strategy is borrowed from Gicheva (2012); it closely follows and extends the strategy found in that paper; the justifications for both the probit model and instrument use are borrowed as well.

<sup>18</sup> The inclusion of controls for amount of education obtained is necessary, as educational attainment could impact marriage and fertility probabilities.

(or vice versa), results are likely to be biased. There may also be unobserved characteristics that affect both the initial value of student loans borrowed, and marriage or fertility decisions (such as family background characteristics). To account for these issues, I employ an instrumental variables strategy. This instrument appears in the first stage of my IV estimation, in the following model:

$$L_i = Z_i\pi + X_i\beta + v_i \quad (2)$$

where  $Z_i$  represents the instrument and  $v_i$  represents the error term. I use the average federal student loan amount as an instrument to predict the loan size ( $L_i$ ) of individuals within the SCF. This average closely follows changes in the maximum federal loan amount brought about by the various reauthorizations of the Higher Education Act. Furthermore, Figure 2 shows that this average is correlated with the size of an individual's student loans - first stage results confirming this relationship are reported for all IV results within the tables. This average should be exogenous to the error term of the model in Equation (1), because the students who take out federal loans have no role in developing the public policy that influences them. Therefore, the average loan amount can be used as an instrument to obtain consistent estimates of the effect of student loan amounts on marriage and fertility.

## V. Results

In Table 2a, I present three two-column groups of results, exclusively for men. The first group (Columns 1 and 2) holds results taken directly from Table 2 of Gicheva (2012), which I include for comparison purposes. The second group (Columns 3 and 4) represents my closest attempt at replicating the results seen within the first group,

following the procedure described within Gicheva (2012). In general, the coefficients that I find are of a similar magnitude and significance level to those found within that paper. The coefficient of my primary independent variable (student loans) is identical for the probit model, and 0.0002 percentage points different from that found by Gicheva in the IV probit model, and only slightly more significant. The third group (Columns 5 and 6) represents the results I obtained using the same model, but making the additional changes described in Section III. Two such alterations visible within this table are the addition of “Some College” as an educational outcome possibility, and the addition of another survey wave, reflected by the number of observations. The results that I find after having made my own changes are again similar to those found by Gicheva. The coefficient on my primary independent variable is identical for the probit model, and 0.0002 percentage points different from Gicheva’s IV probit estimation, but more significant. The remaining coefficients are, like those of Group 1, generally positive and significant. My final IV results (of Column 6) imply that an additional \$10,000 in student loans causes a 7.4 percentage point decrease in the probability of having ever been married, for men.

Table 2b takes the same format as Table 2a, but presents results exclusively for women. In attempting to replicate Gicheva’s results, I match her probit estimate for the coefficient on student loans, and find an instrument coefficient that is 0.0006 percentage points lower than hers. When I incorporate my changes, I estimate roughly the same probit coefficient, but an IV probit coefficient of a smaller magnitude – my estimate is 0.0049 percentage points lower than Gicheva’s. In general, the remaining coefficients take on the same sign and similar significance levels as those seen within Columns 1 and

2. My final IV results (of Column 6) imply that \$10,000 in loans causes a 9.3 percentage point decrease in the probability of having ever been married, for women.

Table 3a presents the fertility results that I find, exclusively for men. The first panel of the table holds the probit results from my estimation, while the second holds IV probit results. Each column represents a model that starts with the dependent variable “Child by X,” beginning with “Child by 25” and moving rightwards as age increases, to conclude with “Child by 40.” The probit results show that, when controls for education, race, and age are put in place, student loans are negatively correlated with the probability of having had a child by a particular age. The negative correlation is increasingly significant, and increasingly large in magnitude.<sup>19</sup> The IV probit results, however, follow a different pattern. The primary independent variable takes on positive and significant coefficients in the first two columns, while these coefficients lose their significance in the final two. The coefficients on each of the other independent variables included in the table hold the same sign in each panel.

Table 3b follows the same format, but for women. Again, the coefficient on the student loan variable becomes increasingly negative as one moves across the probit results. The only significant coefficient, however, is that of the “Child by 35” model. The IV probit results follow a similar pattern as that seen for men, with positive and significant effects on the probability of having a child by age 25 or 30. This significant relationship disappears when the probability of having a child by age 35 or 40 is examined.

---

<sup>19</sup> The largest such coefficient, that of “Child by 40,” indicates that an additional \$10,000 in loans is correlated with a 2.4 percentage point decrease in the probability of having had a child by age 40.

