

The Impact of Early-Life Debt on the Homeownership Rates of Young Households: An Empirical Investigation

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Abstract

There is growing concern that the rising tuition and educational debt burdens of college students, as well as increased credit card usage, will adversely impact young households. One important post-college decision that may be affected is when to purchase a home. There is a literature that documents the impacts of educational debt on college attainment, growing research on credit card debt, and a separate literature that examines the homeownership decisions of young adults. There has not yet been an analysis of the impacts of these early life debts on homeownership rates. Analysis of data from the *Survey of Consumer Finances* indicates that in 2003 educational debt was associated with reduced homeownership rates. In addition, credit card debt was also associated with homeownership rates, although its effect was positive, offsetting the influence of educational debt. Credit constraints on young adults do not appear to explain the homeownership gap.

Introduction

In recent years, rising costs of higher education and the increased debt burden of students have received much attention. There is growing concern that students are being overwhelmed with debt in order to finance their higher education. According to some sources debt burdens are still growing and some undergraduates are leaving school with an average of \$40,000 of educational debt.¹ In addition to the mounting debt burden itself, there is also concern that young adults do not fully understand how to manage their debt or the consequences of failing to do so.² Amid all of this distress, however, there has not yet been a precise analysis of whether debt accrued during college and young adulthood is having a meaningful impact on post-college decisions.

While a considerable amount has been written concerning the efficacy of loans and financial aid in promoting higher education, there is very little in the economics literature that examines the post-schooling impact of debt for education. One important post-school decision is when to purchase a home. Certainly, this decision is influenced by many factors, not the least of which is the household's budget constraint. It is apparent that educational debt will reduce initial wealth and payments on such debt will tighten the household's budget constraint. In addition,

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¹ USA Today, 2006.

² Newsweek, 2006.

educational debt, as well as other types of debt such as credit card debt, may function as a signal in various markets. Holding debt gives someone a credit history, which is informative to lenders about repayment habits and the potential for bankruptcy. Debt, be it from educational loans or associated with credit cards, may potentially impact the homeownership decision in two distinct ways. The presence of debt in a household's wealth portfolio may render the household unable to obtain a mortgage for the amount or terms desired for a home purchase, in which case the household may be considered *credit constrained*. In addition, the presence of debts in the budget constraint may induce the household to voluntarily forgo or delay home purchase until debts are paid down.

The goal of this paper is to incorporate the existence of early-life debt, particularly educational loans, as well as credit card debt, into the analysis of the homeownership decision of young households. While there are already rich bodies of literature in economics examining tenure choice and the wealth profiles of young people, as well as a growing body of literature on credit card usage, this is the first work, to our knowledge, to attempt to explicitly quantify the impact of educational loans and early life credit card debt on homeownership. This paper presents a theoretical model that describes why households may delay home purchase due to their debts. We present reduced form estimates of the propensities for homeownership among young households as a function of only household attributes, both controlling and not controlling for the possible impact of credit constraints, using the *Survey of Consumer Finances* from 1992 to 2004. Educational debt has had a large negative impact on homeownership rates in recent years. Credit card debt, on the other hand, has had a positive effect for the same period and partially offsets the influence of educational debt. The results provide support for the recent concern over early-life debt, particularly from educational loans. However, the concern over credit card debt may be overstated.

The remainder of the paper is organized as follows: Section 1 gives a review of previous literature; Section 2 discusses the theoretical model. Section 3 discusses the methodology. Section 4 discusses the data and variables while section 5 contains the results. Section 6 discusses how much of the gap in homeownership between debtor and non-debtor households may be attributed to credit constraints. Finally, section 7 concludes.

I. Previous Literature

Educational Debt

Average tuition and fees have been rising over the past decade at both public and private institutions.³ In addition to the increase in costs, an increasing proportion of aid students receive for college is in the form of loans, as opposed to grants. This has led to an increase in the amounts that students are borrowing.⁴

Several reports have documented the increased debt burden among students. Professor Sandy Baum (2003) discusses results from the 2002 National Student Loan Survey conducted by Nellie Mae. According to her report, educational debt levels have increased almost 66 percent, to an average of \$18,900 since 1997. About 55 percent of respondents feel burdened by their loans. Price (2004) also finds a similar doubling of educational debt burden and finds that typically disadvantaged students, particularly those from low-income or African-American households are at a higher risk of defaulting on their student loans. Nellie Mae also conducts surveys on the credit card usage of college-aged individuals. Their 2005 report states that most students who hold a credit card carry a balance on those cards and typically underestimate their current outstanding debt.

The impact of borrowing constraints and educational loans on school attainment has been covered extensively in economics (e.g. Cameron and Taber 2004; Lochner and Monge-Naranjo 2002; Keane and Wolpin 2001). While some has been written on the post-school effect of debt for law and medical school (e.g. Spar, Pryor and Simon 1993; Kornhauser and Revesz 1995; Woodworth, Change and Helmer 2000, Field 2006), very little work in economics has been done on the impact of loans for undergraduate education, and other early life debt, in general.

One exception is a paper by Alexandra Minicozzi (2004). Minicozzi uses the US Department of Education's National Post-Secondary Student Aid Survey (NPSAS) for 1987 to estimate log-linear wage models over the first five years following schooling. Minicozzi finds that educational debt has a negligible effect on wage growth, an additional \$1,000 of educational debt leads to about a 1 percent increase in the wage at the first job in the full sample model. Debt is associated with higher initial wages and lower subsequent growth when she examines only the first and fifth year after college using a sample of only men that excludes those pursuing graduate school. The relationship is sensitive to the magnitude of the initial wage. Debt may also have a non-linear effect with higher debt levels exerting more of an influence. Thus,

³ The College Board, 2004

⁴ US Department of Education Statistics, 2000

Minicozzi's paper does not provide strong evidence for a meaningful post-school impact of educational debt, although she does note that her analysis assumes that debt is exogenous to the employment choice, which may be dubious. Another recent addition to the body of literature on the post-college effects of educational debt is a paper by Rothstein and Rouse (2007). They use data from one university where the debt component of financial aid was replaced with grants. They find that debt accrued for education decreases the likelihood of entering public choice careers, and students with debt are more likely to choose jobs with high initial salaries. Their results suggest that students are credit constrained, rather than debt averse.

Homeownership

In recent years, more young households have become homeowners, perhaps due to innovations in the mortgage industry, such as zero down payments, and low interest rates; although the median price of new and existing homes has been increasing.⁵ There are a number of papers focusing on the wealth profiles and homeownership decisions of young people. Using the NLSY79, Haurin, Hendershott and Kim (1994) and Haurin, Hendershott and Wachter (1996) find that wealth is positively related to homeownership and evidence that young households are financially constrained when purchasing a home.

Mayer and Engelhardt (1996) examine the possible motives behind, and impacts of, monetary transfers given as gifts to first time homeowners using data from the Chicago Title and Trust (CT&T) for 1988, 1990 and 1993, and a sample of accepted mortgage applications for the metro Boston area supplied by the Boston Fed. Both data indicate that gifts may be given to ease financial constraints, but may also be merit based, for having children for example. They conclude their paper noting that the results suggest that it is becoming increasingly difficult for young buyers to save for the down payment. Engelhardt (1998) also examines the impact of gift giving on first time home buyers' purchase and savings decisions using the CT&T data. Engelhardt finds evidence that, *ceteris paribus*, young households use monetary transfers to accelerate home purchase and to buy down mortgage debt.

