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Does education loan debt influence household financial distress? An assessment using the 2007-09 SCF Panel

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Does education loan debt influence household financial distress? An assessment using the 2007-09 SCF Panel*

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Abstract:

This paper uses the recent 2007-09 SCF panel to examine the influence of student loans on financial distress. Families with student loans in 2007 have higher levels of financial distress than families without such loans, and these families were more susceptible to transitions to financial distress during the early stages of the Great Recession. This correlation persists once we control for a host of other demographic, work-status, and household balance sheet measures. Families with an average level of student loans were 3.1 percentage points more likely to be 60 days late paying bills and 3 percentage points more likely to be denied credit. During this same time period, families with other types of consumer debt were no more or less likely to be financially distressed.

Education loans enable students to go to college and improve their employment and earnings prospects. On average, families with education loans in the 2007-09 SCF saw higher income growth between surveys. Further, the value of completing a degree is evident in the data: families without a degree but with education debt drive much of the correlations between financial distress and education loans.

* The analysis and conclusions set forth are those of the authors and do not indicate concurrence by other members of the research staff or the Board of Governors. Thanks to Robert Argento for research assistance and participants at a FRB research workshop for helpful comments.

1. Introduction

The rise to prominence of educational debt on the household balance sheet alongside continued high unemployment in the wake of the Great Recession has fueled discussion of financial distress among those with student loans.[1] Media accounts, with headlines such as "A Generation Hobbled by the Soaring Cost of College" and "Student Debt Weighs Heavily on Young Americans," have drawn attention to recent graduates struggling to make payments, remaining at home with their parents and postponing marriage.[2] Representatives of the Consumer Financial Protection Bureau have warned that without significant reforms to the student loan system, hundreds of thousands of borrowers will be "sentenced to a lifetime of permanent financial distress" (Chopra, 2012). And a growing number of beneficiaries are seeing money withheld from their Social Security checks because they have fallen behind in payments on federal student loans.[3]

This paper undertakes the modest task of identifying whether there is in fact any correlation between student loans and household financial distress, and if that correlation can be explained better by factors other than educational debt. Broadly, we find that student loans are correlated with financial distress in the 2007-09 SCF panel and families that hold student loans are more likely to transition to financial distress between 2007 and 2009. Families with student loans in 2007 were about 4 percentage points more likely to be 60 days late paying bills and about 5 percentage points more likely to be denied credit in 2009.

These correlations may be more closely related to factors other than the loans themselves. Younger people and lower-income people, for example, are more likely to experience financial distress, and they are also more likely to hold student loans. However, these correlations persist after controlling for age, highest degree, income, and many other factors that may be correlated

[1] In the 2010 Survey of Consumer Finances (SCF), student loan debt overtook vehicle debt as the largest type installment debt on household's balance sheets.

[2] Martin, Andrew and Andrew Lehren, "A Generation Hobbled by the Soaring Cost of College," *The New York Times*, May 12, 2012. Bond, Shannon, "Student Debt Weighs Heavily on Young Americans," *Financial Times*, July 31, 2012.

[3] See, for example, Block, Sandra and Christine Dugas, "Five Proposals to Solve $1 Trillion College Loan Crisis," *USA Today*, May 21, 2012, and Mitchell, Josh, "Student Debt Hits the Middle-Aged," *The Wall Street Journal*, July 17, 2012. The number of retirees whose checks have been reduced due to delinquent student loan payments rose to 115,000 in the first seven months of 2012, up from 60,000 in all of 2007, and just six in 2000 (Andriotis, 2012). 156,000 Social Security retirees had payments garnished in 2013; on average, the amount garnished was $180 (Sheridan, 2014).

with holding education loans and being financially insecure. Roughly two-thirds of raw correlation between education debt and financial distress remains once these other factors are taken into account: families with an average level of student loans ($23,000) were 3.1 percentage points more likely to be 60 days late paying bills and 3 percentage points more likely to be denied credit. Other forms of common installment debt are not correlated with financial insecurity. Families with education debt that were not in financial distress in 2007 were also more likely to transition into financial distress between 2007 and 2009, relative to comparable families without education debt.

It is puzzling that age and other demographics explain only part of the correlation, especially considering that families with education loans can defer payments in certain circumstances of financial distress.[4] However, a key to unlocking the puzzle may be graduating with a degree: families without a degree but with education debt are more likely to have financial distress.

Education loans themselves are a bridge to skills that offer considerable benefits in the labor market.[5] On average, families with education loans in the 2007-09 SCF saw higher income growth between surveys than families without such loans. And the value of completing a degree (noted above) is evident in the data.