Tables 4a and 4b present the results from the same model as in Tables 3a and 3b, but include a control for whether or not the individual has ever been married. The inclusion of this control is important, as this status could impact the probability that this individual has ever had a child. Table 4a shows results for men only, results that appear similar to those seen within Table 3a. The primary coefficients from the probit model become increasingly negative as one moves rightwards across the results column. Additionally, the coefficient on “Ever Married” is positive and significant in every model. The IV probit results show that IV estimation yields a positive and statistically significant coefficient on the student loan variable, for the first three of the four models run. Each of these coefficients is larger than its counterpart in Panel 2 of Table 3a. Again, the coefficients on the “Ever Married” variable are significant and positive.

Table 4b shows results for women only. The coefficients of the primary independent variable are again increasingly negative, but only significant for “Child by 35” and “Child by 40.” The coefficients on “Ever Married” are smaller in magnitude than those seen in Panel 1 of Table 4a, but still significant in every model. Like the IV results for men, the coefficients on the primary independent variable are positive in every model and significant in the first three. The coefficient on “Ever Married” is again positive and significant.

## **VI. Discussion**

The results within Tables 2a and 2b indicate that, using the model I have already described, student loans are not correlated with the probability of having ever been married in a statistically significant way. When the same model is used, but an

instrumental variables strategy employed, the results suggest that there is a negative and causal relationship between student loans and that same probability. In other words, an exogenous increase in student loan amounts results in a lower likelihood of having ever been married. There are a number of possible interpretations of these results. The first reflects the marital desirability of someone with debt. When making the decision to marry, an individual must evaluate many aspects of the potential partner, one of which is financial maturity. Considering that the finances of the two engaged parties merge after the marriage takes place, the presence of debt attached to one of those involved may make him or her a less attractive partner. This conjecture seems validated by the coefficients on the other variables within the second, fourth, and sixth columns. For men, all completed degrees are positively and significantly correlated with the probability of having ever been married. Unsurprisingly, the magnitudes of these coefficients rise as the degree becomes more difficult to attain, and the potential career earnings associated with each increase. This is also seen within the female sample, as completing some college (but not a degree) is negatively correlated with marriage probability, while master's and doctorate degrees are positively correlated with marriage and statistically significant. Furthermore, given the traditional role of men as the primary income earners within a household, it is unsurprising that women holding debt are less likely to have ever been married than men.

A second interpretation of the results involves marriage as a means of funding education. The institution of marriage brings a variety of financial benefits, such as the ability to split costs like mortgage payments, utility bills, and food. Some individuals may turn to marriage as a way to help bear the burden of these costs, and save money for

educational expenses. If an augmented ability to pay for education stands as a primary motivation for marrying, it makes sense that an increased availability of student loans could lower the likelihood of marrying. With the extra money that comes from loans, students may no longer feel the need to marry for its financial benefits.

The results within Tables 3a and 3b reflect the implications of the two possible interpretations. The probit results suggest that student loans are negatively correlated with fertility in a statistically significant way. This invokes the first explanation, that individuals with student loans are less desirable candidates to have children. Ideally, one would have eliminated most or all of his student debt before having a child, as doing so in 2013 is quite expensive, and not conducive to paying off loans.<sup>20</sup> Of similar interest is that the absolute value of the student loan coefficient increases as the age specified by the dependent variable increases for both men and women. It appears that the persistence of loans has an increasingly negative association with the probability of having children as one gets older. Perhaps a protracted inability to pay off student loans could be a reflection of one's poor candidacy for parenthood, in the eyes of potential partners.

The IV probit results of Tables 3a and 3b, however, invoke the second explanation. For both men and women, the coefficient on student loans is positive and significant for "Child by 25" and "Child by 30." Since the purpose of the instrument is to impose loans on those in the sample and stimulate a causal relationship between loans and the dependent variable, then it could be that when those who would not normally take on loans find themselves with the extra money that they provide, these individuals suddenly

---

<sup>20</sup> Indeed, the average child born in 2013 is expected to cost \$222,360 over the course of a lifetime - [http://www.huffingtonpost.com/2010/06/16/the-lifetime-costs-of-rai\\_n\\_614733.html#s101073&title=Housing\\_\\_31](http://www.huffingtonpost.com/2010/06/16/the-lifetime-costs-of-rai_n_614733.html#s101073&title=Housing__31).



find themselves in the position to bear the expenses that come with having a child. This could also explain why the coefficient is only significant at younger ages. Once someone has passed the age of 30, he would be further removed from the traditional college years (of 18-22) and possibly in a better position to take on child-related expenses. The negative and significant signs on the education variables in the second panel of each table support this idea by indicating that those who spend a large part of their lives accumulating human capital in the form of education are less likely to have had children by ages 25 or 30.