Haurin, Hendershott and Wachter (1997) use the NLSY79 to examine how lender imposed borrowing constraints impact the tenure choice of young homebuyers. The lender constraints are taken generally from Linneman and Wachter (1989) and are derived for the 20 percent down payment requirement and the 28 percent obligation ratio. They find that lender constraints have a negative impact on the probability of homeownership for highly and moderately constrained households. They also conclude that the significant impact of constraints

⁵ National Association of Home Builders, 2006

on both highly and moderately constrained households suggest that buyers do not look for smaller properties to lessen constraints.

Thus, the empirical evidence so far indicates that young people are generally financially constrained. In addition, these constraints have an impact on the timing of homeownership and transfer receipt directed towards home buying. These constraints also influence the impacts of such transfers on savings behavior and home purchase. Given the increased salience of debt early in life, it is reasonable to conjecture that this has impacted these wealth constraints on households and thus influenced their home purchase decisions.

II. Theoretical Model:

The model presented is an extension of Brueckner's (1986) model. The current work introduces a debt-to-income ratio as a credit constraint, rather than using a down payment constraint. The debt-to-income ratio assumes that the household has already chosen the desired amount of housing. The desired mortgage contract $M^*(P^*, \alpha^*)$, comprised of the repayment schedule and interest rate, depends on the price of the desired property, P^* , and the percent down payment the household plans to make, α^* . The desired mortgage contract chosen does not assume that households have a completely accurate perception of their credit profile. It is reasonable to assume that households that make a larger down payment will have access to more favorable mortgage terms. Let $\delta(s^i)$ be the acceptable debt-to-income threshold set by the lender, a fraction of income in the second period, which depends on household savings, s^i . It may be reasonable to assume that this limit varies positively with household savings, $\partial\delta(s^i)/\partial s^i > 0$. In addition, non-housing debts have been included in the budget constraint. The set up is as follows. The household chooses savings to maximize the following two-period utility:

$$U(x_0) + \theta U(x_1)$$

$$\text{Subject to } x_0 = (1-\tau_0)y_0 - s^i - P_d d - Q$$

$$x^R_1 = (1-\tau_1)y_1 + (1 + (1-\tau_1)r)s^R - P_d d - Q \quad (\text{renters})$$

$$x^H_1 = (1-\tau_1)y_1 + (1 + (1-\tau_1)r)s^H - P_d d - (1-\tau_1)Q \quad (\text{owners})$$

$$P_d d + M^*(P^*, \alpha^*) \leq \delta(s^i) y_1, \quad \delta < 1 \quad (\text{debt-to-income ratio})$$

Where x is non-housing consumption in both periods; y is income in each period; Q is the user cost of housing and must be equal to the user cost of renting in equilibrium, although there is a tax advantage to owning; θ is the discount rate; τ is the tax rate; d denotes non-housing debts, including educational and credit card debts; P_d is the price associated with the loan, such that $P_d d$ is the loan payment; r is a risk-free interest rate.

The first order conditions are as follows:

$$\partial U(x_0)/\partial s^i + \theta(1+(1-\tau_1)r)U(x_1)/\partial s^i + \lambda \partial M^*(.)/\partial s^i = 0 \quad (1)$$

$$P_d d + M^*(P^*, \alpha^*) - \delta(s^i) y_1 \leq 0, \quad \lambda \leq 0$$

$$(P_d d + M^*(P^*, \alpha^*) - \delta(s^i) y_1)^* \lambda = 0 \quad (2)$$

Therefore, from (1) and (2) we have:

For owners:

$$\partial U(x^H_0)/\partial s^H + \theta(1+(1-\tau_1)r)U(x^H_1)/\partial s^H = 0 \quad (3)$$

For renters, consider two-cases:

(i) Unconstrained:

$$\partial U(x^R_0)/\partial s^R + \theta(1+(1-\tau_1)r)U(x^R_1)/\partial s^R = 0 \quad (4)$$

(ii) Constrained

$$\partial U(x^{CR}_0)/\partial s^{CR} + \theta(1+(1-\tau_1)r)U(x^{CR}_1)/\partial s^{CR} + \lambda[\partial \delta(s^{CR})/\partial s^{CR}] = 0 \quad (5)$$

Comparing owners and unconstrained renters from (3) and (4):

$$[\partial U(x_0)/\partial s^i] / [\partial U(x_1)/\partial s^i] = \theta(1+(1-\tau_1)r)$$

Ceteris paribus, $x^H_1 > x^R_1$

$$x^R_1 = (1-\tau_1)y_1 + (1 + (1-\tau_1)r)s^R - P_d d - Q$$

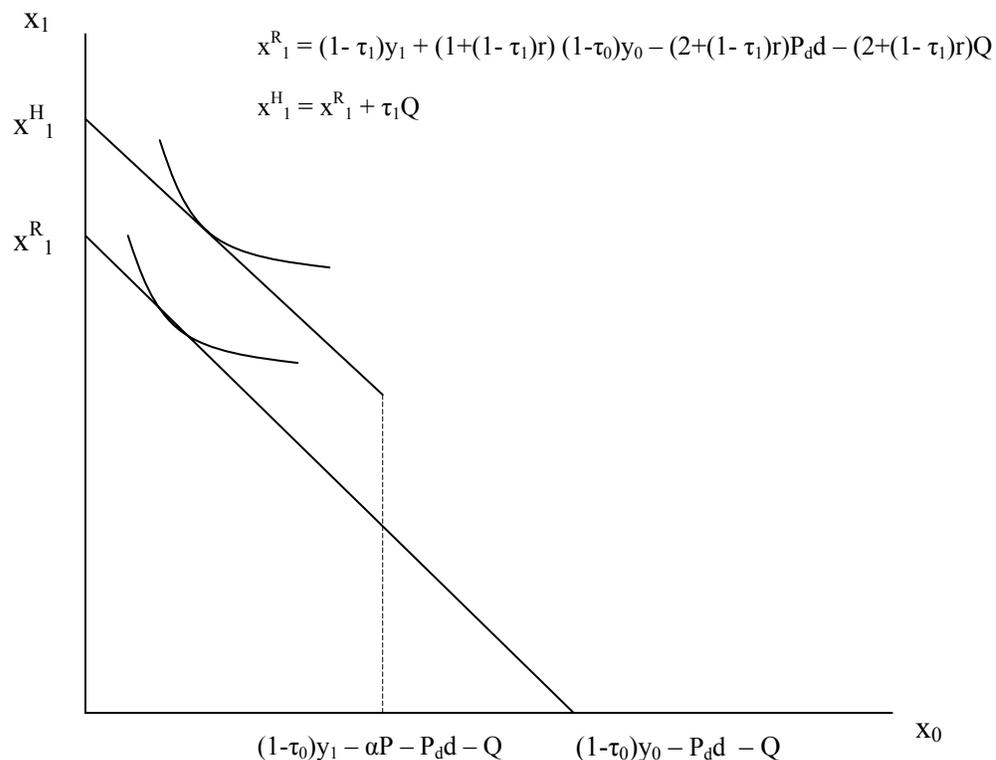
$$x^H_1 = (1-\tau_1)y_1 + (1 + (1-\tau_1)r)s^H - P_d d - (1-\tau_1)Q$$

if $s^R < s^H$, then owning dominates renting

if $s^R > s^H$, outcome is ambiguous

owning dominates for large θ and large y_0

renting dominates for large y_1



Where αP is the down payment and may be zero in principle, but to which savings must at least be equal if a down payment is made.