The paper continues in section 2 with a review of relevant literature surrounding student loans, section 3 summarizes trends in student loans, section 4 summarizes our analytic approach, section 5 discusses the results, and section 6 concludes.

[4] There are several reasons why a borrower may be relieved from making current payments on an education loan, though the specific criteria vary across types of loan. For example, deferment is generally granted when the borrower is continuing his or her education. Deferment is often granted when the borrower is experiencing particular types of financial hardship, such as unemployment. There are also special categories of public service, such as the Peace Corps, the military, or selected medical and teaching positions, which qualify the borrower for relief from making current payments, and sometimes ultimately qualify the borrower for loan forgiveness. The number of loans in deferment has increased over time, reaching 45% of households with educational debt by 2010.

[5] The average return to college is large. Avery and Turner (2012) estimate that a typical 2010 college graduate will earn between $400 thousand and $600 thousand more in net present value over their lives than will a high school graduate, even after considering the increase in student loan debt. Recent estimates of the average return to an additional year of schooling are about 10 to14 percent (Carniero et al, 2010; Carniero et al, 2011). Field of study can influence the return to college (Arcidiacono, 2004) as can qualities of the school. For-profit schools, in particular, may offer little return on investment (Lang and Weinstein, 2012).

2. Review

A number of studies evaluate how taking out loans to finance college education impacts households, but most of them focus on the education and career decisions made by students.[6] Some papers explore the impact of debt on the decision to attend graduate school. This literature is unresolved, but the most recent studies seem to find at best weak relationship for some students (Schapiro, O'Malley, and Litten (1991), Weiler (1994), Fox (1992)[7], and Monks (2001)). In many cases, the net effect of debt on students' choices – in those studies that actually find an effect – is actually to decrease "financial distress" broadly speaking, as the results suggest students pursue higher-paying jobs, paths of study, and specialties than they otherwise would to finance the added burden of student loan debt payments (Mincozzi (2005), Rothstein and Rouse (2011), Kahn et al (2006), Hauer et al (2008), Woodworth (2000), Rosenblatt and Andrilla (2005), Phillips et al (2010), and Field (2009).[8]

Students taking more highly paid jobs or avoiding particular career paths because of debt probably affect their sense of life satisfaction, and may also impose meaningful social costs (i.e. contributing to a shortage of general practitioners), but these responses are quite different from the reports of hardship recounted in the news stories cited earlier. There is very little non-anectdotal analysis indicating student loans are causing what might be generally agreed on as "hardships." In one prospective analysis, an advocacy group uses summary statistics for student

[6] Discussions of the burden of student loans typically highlight the fact that they are not dischargeable (since 1976) in standard bankruptcy proceedings. Due to the impossibility of repossessing a degree and lenient underwriting standards, educational loans are only dischargeable under extraordinary circumstances and tend to grant creditors broad collection powers when borrowers enter into default. Student loan debt can be discharged in bankruptcy proceedings if they can prove in an "adversary proceeding" that the debt represents an "undue hardship." (Lieber, 2012; Pardo and Lacey, 2009, and; Iuliano, 2011). The "Brunner standard," which is the commonly used standard by bankruptcy courts, indicates that this hardship is met if debtors 1) cannot maintain a minimal standard of living if forced to repay the loan, 2) other circumstances suggest that this situation is likely to persist over a long portion of the repayment period, and 3) the debtor has made good faith efforts to pay. Analysis of bankruptcy data by Iuliano (2011) finds that the debtors granted these hardship discharges are less likely to be employed, more likely to have medical problems, and more likely to have had low incomes preceding the bankruptcy period. There are other features of student loans, however, that make them in some ways favorable to other forms of debt. For one thing, interest rates on student loans are relatively low. Educational loans can also go into deferment, allowing a temporary halt to repayment. Interest may or may not accrue during deferment, depending on the type of loan. There are several reasons why a borrower may be relieved from making current payments on an education loan, as noted in a previous footnote.

[7] Fox estimates imply that doubling undergraduate debt would cause women's likelihood of attending graduate or professional programs to fall from 22.7 percent to 21.8 percent. (Fox, 1992, 669)

[8] Minicozzi (2005) uses employment and earnings histories for a sample of male college graduates, and finds that students with higher levels of student loans were more likely to choose jobs with higher initial wages, but lower long-term rates of job growth.

loan levels, incomes of recent college graduates, and home prices to calculate the result that the average student borrower is ineligible for a typical home mortgage (Mishory and Sullivan, 2012). They further calculate that the share of students ineligible due to high borrowing has risen substantially over the last decade.