The contents of Tables 4a and 4b show that the probit results remain unaffected by the presence of a control for whether or not the individual has ever been married. For both men and women, student debt is still negatively correlated with the probability of fertility by most ages. Additionally and perhaps unsurprisingly, the coefficient on the “Ever Married” variable is positive and significant in every model. The IV probit results are slightly different from those seen in Tables 3a and 3b. The magnitude of each primary variable coefficient increases with the inclusion of the “Ever Married” control. Also, the significance of the coefficient on student loans extends to include the “Child by 35” column for both men and women. Taken together, these could indicate that student loans provide some students with the financial stability needed to support a child.

## **VII. Conclusion**

The overall volume of student loan debt has increased substantially in recent years. Indeed, in 2012, the total amount of student loans outstanding surpassed \$1 trillion for the first time, a figure that has brought attention to the way in which student debt could

impact the timing of family formation later in life. In this paper, I use the Survey of Consumer Finances and an estimation strategy borrowed from Gicheva (2012) to evaluate the impact that student debt has on marriage and fertility timing probabilities. I use a probit model with an instrumental variable that harnesses the exogenous variation in the availability of student loans. In line with Gicheva (2012), I find that school loans have a negative and causal impact on the probability of marriage. Extending that work to consider the effects of student loan debt on fertility, I find that school loans are negatively correlated with the probability of having a child. When I use an instrumental variables approach to address issues related to the endogeneity of student loans, however, I do not find evidence for this relationship. In fact, I show that student loans *increase* the probability of having a child at younger ages.

Potential explanations for these results were discussed in Section VI, and center around two possibilities. The first of these sees student loans as a hindrance to the initiation of lifecycle events, as those with loans could be seen as less desirable spouses or parents by potential partners. The second sees student loans as enabling devices that allow individuals to better afford the financial burdens of children.

Opportunities abound for future work in this area. A study that replicates the marriage and fertility aspects of this paper, but utilizes a different data set and empirical approach could augment our knowledge on this topic. Another study could look at the effects of loans on different types of students (vocational, undergraduate, graduate), or on the effects of loans in different types of schools (public/private); such a study could examine the impact of loans on detailed subsets of the population.

## References

- Ahn, Namkee, and Pedro Mira. "Job Bust, Baby Bust?: Evidence from Spain." *Journal of Population Economics* 14.3 (2001): 505-21. Print.
- Cervantes, Angelica et al. *Opening the Doors to Higher Education: Perspectives on the Higher Education Act 40 Years Later*. Rep. TG Research and Analytical Services, Nov. 2005. Web. 19 Mar. 2013.
- Dew, Jeffery. "The Association Between Consumer Debt and the Likelihood of Divorce." *Journal of Family and Economic Issues* 32.4 (2011): 554-65. *Springer-Link*. Web. 19 Mar. 2013.
- Dew, Jeffrey, and Joseph Price. "Beyond Employment and Income: The Association Between Young Adults' Finances and Marital Timing." *Journal of Family and Economic Issues* 32.3 (2011): 424-36. Print.
- Dwoskin, Elizabeth. "Will You Marry Me (After I Pay Off My Student Loans)?" *Businessweek.com*. Bloomberg Businessweek, 28 Mar. 2012. Web. 19 Mar. 2013.
- "GDP (current US\$)." *World Bank National Accounts Data, and OECD National Accounts Data Files*. The World Bank, 2013. Web. 1 Apr. 2013.  
<<http://data.worldbank.org/indicator/NY.GDP.MKTP.CD>>.
- Gibson-Davis, Christina M. "Money, Marriage, and Children: Testing the Financial Expectations and Family Formation Theory." *Journal of Marriage and Family* 71.1 (2009): 146-60. Print.
- Gicheva, Dora. "In Debt and Alone? Examining the Causal Link between Student Loans and Marriage." *Working Paper* (2012): n. pag. Web. 19 Mar. 2013.  
<[http://www.uncg.edu/bae/people/gicheva/MBA\\_loans\\_marriageMay12.pdf](http://www.uncg.edu/bae/people/gicheva/MBA_loans_marriageMay12.pdf)>.

Hamilton, Brady E., and T. J. Matthews. *National Vital Statistics Report. Vol. 51 No. 1.* Rep. Center for Disease Control, 11 Dec. 2012. Web. 24 Mar. 2013.

Hindman, Nate C. "The Lifetime Costs Of Raising A Child (PHOTOS)." *The Huffington Post.* TheHuffingtonPost.com, 16 June 2010. Web. 01 Apr. 2013.

Lorin, Janet. "Student-Loan Debt Reaches Record \$1 Trillion, Report Says." *Bloomberg.* Bloomberg.com, 22 Mar. 2012. Web. 01 Apr. 2013.

Mamun, Arif. *The White Picket Fence Dream: Effects of Assets on the Choice of Family Union.* Washington, DC: Mathematica Policy Research. Mathematica Policy Research, 2006.