Now consider the role that debts may play. Assume, *ceteris paribus*, for all agents,

$$\partial s^i / \partial d < 0$$

It is straightforward that debt payments tighten the budget constraint,

$$\partial x_0^i / \partial d < 0 \rightarrow \partial U(x_0^i) / \partial d < 0$$

$$\partial x_1^i / \partial d < 0 \rightarrow \partial U(x_1^i) / \partial d < 0$$

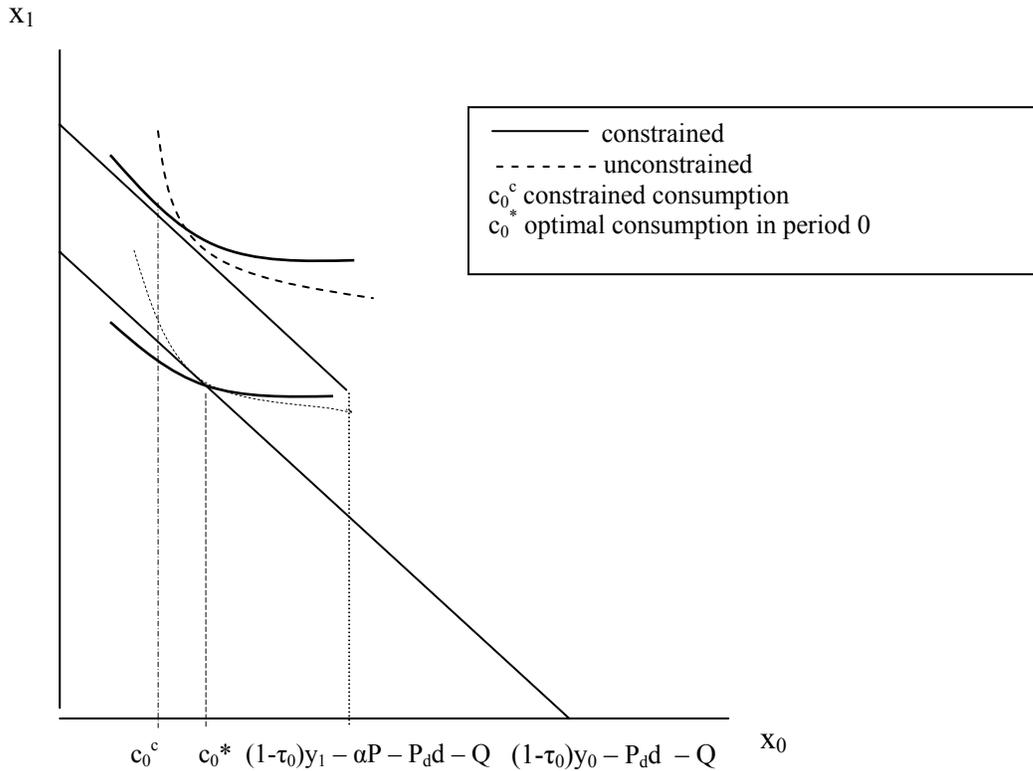
Debt also tightens the debt-to-income ratio constraint by not only increasing debt payments made out of income, but by also reducing the threshold imposed by the lender. To relax the constraint, *ceteris paribus*, potential homeowners must either delay purchase until debt is paid down, or reduce current consumption and save more than is optimal to relax the threshold set by the lender. More formally, from equation (5) constrained renters will have the following marginal rate of substitution:

$$[\partial U(x_0) / \partial s^i] / [\partial U(x_1) / \partial s^i] = \theta(1 + (1 - \tau_1)r) + \lambda[\partial \delta(s^{CR}) / \partial s^{CR}] / [\partial U(x_1) / \partial s^i]$$

since $P_d + M^*(P^*, \alpha^*) - \delta(s^i) y_1 = 0$ it follows from (2) that $\lambda < 0$

In addition $[\partial \delta(s^{CR}) / \partial s^{CR}] < 0$ and $[\partial U(x_1) / \partial s^i] < 0$

With a binding debt-to-income ratio constraint, any solution must be different than in the unconstrained case because the shadow cost of credit is now non-zero. This may be illustrated as the solution entailing a flatter indifference curve.



If $s^R > s^H$ owning is still preferred to renting but constrained renters must save more than the optimal amount, s^* , to compensate for the credit constraint, which necessarily means decreasing period 0 consumption from c_0^* (unconstrained consumption) to c_0^c , ceteris paribus. If the constraint is sufficiently tight, savings needed for homeownership would place the agent at the corner, thus ruling out constrained homeowners.

III. Methodology

There may be unobservable factors influencing a household's decision to own a home that also influence whether or not the household is credit constrained. The bivariate probit specification controls for this possibility. Estimates from such a model give the propensities for homeownership as a function of household characteristics and credit constraints.

The methodology for this paper is a modification of Gabriel and Rosenthal (2005). There are two underlying unobservable indexes, one that governs whether the household is not credit constrained, and the other that determines if the household would prefer to own a home.

$$I_{\text{NotCC}} = \mathbf{x}\mathbf{c} + u_1$$

$$I_{\text{own}} = \mathbf{x}\mathbf{b} + u_2$$

These indexes may be expressed as reduced form functions of household characteristics. Although the indexes themselves cannot be observed, the underlying utility relationship may be inferred from an observable variable, which measures the discrete choice outcome. We observe:

$$\text{NotCC} = 1 \text{ (unconstrained, } I_{\text{NotCC}} = \mathbf{x}\mathbf{c} + u_1 > 0)$$

$$\text{NotCC} = 0 \text{ (possibly constrained, } I_{\text{NotCC}} = \mathbf{x}\mathbf{c} + u_1 \leq 0)$$

$$\text{Own} = 1 \text{ (owner-occupier, } I_{\text{own}} = \mathbf{x}\mathbf{b} + u_2 > 0)$$

$$\text{Own} = 0 \text{ (otherwise, } I_{\text{own}} = \mathbf{x}\mathbf{b} + u_2 \leq 0)$$

Thus, we can express the probabilities that a given outcome for a household is observed as functions of observable household characteristics

$$P(\text{NotCC}) = \Phi(\mathbf{x}\mathbf{c} + u_1)$$

$$P(\text{own}) = \Phi(\mathbf{x}\mathbf{b} + u_2)$$

where u_1 and u_2 are the random errors assumed to be jointly normally distributed and $P(\text{NotCC})$ is the probability that a household is not credit constrained and $P(\text{own})$ is the probability that a household is an owner-occupier. This gives rise to a bivariate probit specification with the homeownership equation estimated jointly with the credit constraint equation. The results give the propensity of homeownership as a function of household characteristics and credit constraints. The log-likelihood function takes the form

$$L = \sum \{ (1 - \text{NotCC}) * (1 - \text{Own}) * \log[\Psi(-\mathbf{x}\mathbf{c}, -\mathbf{x}\mathbf{b}, -\sigma_{\text{Own, NotCC}})] + (1 - \text{NotCC}) * \text{Own} * \log[\Psi(-\mathbf{x}\mathbf{c}, \mathbf{x}\mathbf{b}, \sigma_{\text{Own, NotCC}})] + \text{NotCC} * (1 - \text{Own}) * \log[\Psi(\mathbf{x}\mathbf{c}, -\mathbf{x}\mathbf{b}, -\sigma_{\text{Own, NotCC}})] + \text{NotCC} * (\text{Own}) * \log[\Psi(\mathbf{x}\mathbf{c}, \mathbf{x}\mathbf{b}, \sigma_{\text{Own, NotCC}})] \},$$

Where $\Psi(\cdot)$ denotes the standard bivariate normal distribution.

A simple probit on homeownership gives the probability of owning a home as a function only of household characteristics. Differencing the marginal effects associated with debts from the homeownership models with and without selection gives an estimate of the proportion of the gap in homeownership between households with and without debts that may be explained by credit barriers. The estimates from the bivariate homeownership equation indicate the amount of any gap still unexplained after controlling for credit constraints.