The one research paper to rigorously evaluate a plausible hardship resulting from student loan debt is Gicheva's (2012) analysis of marriage decisions of students and graduates. Using survey data from prospective MBA students registered for the GMAT and data on college graduates in the SCF, Gicheva (2012) shows that accumulated education debt decreases the probability that students anticipate getting married and that graduates will be married. Results from both data sets indicate that the strength of this relationship diminishes with age, and that, for respondents in the younger half of the age distribution, $10,000 in additional debt decreases the probability of students' anticipating marriage by three to four percentage points, and decreases the probability of being married by 11 to 17 percentage points.

To estimate causal effects of student loan debt on household financial distress, we would need to disentangle the relationship between debt and educational attainment as well, since the two are clearly related. In the absence of loans, some students would not attain a degree, and the proper counterfactual would reflect this fact. In this paper, we implicitly assume that loans have no impact on education outcomes, and when we control for educational attainment our regression results contrast financial hardship among similarly educated people, based on the amount of student loans they have taken out. Students who finance higher education without resorting to loans, though, are arguably quite different from those who do take out loans.

Despite these important caveats, the approach we use is informative because it establishes an upper-bound of the impact of education loans on household financial distress, and our findings are suggestive of the magnitudes of some potential outcomes from shifting financial aid resources toward grants instead of loans.

To explore the relationship between student loans and financial distress, we use the 2007-09 Survey of Consumer Finances panel, and use number of different approaches to control for selection. In the next section, we discuss the education debt data in the SCF cross sections, and provide some details on the 2007-09 SCF panel we will use in this study. Then we discuss our

methodological approach, and present the findings of our regression analysis. Finally, we summarize our findings and discuss their implications.

3. Student Loan Debt in the Survey of Consumer Finances

3A. Education Debt Trends using the SCF Cross Section

The Survey of Consumer Finances (SCF) is a household survey conducted by the Federal Reserve Board (FRB) that collects detailed information on the finances of US families. It is unique in the level of detail of information on household assets and debts. The SCF has been administered every three years since 1989 and employs a dual-frame sample design, combining a multi-stage area-probability (AP) sample and the list sample (LS), an oversample of expectedly wealthy households. When weighted, though, the SCF is a nationally representative sample of the non-institutional families in the US.[9] The unit of observation in this paper is the family.

However, to more fully understand the changes that occurred for US families the 2007 SCF families were re-interviewed in 2009, creating a short panel that measured household finances at the bookends of the Great Recession. This analysis draws heavily on the 2007-09 SCF panel.[10] Using these data allows us to use the rich household balance sheet detail from the SCF and also exploit the panel dimension by exploring 2009 outcomes by 2007 debt situation for the same household.

Like the other waves of the triennial cross-sectional SCF surveys, the 2007 wave provided detailed information on all aspects of household finances. To maximize comparability of data between the original and follow-up interviews, the 2009 questionnaire maintained as much as possible the ordering and systematic framing of concepts in the 2007 questionnaire. The 2009 re-interview also collected descriptive information about changes families made or planned to make in their portfolios and about key positive and negative events for the family between 2007 and 2009.

[9] The SCF sampling design excludes college dorms and other institutional settings. Note, also, that the definition of "family" is unique to the SCF. In the survey, a household is divided into a "primary economic unit" (or PEU) which is denoted as the "family", and a non-primary economic unit (or NPEU) which comprises all others in the household.[9] The main SCF statistics refer only to the family. A summary of assets and debts for the NPEU household members is collected at the end of the survey. Education loans are not separately collected separately from other debts in the NPEU questions.

[10] See Bricker, Bucks, Kennickell, Mach, and Moore (2011) for more information on the 2007-09 SCF panel.

The first follow-up interviews were conducted in July of 2009, and nearly all interviews were completed before January 2010, when data collection stopped. When the field work ended, almost 89 percent of the eligible 2007 SCF participants had been re-interviewed, and the panel response rate based on the eligible cases was at least 87 percent in every sample group. Analysis of non-response to the 2009 re-interview suggests that there is little relationship between response and the most important characteristics in the panel.[11]

3B. Education Debt Trends in the SCF

The aggregate outstanding student loans reflected in the SCF imply tremendous growth in education-related debt over the past decade. Inflation-adjusted education-related debt rose from $210 billion in 2001 to $578 billion in 2010 (Table 1).[12] Education debt grew about 15 percent between the 2010 and 2013 SCF and more recent loan data suggest this trend has continued unabated since 2013, with total student loan debt outstanding rising an additional 8 percent (G.19) to 12 percent between 2013Q2 and 2014Q2 (NYFRB/Equifax Consumer Credit Panel).[13]

The growth in the aggregate corresponds with an increase in the fraction of households with educational debt and an increase in the average debt burden among such households. Nearly one in five families has some education debt (19 percent) in 2010, double the share in 1989. Similar to the aggregate debt measure, the lion's share of the growth in the share of families with debt occurred after 2001. Further compounding this trend has been the doubling of both mean and median debt balances in real terms and among the families with debt since 1989, with the mean rising slightly faster than the median (Table 1).