*National Vital Statistics Report Vol. 61, No.1.* Rep. Center for Disease Control, 28 Aug. 2012. Web. 24 Mar. 2013.

Schneider, Daniel. "Wealth and the Marital Divide." *American Journal of Sociology* 117.2 (2011): 627-67. Print.

Smock, Pamela J., Wendy D. Manning, and Meredith Porter. "'Everything's There Except Money': How Money Shapes Decisions to Marry Among Cohabitors." *Journal of Marriage and Family* 67.3 (2005): 680-96. Print.

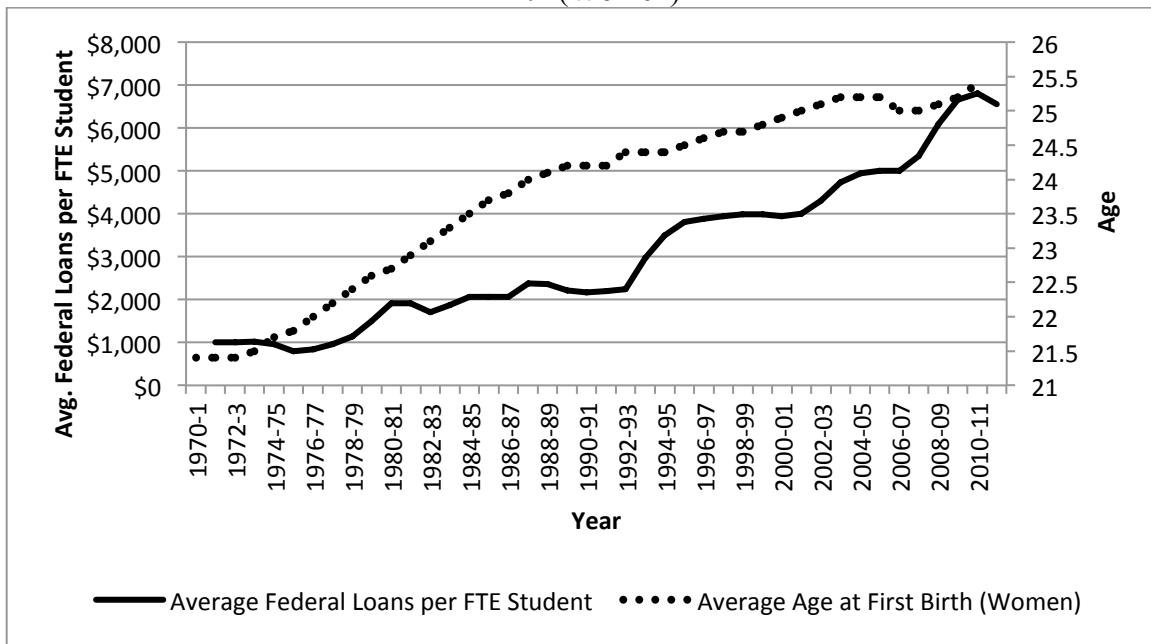
"Study Suggests Young People Are Delaying Marriage Because Of Rising College Debt." *The Huffington Post.* TheHuffingtonPost.com, 28 Mar. 2012. Web. 19 Mar. 2013.

*Trends in Student Aid (2012).* Publication. College Board, 2012. Web. 19 Mar. 2013.

White, Martha C. "Is the Student-Loan Debt Crisis Worse than We Thought?" *Time.com.* Time, Inc., 29 Nov. 2012. Web. 19 Mar. 2013.