IV. Data and variables

The data for this paper are taken from the *Survey of Consumer Finances* for 1992, 1995, 1998, 2001 and 2004. This study is interested in the effect of educational loans and other types of debt on the credit constraint of young adults. Thus the sample includes households with heads, spouses, or partners between the ages of 23 and 32. Setting the youngest age to 23 ensures that most households have been out of school sufficiently long to begin paying back their loans, and also this population is sufficiently old to begin the home search. The typical educational loan repayment period is 10 years⁶. Thus setting the maximum age to 32 limits the sample to the population for which educational debt burden may still be relevant. Anyone still in school, or in graduate school, has been excluded from the sample.

The dependent variable for the selection equation is whether or not the household is credit constrained. Households that are not constrained indicate that they had neither been turned down for nor received less credit than requested. In addition, households who re-applied for credit upon being initially turned down and subsequently received the full amount are identified as not constrained.

Educational loans are defined as any installment loan identified as taken out for educational purposes, the *SCF* allows the respondent to report up to six separate educational loans. A household that has any positive outstanding amount of such loan payments and either the respondent or spouse has at least some college education is categorized as having educational loans. The total amount of outstanding loans is the sum of all six reported outstanding loan amounts.

I have also calculated a poor credit indicator from the *SCF* to control for the credit risk that the household may represent to a lender. Respondents are labeled as having poor credit if they meet any one of the following criteria: They have been late two months or more on any loan payments; they report being turned down for a loan because they have a negative credit history; they report declaring bankruptcy to make up for any income shortfalls (1998, 2001, 2004 only); they report having filed for bankruptcy in the last 10 years (1998, 2001, 2004 only).

Additional explanatory variables are: household head's education, marital status, age, gender, household size, race, total family income and its square, indicators for the head and spouse working full time, if the spouse works part time, and exogenous instruments for the amount of credit card balances and the amount of other non-housing debts. Non-housing debts

⁶ <http://www.collegeboard.com/student/pay/loan-center/432.html>

include other installment loans, (such as car loans), debt on a residence that is not the primary residence and other lines of credit, excluding home equity lines of credit.

The exogenous instruments for other debts and credit card debts are the predicted values from the OLS regressions of the variable of interest on household characteristics. The OLS equation for other debts includes additional variables for identification. These identifiers are an indicator for whether the household has a regular savings plan and an indicator for whether they have a positive attitude towards use of credit. The OLS regression of credit card balances includes another indicator for whether the household regularly spends more than their income for identification purposes. In addition, this equation also contains an indicator for whether the respondent smokes, as well as an indicator for whether the respondent does not have health insurance because they do not perceive the need. These variables are intended to capture differences in discounting of the future.

For examining the homeownership question, the dependent variable is whether the household is an owner-occupier⁷ or renter. The explanatory variables are the same as in the credit constrained equation but without the poor credit indicator.

Each year of the *SCF* is comprised of five complete datasets, or implicates.⁸ The bivariate model is estimated by using all five implicates and weighting each implicate by one-fifth.⁹ The results reported from the homeownership model without selection are those computed using the Repeated Imputation Inference technique. Marginal effects reported are the average of the individual marginal effects computed from the point estimates and are weighted to be representative of the US population.

Table 1 provides summary statistics for dichotomous variables for the entire sample for each year of the Survey. Tables 2a through 2e give summary statistics for the various debt variables. The proportion of households identifying themselves as not credit constrained has decreased over the period from about 70 percent in 1992, to just under half of the sample in all subsequent years. This suggests the growing relevance of credit constraints. The proportion of the households in the sample that are owner-occupiers increased about 5 percentage points over the course of the

⁷ Homeownership is defined by the Fed as owning or buying home, owning as part of a co-op, or condo, paying townhouse association fees, or retirement lifetime tenancy (Kennickell 88-89, 2002),

⁸ To minimize bias in the point estimates and standard errors, the correct approach to estimating models with the *SCF* is to use Repeated Imputation Inference (RII). See Montalto and Sung (1996).

⁹ Unfortunately there is not sufficient within-year-within-implicate variation to use the RII technique to estimate the bivariate probit. The approach is a second-best to RII and has been shown to produce similar point estimates and standard errors. See Lindamood, Hanna and Bi (2006)

survey. The proportion of the sample with educational loan payments increased about 3 percentage points over the course of the survey.

Table 1: Descriptive Statistics for Dichotomous Variables

<i>Variable</i>	1992	1995	1998	2001	2004
<i>Sample Size</i>	457	523	470	481	453
<i>Not Credit Constrained</i>	0.7	0.48	0.44	0.45	0.46
<i>Have outstanding education loans</i>	0.16	0.18	0.18	0.16	0.19
<i>Poor credit</i>	0.17	0.23	0.22	0.21	0.19
<i>Carry a balance on credit card</i>	0.66	0.68	0.65	0.58	0.69
<i>Have both educational and credit card debt</i>	0.11	0.12	0.12	0.1	0.13
<i>Young Owner-Occupiers</i>	0.37	0.38	0.36	0.42	0.42
<i>Head's Education</i>					
<i>no college</i>	0.41	0.39	0.4	0.44	0.41
<i>some college</i>	0.17	0.21	0.21	0.2	0.17
<i>college degree</i>	0.42	0.39	0.39	0.36	0.42
<i>Spouse's education</i>					
<i>no college</i>	0.06	0.1	0.11	0.1	0.13
<i>some college</i>	0.13	0.12	0.12	0.08	0.1
<i>college degree</i>	0.21	0.23	0.25	0.22	0.24
<i>Respondent's Gender</i>					
<i>Male</i>	0.49	0.47	0.47	0.48	0.52
<i>Female</i>	0.51	0.53	0.53	0.52	0.48
<i>Marital Status</i>					
<i>Single</i>	0.43	0.44	0.41	0.47	0.46
<i>Married</i>	0.51	0.45	0.46	0.4	0.42
<i>Partnered</i>	0.06	0.11	0.13	0.13	0.12
<i>race</i>					
<i>White</i>	0.7	0.74	0.66	0.67	0.64
<i>African-American</i>	0.14	0.15	0.17	0.18	0.17
<i>Hispanic</i>	0.11	0.08	0.12	0.12	0.14
<i>Other</i>	0.05	0.04	0.05	0.04	0.06
<i>Work status Respondent</i>					
<i>Full-time</i>	0.79	0.83	0.85	0.85	0.84
<i>Part-time</i>	0.04	0.06	0.05	0.05	0.07
<i>spouse</i>					
<i>Full-time</i>	0.31	0.36	0.36	0.36	0.28
<i>Part-time</i>	0.12	0.07	0.08	0.06	0.05

Almost two-thirds of the full sample carried a balance on their credit card in every year of the survey. The proportion has increased since 1992 from 66 percent of young households to almost 70 percent in 2004. The mean value of credit card balances increased throughout the survey up to the 2004 round. Among households with credit card balances, the mean value has increased over the period, peaking in 2001, consistent with Nellie Mae's findings.