The more pronounced growth in the mean compared to the median suggests a shift in the distribution of educational debt outstanding that can be readily seen in the data. Three-quarters of

[11] There was some change in the composition of the survey households over the 2007-2009 period. For example, in five percent of households there was a spouse or partner of the respondent in 2009 where there had been no such person in 2007, and in 4.7 percent of households there was no spouse or partner in 2009 where there had been such a person in 2007. Previous analysis using the SCF Panel (Bricker et al, 2010), suggests that eliminating families with large compositional changes from the analysis does not affect the qualitative findings of trends in household finances from 2007 to 2009.

[12] The SCF captures approximately 2/3^{rds} of the FRBNY/Equifax Credit Panel figures for student loans over the last ten years. As previously discussed, the SCF does not sample from college dorms or other institutional populations, thus the SCF will undercount the aggregate amount of education loans.

[13] The results of the 2013 SCF can be found in Bricker et al (2014). The Federal Reserve Board's Consumer Credit G.19 release is available at http://www.federalreserve.gov/releases/g19/current/default.htm. The Federal Reserve Bank of New York's statistics on student loans are available at http://www.newyorkfed.org/microeconomics/data.html.

families were found to have balances below $10,000 for 1989, but over time this proportion eroded to just 40 percent of families in 2010 (Table 1). Meanwhile, those families with debt balances above $25,000 shot up from 6% in 1989 to 30% in 2010. The share of debt held by each debt size class tells a similar story. Each class contained roughly a third of the distribution in 1989 but by 2010 around three-quarters of the aggregate was held by households with over $25,000 in loans. Expressed as a share of total income – among households with employed heads ages 24 and older with incomes of at least $10,000 – student loans outstanding rose from 13 percent in 1989 to 32 percent in 2010.

The growth in the aggregate and the corresponding shift in the distribution towards higher debt levels across a larger percentage of families indicates that educational debt may play a larger role on the household balance sheet in the years ahead. Between 1989 and 2010 education debt grew from 5.4 percent to 16.9 percent of non-mortgage household debt. This trend has continued since 2010 as well, rising an additional seven percentage points between the third quarters of 2010 and 2013.[14]

3C. Distress measures in the SCF

This analysis explores whether families in the 2007-09 SCF panel with educational loan balances were more likely to experience financial distress during the 2009 recession. Limitations of the using SCF panel include a relatively small sample size (about 3,900 households participated in both waves), and the short panel limits our focus to short-term measures of financial distress that speak less to long-term consequences of educational debt.

The SCF has a number of variables that indicate household-level financial distress, including bankruptcy, foreclosure, being denied credit, late payment of bills, and a high payment to income ratio. Below we present statistics using each of these five measures, but in most of the analysis choose to focus primarily on being denied credit and late payment of bills, and, to a lesser extent, payment to income ratio. As a practical matter, there are very few instances of bankruptcy (just two percent of the SCF panel sample had experienced bankruptcy between 2007 and 2009) or foreclosure (just over one percent had their homes foreclosed on or were forced to move from their home due to foreclosure) (Table 2).

[14] NYFRB/Equifax Consumer Credit Panel figures put the student loan share of non-mortgage debt in 2010 at closer to 23 percent, resulting in a 2013 Q3 level of 30 percent.

The other distress measures are more common in the data. Nearly 8 percent of households reported having been late paying bills by 60 or more days between 2007 and 2009 ("late60") and 23 percent were either denied credit or did not apply for credit because they believed they would be denied ("denied").[15] Households with a high payment to income ratio (payments above 40 percent of income) are estimated to be 11.2 percent of households interviewed in the 2009 follow-up ("hipir"). The income variable in the SCF panel (as in the usual cross-sectional SCF surveys) is backward-looking, referring to the previous completed calendar year. Households were survey in the summer months of 2009, but the SCF income question refers to 2008, preceding the worst parts of the 2009 recession. Data for assets and debts are current at the point of the survey, and measures of economic circumstances, including unemployment, being late on payments, and being denied credit include the period up through mid-2009.

4. The Empirical Approach

This paper uses a relatively simple empirical approach to explore the potential relationship between education-related debt and household financial well-being. Initially we focus on the financial distress outcomes (outlined in Section 3C) and later examine positive financial outcomes involving income (outlined in Section 3D).