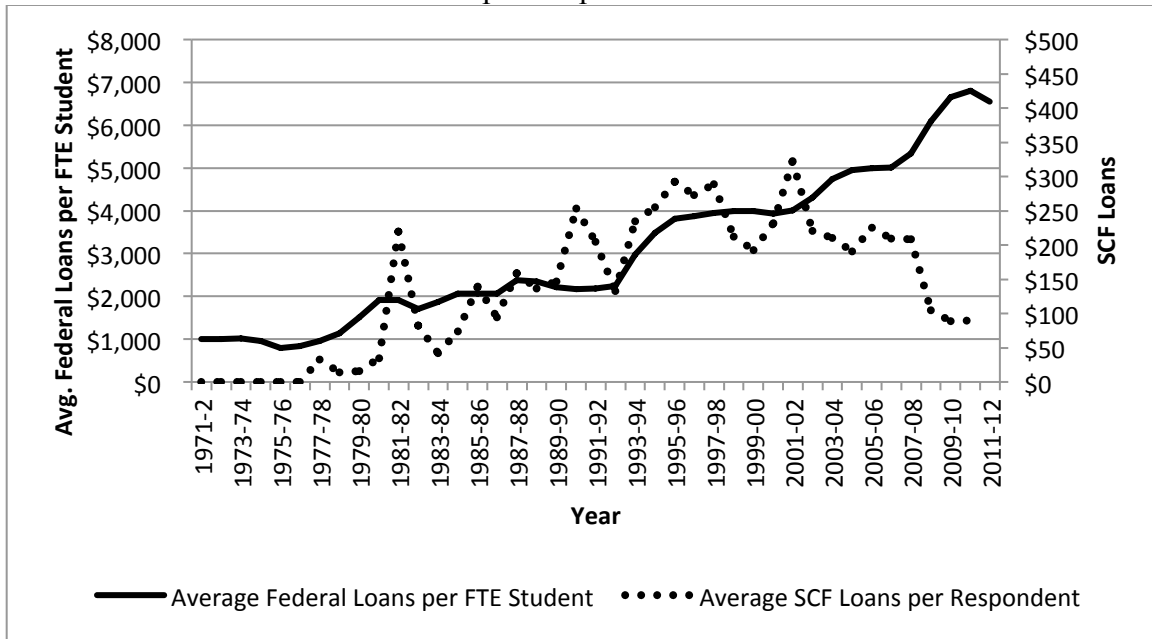
## Figures and Tables

Figure 1: Average Federal Loans per Full-Time Equivalent Student, Average Age at First Birth (Women)



Sources: Federal loan information taken from College Board’s “Trends in Student Aid” annual report for 2012. Data can be downloaded via the following link (Figure 3): <http://trends.collegeboard.org/student-aid/figures-tables/total-aid#Total Aid per Full-Time Equivalent Student>  
 Birth Information taken from the CDC’s National Vital Statistics Reports Vol. 51 No.1 and Vol. 61 No. 1.  
[http://www.cdc.gov/nchs/data/nvsr/nvsr51/nvsr51\\_01.pdf](http://www.cdc.gov/nchs/data/nvsr/nvsr51/nvsr51_01.pdf)  
[http://www.cdc.gov/nchs/data/nvsr/nvsr61/nvsr61\\_01\\_tables.pdf#I01](http://www.cdc.gov/nchs/data/nvsr/nvsr61/nvsr61_01_tables.pdf#I01)  
 All monetary figures presented in 2010 dollars.

Figure 2: Average Federal Loans per Full-Time Equivalent Student, average SCF Loans per Respondent



Sources: Federal loan information taken from College Board’s “Trends in Student Aid” annual report for 2012. Data can be downloaded via the following link (Figure 3): <http://trends.collegeboard.org/student-aid/figures-tables/total-aid#Total Aid per Full-Time Equivalent Student>

SCF Loan information taken from the Survey of Consumer Finances.

The SCF averages calculated as the total amount of loans taken out in each year divided by the total number of respondents who were at least 17 in the year examined, including those who did not receive loans. All monetary figures presented in 2010 dollars.

Table 1: SCF Summary Statistics (SCF Waves 1995-2010)

	Student Loan=0	Student Loan>0	Student Loan=0	Student Loan>0
	Male	Male	Female	Female
White	0.7777	0.7691	0.7338	0.6730
Black	0.0858	0.1194	0.1446	0.2232
Hispanic	0.0764	0.0698	0.0811	0.0755
Age (Mean)	39.73	31.14	38.22	30.94
Ever Been Married	0.7585	0.5811	0.7745	0.5519
Child by 25	0.1610	0.1847	0.3501	0.3785
Child by 30	0.3340	0.2984	0.5397	0.4807
Child by 35	0.4681	0.3660	0.6279	0.5245
Child by 40	0.5212	0.3795	0.6566	0.5322
Completed some College	0.2282	0.2973	0.2745	0.3725
Bachelor's Degree	0.2629	0.3514	0.2155	0.3064
Master's Degree	0.1219	0.1081	0.0760	0.1202
Doctorate (Ph.D., J.D. M.D.)	0.0797	0.0935	0.0264	0.0283
Amount Borrowed/1000		35.45 (41.00)		29.37 (41.00)
<i>N</i>	5119	888	5082	1165
Survey Year				
1995	0.0938	0.1232	0.1216	0.1185
1998	0.1207	0.1366	0.1318	0.1262
2001	0.1451	0.1629	0.1239	0.1296
2004	0.1649	0.1623	0.1419	0.1339
2007	0.177	0.1673	0.1486	0.1579
2010	0.2985	0.2477	0.3322	0.3339