Table 2a: Summary statistics for debt variables for the full sample (2004 dollars)

	Mean	Standard deviation
1992		
Total amount of outstanding education loans	1,360.96	3,101.31
By college completion of head		
<i>head has some college</i>	134.06	463.58
<i>head has college</i>	1,226.90	3,080.64
Total other non-housing debts	6,517.99	14,827.21
Total credit card balances	1,541.74	1,880.23
1995	Mean	
Total amount of outstanding education loans	1,947.64	4,875.64
By college completion of head		
<i>head has some college</i>	172.75	630.19
<i>head has college</i>	1,774.89	4,850.40
Total other non-housing debts	7,617.41	8,250.23
Total credit card balances	1,705.30	1,600.12
1998	Mean	
Total amount of outstanding education loans	3,624.96	6,333.59
By college completion of head		
<i>head has some college</i>	753.4	3,440.50
<i>head has college</i>	2,817.56	5,418.23
Total other non-housing debts	8,033.29	9,115.82
Total credit card balances	2,238.61	2,388.87
2001	Mean	
Total amount of outstanding education loans	2,223.83	3,528.49
By college completion of head		
<i>head has some college</i>	192.76	813.41
<i>head has college</i>	2,031.07	3,461.87
Total other non-housing debts	8,727.82	11,624.60
Total credit card balances	2,002.84	2,517.79
2004	Mean	
Total amount of outstanding education loans	2,728.79	4,328.75
By college completion of head		
<i>head has some college</i>	219.4	964.05
<i>head has college</i>	2,509.39	4,255.14
Total other non-housing debts	11,316.89	19,238.98
Total credit card balances	1,596.49	1,832.20

Table 2b: Summary statistics for Households with educational debt

	1992	1995	1998	2001	2004
Mean total amount	8,396.61	10,699.99	20,055.61	13,557.46	14,222.44
standard deviation	6,335.11	10,433.01	11,877.88	6,270.28	7,449.37
Mean value by college completion of head					
<i>head has some college</i>	827.11	949.06	4,168.30	1,175.16	1,143.50
standard deviation	1,038.52	1,423.31	7,909	1,981.58	2,174.52
<i>head has college</i>	7,569.49	9,750.93	15,887.31	12,382.30	13,078.95
standard deviation	6,488.69	10,557.42	10,578.97	6,558.67	7,690.75

Tables 2c through 2e illustrate that there is stronger use of credit card debt among households with educational loans in contrast to those without educational loans. In addition, households that carry credit card balances also have generally made greater use of educational loans. This indicates that there may be some complementarities between the two types of debt. In each year of the survey, about 13 percent of households hold educational loans and carry a balance on their credit cards, as given in Table 1. It is not clear from the summary statistics how the use of these debt instruments might impact homeownership rates. Multivariate analysis is necessary to determine the relationship.

Table 2c: Summary statistics on Educational Loans for households with and without credit card debt

	1992	1995	1998	2001	2004
Proportion of households with educational loans					
<i>with credit card debt</i>	0.19	0.23	0.21	0.2	0.29
<i>without credit card debt</i>	0.12	0.12	0.14	0.13	0.11
Mean value of educational debt for households					
<i>with credit card debt</i>	1,901.08	2,815.55	3,587.65	2,434.07	1,298.66
standard deviation	3,990.75	6,431.93	4,869.57	3,478.62	5,399.05
<i>without credit card debt</i>	698.69	900.33	3,672.37	2,037.23	4,403.61
standard deviation	1,301.34	1,658.56	7,624.35	3,569.59	3,099.79

Table 2d: Summary statistics on credit card debt for households with and without educational loans

	1992	1995	1998	2001	2004
Proportion of Households holding credit cards					
<i>with educational loans</i>	0.66	0.68	0.65	0.58	0.7
<i>without educational loans</i>	0.53	0.52	0.54	0.45	0.41
Mean value of credit card debt for households					
<i>with educational loans</i>	1,973.52	2,749.47	2,312.08	1,746.08	3,650.96
standard deviation	2,011.36	2,097.33	1,936.42	1,540.28	2,582.75
<i>without educational loans</i>	1,458.22	1,472.94	2,222.40	2,053.22	1,108.72
standard deviation	1,848.44	1,444.23	2,477.28	2,659.97	1,508.13

Table 2e: Summary Statistics on Credit Card Balances for households that carry a balance

	1992	1995	1998	2001	2004
Mean Balance amount	2,799.11	3,118.48	4,000.32	4,259.40	3,466.14
standard deviation	2,343.46	1,909.93	3,006.15	3,365.39	2,423.18

V. Results

Table 3a contains the marginal effects for the homeownership equations with and without credit constraints for each year of the *SCF*. The econometric model of interest is the homeownership model controlling for credit constraints. Estimates for the homeownership model without credit constraints are also presented as the marginal effects from the simple probit are necessary for inferring the possible effect of credit constraints. Debt may influence the homeownership decision in two distinct ways. Households with debt may be credit constrained, meaning that their debt holdings contribute to their literal inability to finance their home purchase as desired. In addition, debt may induce voluntary delays in homeownership by tightening the budget constraint. To further investigate the impact of educational loans, we have also interacted educational loans with dummy variables indicating whether or not the household head completed college to determine if college completion is an important factor. Appendix B contains these results.

The bivariate probit specification assumes that the error terms of the credit constrained equation and the homeownership equation are correlated. The estimates of the correlation coefficient indicate that there are unobservables correlated with both being credit constrained and the homeownership decision in the most recent four rounds of the survey and thus that this econometric model is appropriate for modeling the tenure choice decision. This is reasonable considering the growing importance of credit constraints in recent years.

The educational debt and credit card debt variables are significant in the most recent round of the survey, indicating that this problem coincides with the sharp increases in tuition and educational debt student in recent years. When controlling for credit constraints the estimate indicates that the total amount of educational loans in the household decreases homeownership rates by 0.5 percentage points for every \$1,000 of outstanding educational debt. Thus there is a gap in homeownership rates as a result of educational loans when accounting for credit constraints in 2004. Every additional \$1,000 of educational loans to repay reduces homeownership rates by about 2.63 percent. For a household with educational loans, the marginal effect of a one-standard deviation increase in the outstanding loan amount decreases the probability of homeownership by almost 19.6 percent. Even for the full samples, combining

those with and without educational loans, the marginal effect of a one-standard deviation increase in the outstanding loan amount decreases the predicted homeownership rates by 11.4 percent.

This result is driven by household heads with educational loans who have completed college. Such household heads are 0.5 percentage points, or 6.27 percent, less likely to own their home, while there is no impact for those who have not completed college. This is reasonable given that the educational loan amount increases directly with college completion. (These estimates are presented in Table B1 in Appendix B.)

Also in the most recent survey round, credit card debt is important to the homeownership decision. After accounting for credit constraints, the marginal effect is positive for credit card debt, increasing the probability of homeownership by 4.4 percentage points per every \$1,000 of credit card balances, or 6.37 percent. The marginal impact of a one-standard deviation increase in credit card balances, for households with balances, in 2004 is to increase the probability of homeownership by almost 15.4 percent.

This result indicates the credit card debt may actually facilitate homeownership. Rather than further burdening the household with debt, the use of this credit may soften the constraints on the household. The household can accumulate savings to acquire a home by using the line of credit from a credit card for other non-durable consumption purchases. This positive impact of carrying a credit card balance offsets the negative impact of having educational loan debt. The effect is potentially relevant for about 13 percent of the sample who hold both types of debt. In the absence of credit cards, educational debt will result in a greater reduction in the homeownership rates of young households. Thus access to the credit card debt instrument mitigates the potential impact of the educational debt instrument.