We begin our analysis with simple linear models to test whether the observed correlation between education debt and financial distress can be explained by demographic characteristics, economic circumstances, or other items on the household balance sheet. Subsequently we estimate a series of "transition probability models," using several different approaches to control for selection on initial conditions.

Initially we estimate the following basic equation using OLS:

$$Distress_{i,09} = fn\left(EdLoans_{i,07}, X_{i,07}, X_{i,09}, X_{i,09-07}, \varepsilon_i\right), \quad \textbf{(1)}$$

where distress ={late60, denied, hipir}.

[15] Jappelli (1990) and Duca and Rosenthal (1991) have found the SCF questions about credit applications and outcomes provide a useful indicator of households that are credit constrained. The SCF panel asked families if, in the past two years, they had applied for credit and been turned down *and* if they believed they would be turned down if they had applied for credit. Jappelli (1990), found that the families who believed they would be turned down looked and behaved like the families that had applied for and been denied credit.

Each of the distress measures, reflecting responses to the second wave of the panel, is binary, making the initial specification a linear probability model (LPM). The distress measures were discussed in Section 2C. We first estimate (1) using only a covariate reflecting education debt in 2007. Then we proceed to include a variety of additional demographic, economic, and household balance sheet measures that are expected to be correlated with debt as well as distress.

Summary statistics for all of the independent and dependent variables are included in Appendix Table 1. Demographic covariates include race, age and gender of respondent, family structure, number of children, region of the country, self-reported health status, and indicators for rural area and recent divorce. The labor-market/economic condition variables include educational attainment (with indicators for degree-level), work status, occupation group, industry group, income in 2007, and indicators for unemployment spells in 2007 and 2009. Measures of household balance sheets include changes in home equity and net worth between 2007 and 2009, total level of household debt in 2007, and indicators for saving any amount in 2007, presence of non-education installment debt, presence of credit card debt, and owning any stocks in 2007. Additional independent variables include: an indicator for being a "high" earning type (actual earnings being more than 50 percent greater than earnings predicted based on educational attainment, occupation, and demographic information using on external Current Population Survey data); and indicators for experiencing "negative income shocks" in 2007 and 2009 (actual income being at least 5 percent lower than the household's "normal" income.)

In many specifications, we include all ages and include age variables (indicators for age class or age in years and its square). But, we also estimate (1) separately for different age groups (20 to 39, 40 to 49, 50 to 59, and 20 to 59). Most of our specification reflect the influence of other kinds of debt by both including indicators for presence of non-education installment debt as well as variable for total household debt in 2007. We also consider versions of (1) that include other types of debt (non-education installment debt and credit card debt) as the dependent variable in place of education debt.

In various specifications of (1) we parameterize education-related debt in several different ways. Initially, we use an indicator for the presence of any level of debt. In most specifications, though, we include both the level and the square of the level of education debt.[16]

The final portion of the analysis involves modifications to (1) that are consistent with the "transition probability" models used in research on the factors that influence transitions to poverty, low-pay, or other states of interest (see Cappallari and Jenkins, 2004, and Stewart and Swaffield, 1999, for examples).

In a transition probability model, the sample is split into two subsets: families for whom the initial state exists and families for whom it does not exist. Analysis is performed on only one subset and the analysis evaluates the factors influencing transition into or out of that state. In our analysis we keep families that did not experience distress in 2007 and examine factors that influenced the transition to distress by 2009.

By selecting our sample to include only those households that did not experience financial distress in 2007, our sample suffers from an initial conditions selection problem (Heckman, 1981). We use three estimation methods to account for this nonrandom sample problem: first, a bivariate probit model with endogenous selection, second, a Heckman two-step model and, third, a nonparametric sample selection model from Das, Newey, and Vella, (2003, hereafter DNV). Each model is a variant of a control function and is summarized below.

4A. Modeling transitions into distress: bivariate probit models.

The standard univariate probit model serves as the jumping off point for modeling transitions into financial distress. Consider a model to describe the relationship between a latent outcome $distress^{*}_{i,2007}$ and its correlates in 2007:

$$distress^{*}_{i,2007} = X'_{i,2007}\beta + u_{i,2007}\,.$$

The dummy variable $distress_{i,2007}$ is then:

[16] We also explore using indicators for a categorical variable based on debt levels, which takes on four different values, with the value ranges designed to group households with positive debt into three roughly equal groups; households with no debt are given a zero, and those with the highest level of debt (above $23,000) are given a four. Coefficients from these specifications are consistent with those using the level and the square of the level of debt. Results from these regressions are not shown for space, but are available upon request.

$distress_{i,2007} = 1 \text{ if } distress^{*}_{i,2007} > 0$, and

$distress_{i,2007} = 0 \text{ if } distress^{*}_{i,2007} \leq 0$.