Standard Deviations in Parentheses

Table 2a: SCF Marriage Estimation Results, Men

Variables	Gicheva (2012)	Gicheva (2012)	Replication 1	Replication 1	Replication 2	Replication 2
Amount Borrowed/1000	0.0002 (0.0004)	-0.0072 (0.0043)*	0.0002 (0.0003)	-0.0074 (0.0030)**	-0.0002 (0.0003)	-0.0074 (0.0016)***
Some College					0.0030 (0.0135)	0.0109 (0.0117)
Bachelor's Degree	0.0258 (0.0147)*	0.0622 (0.0240)**	0.0240 (0.0141)*	0.0604 (0.0190)***	0.0218 (0.0177)	0.0600 (0.0181)***
Master's Degree	0.0513 (0.0225)**	0.0886 (0.0280)**	0.0480 (0.0252)*	0.0886 (0.0231)***	0.0615 (0.0243)**	0.1110 (0.0218)***
Doctorate (J.D., M.D., Ph.D.)	0.0619 (0.0249)**	0.1732 (0.0672)**	0.0605 (0.0189)***	0.1753 (0.0551)***	0.0737 (0.0234)***	0.1988 (0.0459)***
First Stage		0.0023 (0.0006)**		0.0027 (0.0007)***		0.0036 (0.0005)***
F-Statistic		13.11		14.53		64.50
<i>N</i>	4,856	4,856	4,759	4,759	6,007	6,007

\*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$ . Dependent variable is the probability of having ever been married. All coefficients are marginal effects. All regressions also include a cubic polynomial in age and controls for race (White, Black, Hispanic). Standard errors clustered by year of birth. First stage estimated by linear regression. Result Columns 1 and 2 taken from Table 2 of Gicheva (2012). Columns 3 and 4 represent my closest attempts at replicating Table 2 of Gicheva (2012). Columns 5 and 6 present results from my extension of Table 2 (Gicheva (2012)).



Table 2b: SCF Marriage Estimation Results, Women

Variables	Gicheva (2012)	Gicheva (2012)	Replication 1	Replication 1	Replication 2	Replication 2
Amount Borrowed/1000	-0.0004	-0.0142	-0.0004	-0.0148	-0.0003	-0.0093
		(0.0022)**	(0.0003)	(0.0024)***	(0.0002)	(0.0018)***
Some College					-0.0543	-0.0338
					(0.0143)***	(0.0127)***
Bachelor's Degree	-0.0376	0.0518	-0.0379	0.0582	-0.0657	0.0143
	(0.0133)**	(0.0225)**	(0.0139)***	(0.0226)***	(0.0154)***	(0.0215)
Master's Degree	-0.0449	0.1167	-0.0447	0.1291	-0.0651	0.0818
	(0.0189)**	(0.0403)**	(0.0200)**	(0.0420)***	(0.0201)***	(0.0397)**
Doctorate (J.D., M.D., Ph.D.)	-0.0217	0.1374	-0.0242	0.1390	-0.0540	0.1107
	(0.0310)	(0.0424)**	(0.0301)	(0.0350)***	(0.0307)*	(0.04681)**
First Stage		0.0019		0.0022		0.0042
		(0.0003)**		(0.0004)***		(0.0006)***
F-Statistic		47.69		34.98		49.32
<i>N</i>	5,555	5,555	5,466	5,466	6,247	6,247

\*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$ . Dependent variable is the probability of having ever been married. All coefficients are marginal effects. All regressions also include a cubic polynomial in age and controls for race (White, Black, Hispanic). Standard errors clustered by year of birth. First stage estimated by linear regression. Result Columns 1 and 2 taken from Table 2 of Gicheva (2012). Columns 3 and 4 represent my closest attempts at replicating Table 2 of Gicheva (2012). Columns 5 and 6 present results from my extension of Table 2 (Gicheva (2012)).

Table 3a: SCF Fertility Estimation Results, Men

Probit	Child by 25	Child by 30	Child by 35	Child by 40
Amount Borrowed/1000	0.00002 (0.0002)	-0.0006 (0.0004)*	-0.0012 (0.0005)**	-0.0024 (0.0007)***
Some College	-0.0311 (0.0143)**	-0.0131 (0.0212)	-0.0062 (0.0276)	-0.0084 (0.0329)
Bachelor's Degree	-0.1074 (0.0125)***	-0.0271 (0.0217)	0.0857 (0.0244)***	0.1539 (0.0316)***
Master's Degree	-0.1419 (0.0229)***	-0.0093 (0.0272)	0.1274 (0.0195)***	0.2120 (0.0203)***
Doctorate (J.D., M.D., Ph.D.)	-0.1299 (0.0241)***	-0.0565 (0.0333)*	0.1387 (0.0256)***	0.2433 (0.0343)***
<i>N</i>	5,449	4,656	3,735	2,638
IV Probit	Child by 25	Child by 30	Child by 35	Child by 40
Amount Borrowed/1000	0.0049 (0.0019)**	0.0075 (0.0032)**	0.0054 (0.0043)	0.0053 (0.0059)
Some College	-0.0327 (0.0144)**	-0.0139 (0.0188)	-0.0094 (0.0261)	-0.0103 (0.0322)
Bachelor's Degree	-0.1267 (0.0156)***	-0.0503 (0.0183)***	0.0713 (0.0245)***	0.1426 (0.0298)***
Master's Degree	-0.1710 (0.0256)***	-0.0578 (0.0307)*	0.1016 (0.0270)***	0.2000 (0.0241)***
Doctorate (J.D., M.D., Ph.D.)	-0.2108 (0.0471)***	-0.1678 (0.0526)***	0.0670 (0.0584)	0.2148 (0.0412)***
First Stage	0.0045 (.0006)***	0.0045 (.0006)***	0.0041 (0.0008)***	0.0039 (0.0008)***
F-Statistic	66.08	51.72	28.46	27.44
<i>N</i>	5,449	4,656	3,735	2,638