Table 3a: Marginal Effects for Homeownership Equations (t-values in parentheses)^{10, 11}

Variable	2004		2001		1998	
	With Credit Constraints	Without	With Credit Constraints	Without	With Credit Constraints	Without
Intercept	-5.205 ^{***} (-4.74)	-5.208 ^{***} (-4.65)	0.793 (0.5)	0.615 (0.38)	-3.4 ^{***} (-3.4)	-3.59 ^{***} (-3.54)
Total Amount Of Educational Loans	-0.005 ^{***} (-2.64)	-0.009 ^{***} (-2.57)	0.006 (1.1)	0.005 (1.11)	0.0006 (-0.32)	-0.001 (-0.48)
Predicted Value Of Other Debts	-0.0005 (-0.06)	-0.0017 (-0.21)	-0.0292 ^{***} (-3.51)	-0.044 ^{***} (-3.21)	-0.0392 (-0.58)	-0.006 (-0.57)
Predicted Value Of Credit Card Balances	0.044 ^{***} (2.87)	0.074 ^{***} (2.64)	0.044 (1.56)	0.071 (1.4)	-0.0017 (-0.22)	-0.008 (-0.32)
Marital Status						
Married	0.085 (0.48)	0.032 (0.38)	0.119 ^{***} (2.74)	0.22 ^{***} (2.61)	0.095 (0.7)	0.071 (0.72)
Partner	-0.098 (-1.73)	-0.184 [*] (-1.81)	0.335 ^{***} (2.65)	0.52 ^{**} (2.28)	-0.041 (-0.81)	-0.085 (-0.83)
Single Male	0.047 (0.46)	0.052 (0.52)	0.149 ^{***} (2.74)	0.225 ^{**} (2.51)	0.058 (0.43)	0.035 (0.47)
Education						
Head Has Some College	0.031 (0.32)	0.028 (0.43)	-0.106 ^{***} (-2.78)	-0.18 ^{***} (-2.67)	0.096 (1.62)	0.144 (1.6)
Head Has College	0.018 (-1.36)	-0.085 (-1.31)	-0.181 ^{***} (-2.84)	-0.271 ^{***} (-2.72)	0.039 (0.6)	0.035 (0.53)
Age	0.012 ^{***} (2.77)	0.025 ^{***} (2.7)	-0.014 (-1.62)	-0.02 (-1.47)	0.004 (1.63)	0.017 (1.8)
Income	0.0074 ^{***} (4.72)	0.01 ^{***} (4.68)	0.013 ^{***} (4.39)	0.015 ^{***} (4)	0.005 ^{***} (3.43)	0.005 ^{***} (3.34)
Income Squared	0.0052 ^{***} (-3.7)	-0.002 ^{***} (-3.70)	0.01 [*] (-1.91)	-0.004 ^{**} (-2.05)	0.0029 ^{**} (-2.02)	-0.002 ^{**} (-1.96)
Household Size	0.004 (0.77)	0.019 (0.86)	0.026 ^{**} (3.19)	0.059 ^{**} (3.1)	0.024 [*] (1.69)	0.039 [*] (1.66)
Race						
African-American	-0.1 (-1.16)	-0.083 (-1.31)	-0.19 ^{**} (-2.42)	-0.193 ^{**} (-2.32)	-0.166 [*] (-1.93)	-0.184 ^{**} (-1.96)
Hispanic	-0.046 (0.18)	0.006 (0.08)	-0.211 ^{***} (-3.11)	-0.274 ^{***} (-2.83)	-0.183 ^{***} (-3.14)	-0.26 ^{***} (-3.08)
Other	-0.105 (-1.09)	-0.172 (-1.36)	-0.174 (-0.85)	-0.093 (-0.79)	-0.124 (-0.87)	-0.104 (-0.85)
Head Works Full-Time	0.026 (0.47)	0.059 (0.6)	-0.152 [*] (-1.69)	-0.254 (-1.44)	0.072 (0.13)	0.009 (0.099)
Spouse Works Full-Time	-0.067 (-0.9)	-0.059 (-0.79)	-0.126 ^{**} (-2.26)	-0.237 ^{**} (-1.96)	0.071 (1.44)	0.123 (1.51)
Spouse Works Part-Time	0.023 (0.87)	0.096 (0.83)	-0.008 (-1.34)	-0.141 (-1.17)	0.078 (1.34)	0.136 (1.35)
Rho	0.413 ^{***} (4.1)		0.425 ^{***} (4.6)		0.341 ^{***} (3.48)	
Log-Likelihood	-308.894		-362.337		-359.68	

¹⁰ * 10% significance ** 5% significance *** 1% significance¹¹ Marginal effects for monetary variables are reported for \$1000 increments

Table 3a continued

Variable	1995		1992	
	With Credit Constraints	Without	With Credit Constraints	Without
Intercept	-4.49 ^{***} (-5.56)	-4.52 ^{***} (-5.56)	-2.86 ^{**} (-2.48)	-2.81 ^{**} (-2.43)
Total Amount Of Educational Loans	0.002 (0.1)	0.0002 (0.07)	-0.006 (-1.25)	-0.004 (-0.89)
Predicted Value Of Other Debts	0.207 (0.093)	0.17 (0.106)	-0.006 (0.062)	0.036 (0.054)
Predicted Value Of Credit Card Balances	-0.0032 (-0.19)	-0.004 (-0.16)	-0.022 (0.24)	0.009 (0.31)
Marital Status				
Married	-0.02 (0.56)	0.05 (0.44)	0.207 ^{**} (2.56)	0.211 ^{**} (2.24)
Partner	-0.081 (-0.76)	-0.084 (-0.74)	0.149 1.49	0.149 0.26
Single Male	-0.015 (-0.09)	-0.021 (-0.22)	0.024 (0.84)	0.043 (0.6)
Education				
Head Has Some College	0.026 (-0.26)	-0.015 (-0.26)	-0.08 (-0.96)	-0.078 (-1.08)
Head Has College	-0.03 (-0.46)	-0.05 (-0.54)	-0.018 (-0.8)	-0.093 -1.02
Age	0.007 ^{***} (3.65)	0.028 ^{***} (3.63)	0.015 (1.3)	0.011 (1.17)
Income	0.006 ^{***} (4.23)	0.007 ^{***} (3.96)	0.0032 ^{***} (2.71)	0.005 ^{**} (2.25)
Income Squared	0.005 ^{***} (-2.6)	-0.002 ^{**} (-2.28)	0.003 ^{***} (-3.78)	-0.001 -1.5
Household Size	0.024 ^{**} (2.3)	0.045 ^{**} (2.3)	-0.001 (0.28)	0.004 (0.19)
Race				
African-American	-0.054 (-1.48)	-0.144 (-1.38)	-0.18 ^{**} (-1.98)	-0.166 [*] (-1.87)
Hispanic	-0.015 (-0.73)	-0.097 (-0.76)	-0.11 (-1.69)	-0.158 (-1.62)
Other	0.083 (0.08)	0.044 (0.24)	-0.26 (-1.41)	-0.354 (-1.36)
Head Works Full-Time	-0.055 (-0.82)	-0.07 (-0.9)	0.092 (0.61)	0.042 (0.52)
Spouse Works Full-Time	-0.009 (-0.43)	-0.046 (-0.51)	0.017 (-0.4)	-0.039 (-0.52)
Spouse Works Part-Time	0.099 (0.56)	0.057 (0.6)	0.035 (-0.48)	-0.064 (-0.44)
Rho	0.296 ^{***} (3.2)		0.09 (0.71)	
Log-Likelihood	-432.103		-319.496	

VI. Explaining the Gap in Homeownership Rates

Debt, be it from educational loans or credit cards, potentially can impact the homeownership decision in two possible ways. One is by tightening the credit constraints facing the household, thereby inhibiting its ability to obtain the desired financing. The second way is through the budget constraint by altering the household's voluntary optimization process. Marginal effects from the bivariate probit determine the proportion of the gap in homeownership that is still unexplained after accounting for credit constraints. The difference between the marginal effects for the homeownership models with and without credit constraints gives the proportion of the gap that is explained by credit constraints. Differencing the marginal effects in Table 3a gives Table 3b.¹² Table 3b indicates that credit constraints account for 0.4 percentage points of the gap in homeownership between households with and without educational loans in recent years. Controlling for credit constraints decreases the marginal effect of educational debt by almost half its original magnitude. However, this result is not statistically different from zero, therefore we cannot conclude that credit conditions play any role in the homeownership decision. Rather, it appears that households are voluntarily re-optimizing in response to the tighter budget constraint.