A parallel process can be constructed for distress in 2009:

$$distress_{i,2009} = 1 \text{ if } X'_{i,2009}\delta + u_{i,2009} > 0,$$
$$distress_{i,2009} = 0 \text{ otherwise}$$

.

However, if our goal is to examine the *transition* to distress between 2007 and 2009 then we necessarily have to condition on not being in distress in 2007 (that is, omit the households that were already in distress in 2007). In doing so, any inference made with our analysis data is likely to be biased. For example, the conditional expectation of interest becomes (equation (2)):

$$E[distress_{i,09} \mid X, distress_{i,07} = 0] = X'_{i,09}\delta + E[u_{i,09} \mid X, u_{i,07} > -X'_{i,07}\beta], \quad \textbf{(2)}$$

but the conditional expectation of the regression error term ($E[u_{i,09} \mid X, u_{i,07} > -X'_{i,07}\beta]$) is not zero unless the unobservables that determine late payments in 2007 are uncorrelated with those from 2009.

If the unobservables are uncorrelated across waves and error terms are assumed to be normally distributed then a univariate probit model can describe the transition. Otherwise, a bivariate probit regression model can account for this potential endogenous sample selection by modeling the covariance between the error terms of the $distress_{i,07}$ and $distress_{i,09}$ equations.[17]

The bivariate probit assumes the regression error terms follow a bivariate standard normal distribution with joint probability:

$$\Pr[distress_{i,07} = 1, distress_{i,09} = 1] = \Phi_2(X'_{i,07}\beta, X'_{i,09}\delta; \rho_{u_{07},u_{09}}),$$

where $\Phi_2(\cdot)$ represents the bivariate normal distribution and $\rho_{u_{07},u_{09}}$ represents the correlation between $u_{i,09}$ and $u_{i,07}$.

The transition of interest (the probability that a family is distressed in 2009 conditional on not being distressed in 2007 – see equation (2)) in the bivariate probit is expressed as:

[17] In this way, the bivariate probit model is similar to a SUR regression system with two probits.

$$\Pr[distress_{i,09} = 1 \mid distress_{i,07} = 0] = \Phi_2(-X'_{i,07}\beta, X'_{i,09}\delta; \rho_{u_{07},u_{09}}) / \Phi(-X'_{i,07}\beta)\,.^{18}$$

The structure assumed in the bivariate probit model will identify the parameters in the conditional model described above. In our work, though, we also exclude family income from the $distress_{09}$ model but include it in the $distress_{07}$ model; this exclusion restriction allows the model to be identified by more than the assumed bivariate normality. In the SCF panel, family income in 2007 is highly (and negatively) correlated with late debt payments in 2007 but is not correlated with *the transition to* late payments in 2009; accordingly it is suitable as an exclusion restriction in a transition model (Cappellari and Jenkins, 2004).[19]

4B. Modeling transitions into distress: Heckman models.

Though the bivariate probit model provides a helpful framework, there is no way of knowing whether its assumed structure is correct. A slightly different method uses the same system of equations ($distress_{i,09} = X'_{i,09}\delta + u_{i,09}$ and $late60_{i,07} = X'_{i,07}\beta + u_{i,07}$) in a two-step process from Heckman (1979) in which $u_{i,09}$ and $u_{i,07}$ are expected to be correlated.

The first stage uses a probit model to both estimate the probability of being in the second stage estimation sample and to estimate an inverse Mills ratio that models the selection problem. The second stage is an OLS regression of the equation of interest and includes the estimated inverse Mills ratio. The nonlinearity of the first stage probit is enough to identify the second stage model, and the Mills ratio in the second stage is not perfectly collinear because of this nonlinearity.[20] However, as with the bivariate probit, one must make a strong assumption; here, it is that the errors in the system of equations are both normally distributed.

[18] As Stewart and Swaffield (1999, page 32) explain, an assumption of zero correlation between the error terms of the two equations leads this conditional probability to collapse to a regular probit model. The normality assumption also allows us to calculate the average impact of education loans on transitioning to late payments (i.e. the average treatment effect; see Angrist and Pischke (2009) page 197-204 for a summary discussion).

[19] Results not shown but available upon request.

[20] It is still advisable to use an exclusion restriction even though the model is identified without one, and we continue to use family income in 2007 as an exclusion restriction because it is negatively correlated with distress in 2007 but is not correlated with the transition to distress between 2007 and 2009. Though a second-stage probit is feasible, it is not advised (Bushway et al, 2007; Freedman and Sekhon, 2008; Angrist and Pischke, 2009).

4C. Modeling transitions into distress: semi-parametric sample selection models.