\*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$ . Dependent variable is the probability of having a child by a particular age (25, 30, 35, or 40). Primary independent variable is the amount of student loans taken out. All coefficients are marginal effects. All regressions also include a cubic polynomial in age and controls for race (White, Black, Hispanic). Standard errors clustered by year of birth. Sample limited to individuals who are at least as old as the age specified by the dependent variable.

Table 3b: SCF Fertility Estimation Results, Women

Probit	Child by 25	Child by 30	Child by 35	Child by 40
Amount Borrowed/1000	0.0001 (0.0003)	-0.0003 (0.0004)	-0.0008 (0.0005)*	-0.0014 (0.0010)
Some College	-0.0516 (0.0127)***	-0.0261 (0.0193)	-0.0134 (0.0190)	0.0265 (0.0184)
Bachelor's Degree	-0.2715 (0.0148)***	-0.1497 (0.0184)***	-0.0239 (0.0229)	0.0213 (0.0282)
Master's Degree	-0.3156 (0.0286)***	-0.2129 (0.0332)***	-0.0113 (0.0317)	0.0955 (0.0305)***
Doctorate (J.D., M.D., Ph.D.)	-0.4576 (0.0486)***	-0.2378 (0.0315)***	-0.0692 (0.0328)**	0.1542 (0.0420)***
<i>N</i>	5,530	4,566	3,476	2,254
IV Probit	Child by 25	Child by 30	Child by 35	Child by 40
Amount Borrowed/1000	0.0082 (0.0018)***	0.0074 (0.0023)***	0.0022 (0.0048)	-0.0020 (0.0097)
Some College	-0.0505 (0.0124)***	-0.0264 (0.0181)	-0.0132 (0.0193)	0.0266 (0.0186)
Bachelor's Degree	-0.2869 (0.0175)***	-0.1732 (0.0183)***	-0.0338 (0.0284)	0.0227 (0.0366)
Master's Degree	-0.3894 (0.0320)***	-0.2812 (0.0369)***	-0.0376 (0.0528)	0.0986 (0.0518)*
Doctorate (J.D., M.D., Ph.D.)	-0.5239 (0.0570)***	-0.3215 (0.0431)***	-0.0886 (0.0436)**	0.1566 (0.0559)***
First Stage	0.0051 (0.0007)***	0.0053 (0.0007)***	0.0035 (.00063)***	0.0030 (0.0004)***
F-Statistic	49.94	54.92	31.06	74.28
<i>N</i>	5,530	4,566	3,476	2,254

\*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$ . Dependent variable is the probability of having a child by a particular age (25, 30, 35, or 40). Primary independent variable is the amount of student loans taken out. All coefficients are marginal effects. All regressions also include a cubic polynomial in age and controls for race (White, Black, Hispanic). Standard errors clustered by year of birth. Sample limited to individuals who are at least as old as the age specified by the dependent variable.