The estimate from Table 3b shows a *positive* gap in homeownership between households with credit card balances and those without (i.e., those with credit card debt have greater homeownership rates). Again, when controlling for credit constraints the marginal effect is reduced almost by half, however the difference is not statistically different from zero. We cannot conclude that credit constraints are influencing how credit card debt impacts the homeownership decision. It appears that households may be using credit cards to soften their budget constraints. Consuming out of available credit may allow the household to more easily finance home purchases.

Table 3b: Proportion of Gap Explained by Credit Constraints (t-values in parentheses)

Difference In Marginal Effects	2004	2001	1998	1995	1992
Total Amount Of Educational Loans	-0.004 (-0.20)	-0.001 (-0.04)	-0.0016 (-0.16)	-0.0018 (-0.11)	0.002 (0.08)
Predicted Value Of Other Debts	-0.0012 (0.00)	-0.0148 (-0.02)	0.0332 (0.06)	-0.037 (-0.05)	0.042 (0.12)
Predicted Value Of Credit Card Balances	0.03 (0.19)	0.027 (0.10)	-0.0063 (-0.04)	-0.0008 (-0.01)	0.031 (0.21)

* 10% significance ** 5% significance *** 1% significance

¹² See Appendix A.

VII. Conclusion

In recent years, the rising costs of college and the increase in the debt burdens of young Americans have received a great deal of attention. One impact of debt is on the decision to purchase a home. This paper develops a theoretical model that demonstrates two distinct channels through which debt may influence the household's decision to own a home. One channel is through a credit constraint modeled as a debt-to-income ratio that the household cannot exceed. Another channel is the budget constraint, which the presence of debts necessarily tightens, thereby altering the household's voluntary optimization process.

Using data from the *Survey of Consumer Finances*, we use a bivariate probit specification to infer the impact of debts on the probability of homeownership while controlling for credit constraints. We find that educational debt is associated with reduced homeownership rates for young households in recent years, and the effect is substantial. The data do not support the hypothesis that educational loans are tightening the credit constraints facing households, rather that households are re-optimizing voluntarily in response to their tighter budget constraints. These results indicate that the costs of educational debt on other post-college economic behavior should be taken into account when considering the issue of financial aid and the resulting benefits from educational attainment.

Credit card debt, on the other hand, is associated with an increased propensity to own a home and partially offsets the negative impact of educational debt. Again, we cannot conclude from the data that credit card debt is altering the credit constraints facing the household. Availability of credit card debt may relax the budget constraint, allowing households to save for a down payment, accelerating entry into homeownership. This result offsets the negative impact of educational loans. These two offsetting effects are relevant for about 13 percent of the sample. This result suggests that there are positive attributes to the availability and flexibility of credit card debt. Legislators who are considering regulations that affect credit card usage should take this into account when formulating policies.

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Appendix A

Statistical Significance of Differenced Marginal Effects

The t-values reported for the differenced marginal effects assume that the coefficient estimates from the models with and without credit constraints are uncorrelated. The models are estimated using the same data, thus it is likely that the coefficient estimates are correlated between models. As such, the t-values presented suggest a lower bound on the significance of these differences.

Let β_1 be the marginal effect of an explanatory variable from the model with selection

Let β_2 be the marginal effect of the same explanatory variable from the model without selection

$$\alpha = \beta_1 - \beta_2$$

The t-statistic for α is $\alpha/\text{s.e.}(\alpha)$, where $\text{s.e.}(\alpha)$ is the standard error of the difference

$$\text{Var}(\alpha) = \text{Var}(\beta_1 - \beta_2) = \text{Var}(\beta_1) + \text{Var}(\beta_2) - \text{Cov}(\beta_1, \beta_2)$$

$$\text{s.e.}(\alpha) = \sqrt{[\text{Var}(\beta_1) + \text{Var}(\beta_2) - \text{Cov}(\beta_1, \beta_2)]}$$

The standard errors produced assuming that the marginal effects are uncorrelated place an upper bound on the actual standard errors, which yield a lower bound of the t-values.

Differences that are significant under the assumption of no correlation will still be significant in the presence of correlation as long as the covariance between estimates is positive. Differences that are insignificant under the assumption may be significant if the covariance of the marginal effects achieves some threshold level if the covariance between estimates is positive. These covariances are unobserved, but we can construct these lower bounds for different significance levels.

$$\text{Var}(\beta_1) + \text{Var}(\beta_2) - (\alpha/\text{t-value})^2 = \text{Cov}(\beta_1, \beta_2)$$

The tables below display these covariance lower bounds that will result in differenced marginal effects that are statistically different from zero at a conventional 5-percent level. The values indicate that the covariance between marginal effects vary substantially for different types of debt and across years. Interestingly, the covariances required among estimates of the effect of educational loans are much smaller than those for other types of debt. Thus, credit constraints may be responsible for some proportion of the gap in homeownership rates along these dimensions.¹³

¹³ Table B3 in Appendix B contains Covariance Lower Bounds for the estimates in Table B2

Table A1: Covariance Lower Bounds for Selected Confidence Levels

	2004	2001	1998	1995	1992
10 Percent Level					
Total Amount Of Educational Loans	0.00039	0.00057	0.00010	0.00027	0.00062
Predicted Value Of Other Debts	0.21539	0.54895	0.33760	0.64159	0.03783
Predicted Value Of Credit Card Balances	0.02534	0.07442	0.02027	0.01569	0.00961
5 Percent Level					
Total Amount Of Educational Loans	0.00039	0.000570169	9.77508E-05	0.000269021	0.00062403
Predicted Value Of Other Debts	0.2154	0.548970234	0.337727754	0.641743706	0.13274825
Predicted Value Of Credit Card Balances	0.025442479	0.074500516	0.020278491	0.015691417	0.02238404

Appendix B

Table B1: Marginal Effects for Homeownership Equations (t-values in parentheses)