In both sample selection models discussed thus far, assumptions about the unobservables feature heavily. Like the Heckman model, the DNV estimator is a two-step estimator. Unlike the Heckman model, it does not prescribe a functional form for either stage, nor does it prescribe a form for the error terms in either stage. A flexible series estimator can make the entire model nonparametric; in our use, though, the model is semi-parametric as we assume linearity in the non-education loan control variables (denoted here are *W*). Let $X_i^{'} = \left[W_i^{'}, EdLns_i \right]$ and define the variable that provides an exclusion restriction as Z_1. Then:

$$(1st\ stage)\ \ in\ sample_i = W_i^{'}\phi + h(Z_{i1}^{'}) + \eta_i$$
$$(2nd\ stage)\ \ distress_{i,09} = W_i^{'}\beta + g(EdLns_{i,07}) + k(\hat{p}_i) + \varepsilon_i$$

Like the Heckman model, the object of the first stage is to estimate the probability of being in the (second stage) estimation sample. Unlike the Heckman model, the first stage of the DNV estimator uses a nonparametric linear probability model. Also unlike the Heckman model, we generate a predicted propensity score ($\hat{p}_i$) after the first stage (rather than a Mills ratio).

The exclusion restriction variable (Z_1) in the first stage is estimated flexibly as a series, and the order of the series of $h(\cdot)$ is estimated from the data using a leave-one-out (LOO) cross validation method.[21] The predicted propensity scores are not guaranteed to be within the [0,1] range, and the second stage of the DNV estimator only use the observations with a propensity score in the [0,1] range.[22]

The propensity score is included as a regressor in the second stage model. The order of the propensity score is estimated flexibly as a series; a LOO cross-validation method determines the order of $k(\cdot)$.

[21] As in the biprobit and Heckman models, 2007 family income remains our exclusion restriction.

[22] The Heckman selection model uses a probit first stage; the assumptions of the probit model ensure linear predictions in the [0,1] range. However, the assumptions used in a probit model may not be correct. The cost of this model comes in the number of cases that we have to throw out (about 25 percent) that are not predicted to be in the [0,1] range

5. Results

Preliminary analysis of the 2007-09 SCF panel shows that households with student loan debt in 2007 were more likely to experience financial distress in 2009. About 13 percent of debt holders were late making payments and about 33 percent had been denied credit, compared to just 9 percent and 28 percent, respectively, of those without student loans (Table 2). Student loan holders also had higher payment to income ratios, and were more likely to have experienced foreclosure or bankruptcy. These simple correlations, though, cannot be said to imply a causal relationship. The fact that student loan holders experience higher incidence of financial hardship is arguably much more related to basic demographic factors. Those households who still have student loans are also younger households who have not established themselves professionally, and are more likely to experience financial distress (Table 3). Age is strongly correlated with student debt and financial distress, and there are a host of other factors that can reasonably explain the naïve link between student loans and distress.

The remainder of this paper uses a simple regression analysis framework (including linear probability models, probits, and several different selection models) to evaluate whether any correlation between student loans and financial distress persists once we account for additional variables reflecting demographics, employment situation, and household finances. We present results using these different estimators, and also using different financial distress measures as the dependent variable, for different age groups, and different ways of parameterizing education debt.

5A. OLS results

The most preliminary results without any covariates (Table 4, Panel A, columns 1, 4, and 7) reflect the previous statistics from Table 2 and show large and statistically significant increases in the probability of distress in 2009 for those with any student loan debt in 2007. Including a range of demographic factors (age, race, educational attainment, region of the country, urban status, industry, occupation, family type, health status, divorce status, and presence of kids) decrease the coefficients on both "late 60" and "denied". In the case of "late 60," the introduction of these covariates decreases the magnitude of the coefficient on debt from 0.0565 (column 1) to 0.0520 (column 2). Including additional covariates for the full set of employment

status and household finance variables (described above and shown in Appendix Table 1), further reduces the student debt coefficient (column 3) to 0.0420.

However, this estimate still implies that a family with education debt in 2007 is about four percentage points more likely to have been late on debt payments by 60 days in the year leading up to the 2009 interview. This estimate is large in the sense that 7.8 percent of families were 60 days late on debt payments in the 2009 interview.

The results are largely similar when financial distress is measured by being denied credit in the two years leading up to the 2009 interview. Including the demographics and household finance variables, the coefficient on having education-related debt (column 6) implies that having education debt increases a households chances of being denied credit (or fear being denied) about 3.6 percentage points in 2009. This estimate is smaller than the "late 60" distress measure, but still implies that families with education loans are 15 percent more likely to have been denied credit in 2009.[23]

In Panel B of Table 4, the dummy for presence of education debt is replaced by the dollar value (in thousands) and square of the balance of the family's education loans. Adding covariates to the regression models influences the estimates in a similar pattern to Panel A. Yet in both models we still expect the dollar value of education debt in 2007 to impact financial distress in 2009. These results are surprising if our prior beliefs were that observable characteristics were driving the Table 3 results.