Table 4a: SCF Fertility Estimation Results, Men

Probit	Child by 25	Child by 30	Child by 35	Child by 40
Amount Borrowed/1000	0.00004 (0.0002)	-0.0007 (0.0003)**	-0.0010 (0.0005)**	-0.0019 (0.0007)***
Some College	-0.0287 (0.0130)**	-0.0133 (0.0194)	-0.0121 (0.0244)	-0.0097 (0.0272)
Bachelor's Degree	-0.1115 (0.0115)***	-0.0462 (0.0197)**	0.0493 (0.0233)**	0.1230 (0.0295)***
Master's Degree	-0.1456 (0.0219)***	-0.0387 (0.0235)*	0.0823 (0.0140)***	0.1662 (0.0139)***
Doctorate (J.D., M.D., Ph.D.)	-0.1339 (0.0240)***	-0.0799 (0.0333)**	0.1006 (0.0277)***	0.1982 (0.0297)***
Ever Married	0.2292 (0.0165)***	0.4820 (0.0229)***	0.6080 (0.0296)***	0.5904 (0.0353)***
<i>N</i>	5449	4656	3735	2638
IV Probit	Child by 25	Child by 30	Child by 35	Child by 40
Amount Borrowed/1000	0.0063 (0.0019)***	0.0091 (0.0027)***	0.0072 (0.0036)**	0.0064 (0.0052)
Some College	-0.0301 (0.0129)**	-0.0136 (0.0164)	-0.0160 (0.0221)	(0.0119) (0.0262)
Bachelor's Degree	-0.1340 (0.0152)***	-0.0700 (0.0168)***	0.0321 (0.0233)	0.1107 (0.0295)***
Master's Degree	-0.1803 (0.0257)***	-0.0917 (0.0263)***	0.0507 (0.0234)**	0.1528 (0.0206)***
Doctorate (J.D., M.D., Ph.D.)	-0.2369 (0.0497)***	-0.2077 (0.0505)***	0.0110 (0.0567)	0.1668 (0.0408)***
Ever Married	0.2094 (0.0184)***	0.4017 (0.0405)***	0.5784 (0.0450)***	0.5868 (0.0337)***
First Stage	0.0045 (0.0006)***	0.0045 (0.0006)***	0.0041 (0.0008)***	0.0039 (0.0007)***
F-Statistic	64.40	51.41	28.61	27.80
<i>N</i>	5449	4656	3735	2638

\*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$ . Dependent variable is the probability of having a child by a particular age (25, 30, 35, or 40). Primary independent variable is the amount of student loans taken out. All coefficients are marginal effects. All regressions also include a cubic polynomial in age and controls for race (White, Black, Hispanic). Standard errors clustered by year of birth. Sample limited to individuals who are at least as old as the age specified by the dependent variable.

Table 4b: SCF Fertility Estimation Results, Women

Probit	Child by 25	Child by 30	Child by 35	Child by 40
Amount Borrowed/1000	0.0002 (0.0002)	-0.0002 (0.0004)	-0.0007 (0.0004)*	-0.0015 (0.0008)*
Some College	-0.0417 (0.0127)***	-0.0116 (0.0186)	0.0015 (0.0179)	0.0431 (0.0157)***
Bachelor's Degree	-0.2622 (0.0143)***	-0.1404 (0.0178)***	-0.0153 (0.0240)	0.0378 (0.0278)
Master's Degree	-0.3074 (0.0288)***	-0.2032 (0.0327)***	-0.0012 (0.0303)	0.1141 (0.0299)***
Doctorate (J.D., M.D., Ph.D.)	-0.4465 (0.0474)***	-0.2270 (0.0319)***	-0.0673 (0.0289)**	0.1696 (0.0327)***
Ever Married	0.1942 (0.0121)***	0.3131 (0.0170)***	0.3701 (0.0204)***	0.4052 (0.0248)***
<i>N</i>	5530	4566	3476	2254
IV Probit	Child by 25	Child by 30	Child by 35	Child by 40
Amount Borrowed/1000	0.0095 (0.0017)***	0.0097 (0.0019)***	0.0071 (0.0039)*	0.0087 (0.0067)
Some College	-0.0401 (0.0120)***	-0.0132 (0.0167)	0.0019 (0.0182)	0.0394 (0.0160)**
Bachelor's Degree	-0.2738 (0.0190)***	-0.1665 (0.0184)***	-0.0402 (0.0253)	0.0124 (0.0318)
Master's Degree	-0.3854 (0.0337)***	-0.2845 (0.0353)***	-0.0688 (0.0467)	0.0572 (0.0415)
Doctorate (J.D., M.D., Ph.D.)	-0.5118 (0.0576)***	-0.3265 (0.0466)***	-0.1146 (0.0345)***	0.1208 (0.0571)**
Ever Married	0.1692 (0.0157)***	0.2688 (0.0228)***	0.3518 (0.0321)***	0.3834 (0.0384)***
First Stage	0.0051 (0.0007)***	0.0053 (0.0007)***	0.0035 (.0006)***	0.0031 (0.0003)***
F-Statistic	48.39	54.03	30.73	79.24
<i>N</i>	5530	4566	3476	2254

\*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$ . Dependent variable is the probability of having a child by a particular age (25, 30, 35, or 40). Primary independent variable is the amount of student loans taken out. All coefficients are marginal effects. All regressions also include a cubic polynomial in age and controls for race (White, Black, Hispanic). Standard errors clustered by year of birth. Sample limited to individuals who are at least as old as the age specified by the dependent variable.