Variable	2004		2001		1998	
	With Credit Constraints	Without	With Credit Constraints	Without	With Credit Constraints	Without
Intercept	-5.31 ^{***} (-4.77)	-5.5 ^{***} (-4.74)	0.814 (0.52)	-0.99 (-0.71)	-3.25 ^{***} (-3.22)	-3.61 ^{***} (-3.53)
Educational Loans						
Head Has Some College	0.024 (0.46)	0.004 (2.81)	-0.01 (-0.4)	-0.0002 (-0.65)	0.001 (1.08)	2.28E-06 (1.8)
Head Has College	-0.005 ^{***} (-2.61)	0.004 (0.34)	0.007 (1.24)	0.004 ^{**} (2.12)	-0.001 (-1.13)	0.00001 (0.92)
Predicted Value Of Other Debts	-0.005 (-0.05)	-0.0009 (-0.87)	-0.029 ^{***} (-3.52)	-0.0006 (0.007)	0.004 (-0.52)	2.30E-06 (0.17)
Predicted Value Of Credit Card Balances	0.044 ^{***} (2.87)	0.012 ^{***} (2.8)	0.047 (1.61)	0.0006 (0.51)	-0.004 (-0.46)	-6.55E-07 (-0.19)
Marital Status						
Married	0.086 (0.51)	0.002 (0.6)	0.12 ^{***} (2.74)	-0.0002 (-0.49)	0.069 (0.75)	5.40E-07 (0.89)
Partner	-0.094 [*] (-1.7)	0.014 (1.01)	0.349 ^{***} (2.67)	0.004 [*] (1.87)	-0.046 (-0.92)	2.64E-06 (0.31)
Single Male	0.047 (0.47)	-0.001 ^{***} (-2.95)	0.144 ^{***} (2.72)	0.00005 (0.49)	0.054 (0.34)	-3.87E-07 (-1.07)
Education						
Head Has Some College	0.011 (0.01)	-0.019 (-1.36)	-0.094 ^{***} (-2.63)	-0.005 ^{**} (-2.02)	0.093 (1.54)	2.08E-06 (0.25)
Head Has College	0.024 (-1.28)	-0.039 ^{**} (-2)	-0.183 ^{***} (-2.86)	0.007 [*] 1.64	0.044 0.79	-0.00001 (-0.65)
Age	0.013 ^{***} (2.83)	0.0005 (0.04)	-0.014 [*] (-1.64)	-0.003 ^{**} (-2)	0.004 (1.42)	0.00001 (1.01)
Income	0.0072 ^{***} (4.72)	0.002 ^{***} (5.35)	0.01 ^{***} (4.4)	0.0002 ^{***} (3.81)	0.0045 ^{***} (3.36)	7.00E-07 ^{***} (3.22)
Income Squared	0.0051 ^{***} (-3.61)	-0.0004 ^{***} (-3.67)	0.01 [*] (-1.92)	-0.00001 ^{**} (-2.2)	0.0029 [*] (-1.95)	-2.00E-07 [*] (-1.93)
Household Size	0.006 (0.81)	0.004 (1.09)	0.026 ^{***} (3.19)	0.001 (0.005)	0.024 [*] (1.72)	3.63E-06 (0.22)
Race						
African-American	-0.097 (-1.1)	-0.01 (-1.16)	-0.183 ^{**} (-2.37)	-0.003 (-1.58)	-0.167 ^{**} (-1.97)	-0.00004 (-1.46)
Hispanic	-0.045 (0.19)	0.0006 (0.06)	-0.207 ^{***} (-3.1)	-0.006 ^{***} (-2.59)	-0.186 ^{***} (-3.23)	-0.00008 ^{***} (-2.86)
Other	-0.105 (-1.11)	-0.025 [*] (-1.82)	-0.17 (-0.84)	-0.002 (-0.93)	-0.128 (-1)	-5.03E-06 (-0.52)
Head Works Full-Time	0.026 (0.47)	0.011 (0.91)	-0.159 (-1.71)	-0.002 (-0.48)	0.076 (0.36)	-2.26E-06 (-0.2)
Spouse Works Full-Time	-0.068 (-0.94)	-0.011 (-0.93)	-0.136 ^{**} (-2.3)	-0.004 (-1.23)	0.073 (1.51)	7.72E-06 (1.23)
Spouse Works Part-Time	0.016 (0.81)	0.012 (0.55)	-0.022 (-1.38)	-0.001 (-0.26)	0.069 (1.11)	8.68E-06 (1.24)
Rho	0.409 ^{***} (4.04)		0.423 ^{***} (4.57)		0.348 ^{***} (3.57)	
Log-Likelihood	-307.556		-367.224		-357.664	

Table B1 continued¹⁴

Variable	1995		1992	
	With Credit Constraints	Without	With Credit Constraints	Without
Intercept	-4.45*** (-5.51)	-4.21*** (-5.25)	-2.97*** (-2.58)	-2.86** (-2.49)
Educational Loans				
Head Has Some College	-0.038 (-1.4)	0.011*** (3.62)	-0.006 (0.65)	0.0002 (1.24)
Head Has College	0.002 (0.18)	0.058 (1.56)	-0.002 (-1.37)	0.003** (2.24)
Predicted Value Of Other Debts	0.0204 (0.91)	-0.007 (-1.71)	-0.0007 (0.54)	0.0006 (0.55)
Predicted Value Of Credit Card Balances	-0.003 (-0.18)	-0.001 (-0.11)	-0.022 (0.17)	0.0001 (0.29)
Marital Status				
Married	-0.014 (0.63)	-0.021 (-1.37)	0.207*** (2.58)	0.0002 (0.59)
Partner	-0.077 (-0.74)	0.05 (1.35)	0.148 (1.43)	0.0008 (0.59)
Single Male	-0.015 (-0.1)	-0.0008 (-0.6)	0.024 (0.84)	-0.0001 (-0.95)
Education				
Head Has Some College	0.0514 (0.26)	0.05 (1.6)	-0.07 (-1.16)	-0.001 (-1)
Head Has College	-0.028 (-0.43)	-0.048 (-1.54)	0.109 (-0.72)	0.002 1.07
Age	0.007 (3.54)	0.007 (0.29)	0.016 (1.4)	-0.002 (-1.25)
Income	0.006*** (4.08)	0.002*** (3.41)	0.0033*** (2.75)	0.0001** (2.26)
Income Squared	0.005** (-2.49)	-0.0006** (-2.14)	0.0028*** (-3.74)	-2E-06 (-1.5)
Household Size	0.025** (2.36)	0.021*** (2.92)	-0.001 (0.25)	0.0001 (0.16)
Race				
African-American	-0.05 (-1.42)	-0.088*** (-3.35)	-0.18* (-1.95)	-0.003* (-1.87)
Hispanic	-0.022 (-0.81)	-0.086*** (-2.79)	-0.107 (-1.59)	-0.003 (-1.56)
Other	0.089 (0.13)	-0.078* (-1.69)	-0.25 (-1.34)	-0.006 (-1.37)
Head Works Full-Time	-0.05 (-0.69)	0.015 (0.62)	0.092 (0.61)	0.001 (-0.49)
Spouse Works Full-Time	-0.006 (-0.36)	0.033 (1.1)	0.017 (-0.32)	-0.001 (-0.48)
Spouse Works Part-Time	0.097 (0.57)	-0.0003 (-0.01)	0.032 (-0.39)	-0.001 (-0.43)
Rho	0.294*** (3.18)		0.097 (0.77)	
Log-Likelihood	-430.395		-318.433	

¹⁴ * 10% significance

** 5% significance

*** 1% significance

Table B2: Proportion of Gap Explained by Credit Constraints (t-values in parentheses)¹⁵

Difference In Marginal Effects	2004	2001	1998	1995	1992
Educational Loans					
Head Has Some College	-0.02 (-0.16)	0.0098 (0.12)	-0.000997725 (-0.02)	0.049 (0.35)	0.0062 (0.07)
Head Has College	0.009 (0.03)	-0.003 (-0.01)	0.00101 (0.00)	0.056 0.16	0.005 (0.01)
Predicted Value Of Other Debts	0.0041 (0.01)	0.0284 (0.04)	-0.0039977 (-0.01)	-0.0274 (-0.04)	0.0013 (0.00)
Predicted Value Of Credit Card Balances	-0.032 (-0.20)	-0.0464 (-0.18)	0.003999345 (0.03)	0.002 (0.02)	0.0221 (0.15)

Table B3: Covariance Lower Bounds for Selected Confidence Levels

	2004	2001	1998	1995	1992
10 Percent					
Educational Loans					
Head Has Some College	-4.45977E-05	-1.07079E-05	-1.10988E-07	-0.000267698	-4.28584E-06
Head Has College	-9.03104E-06	-1.00345E-06	-1.13735E-07	-0.000349646	-2.78736E-06
Predicted Value Of Other Debts	-1.87422E-06	-8.99268E-05	-1.78186E-06	-8.37055E-05	-1.88425E-07
Predicted Value Of Credit Card Balances	-0.00011417	-0.000240043	-1.78332E-06	-4.45977E-07	-5.44549E-05
5 Percent Level					
Educational Loans					
Head Has Some College	0.015044554	0.006948656	0.001678226	0.019276063	0.008164859
Head Has College	0.10828998	0.125561205	0.13002072	0.124038415	0.12164346
Predicted Value Of Other Debts	0.170952595	0.420799727	0.317753275	0.45810994	0.130189401
Predicted Value Of Credit Card Balances	0.025599647	0.062873347	0.020588262	0.016123951	0.022054946

¹⁵ * 10% significance

** 5% significance

*** 1% significance