The probabilities for experiencing financial distress – at different levels of debt – implied by these results are reflected in Figure 1**.** At $23,000 of education-related debt (mean debt among debt holders in 2007) the increased probability of being late paying bills is 2.9 percentage points, and the probability of being denied credit is 2.2 percentage points.

The impact of debt on the probability of being late on payments increases up through approximately $95,000 in debt (reaching about 7 percentage points), at which point it starts to fall and eventually turns negative at approximately $195,000 (not shown). Such high levels of student debt presumably reflect the situation of highly compensated doctors or other professionals; they have high levels of debt and are unlikely to experience financial distress, but

[23] Based on Table 2, about 23 percent of families were denied credit in 2009.

their education and occupational attributes are not adequately reflected in the regression covariates. The impact of debt on the probability of being denied credit increases across the entire range observed in the sample; the coefficient on the square of debt is negative but also very small.

5B. OLS results by Age and Type of Debt

5B.i. By Age

When the specifications including the full range of covariates (Columns 3 and 6 in Table 4, Panel B), are calculated separately by age group the signs on the key coefficient – positive on the level of debt (thousands of $2009) and negative on the square term – remain the same. The impact of student loans on being late paying bills is fairly consistent across age groups (Table 5, Columns 1-3). The coefficients themselves are not significantly different from zero, though this seems to be due to small sample sizes when we split the sample by age: the estimate in column 4, where ages are pooled, is of similar magnitude to columns 1 through 3, but the standard error is much smaller.[24]

The impact of student debt on being denied credit, by contrast, is somewhat larger for younger respondents (0.0020 for 20-39 year olds and 0.0066 for 40-49 year olds, compared to near zero for 50-59 year olds). Again, both are imprecisely estimated once we consider each age level and have smaller sample sizes. At the mean debt level ($23,000), the increased probability of being late paying bills for 20-59 year olds is 3.1 percentage points, and the increased probability of being denied credit is 3.0 percentage points.

5B.ii. Type of Debt

One obvious question about the correlation we observe between student debt and household financial distress is whether the type of debt matters. It seems plausible that we might observe all kinds of debt – ceteris paribus – being correlated with heightened financial distress during the Great Recession. In Table 6, we present the key coefficients from regressions using other types of debt instead of, and in addition to, education debt.

[24] Table 5 (panels A and B) and Table 6 both indicate that education debt is associated with measures of financial distress after conditioning on age and many other covariates. Alternate parameterizations of the problem (including bins of education debt interacted with age bins) yield a similar result. Results are not presented here for brevity but available upon request.

Using non-education installment debt instead of education debt (Panel A) and focusing on all ages (columns 4 and 8), we find no significant relationship between 2007 debt and 2009 financial distress.[25] Adding education debt in Panel B does not change the (nonexistent) relationship between distress and non-education installment debt from Panel A, nor does it change the economically significant relationship between distress and education debt from Table 6.

Credit card debt balances do not seem to have any predictable relationship with financial distress across the age groups, with the sign on debt level negative as often as it is positive (Panel C). When credit card debt, non-education installment debt, and education debt are all included (Panel D), the pattern of results remains. In two instances the coefficients for these other debts are larger than the education-debt coefficient (late60 for 20-39 year olds (Panel D, Column 1) and late60 for 30-39 year olds (Panel D, Column 2)). In most cases, however, the coefficients on education-related debt are larger. In addition, education-related debt is the only debt where the coefficients have a consistent sign and where half of the coefficients are consistently significantly different from zero.

5C. Transition models, probits, and selection-corrected regressions

Absent a valid control group for a quasi-experimental research design, the results of the regression analysis in this section should only be considered as suggestive. There are, however, some additional steps that we can take to further test the resilience of the correlation between education-related debt and financial distress that we observe. These include the application of selection-correction regressions, and transition probability models – commonly used in research on the dynamics of poverty and low-pay.

As discussed in the previous section, we follow the basic approach of the transition probability models and split our sample based on initial distress conditions of respondents in the panel, keeping only those without initial distress, and evaluating the factors associated with transitioning into distress. The focus on transitions to financial distress is natural for our purposes: relatively few households initially experienced distress, and we will be able to investigate whether student loans are associated with transitioning into distress **(**Table 7**)**.

[25] Non-education installment debt includes vehicle loans and other loans (which include, among others, medical loans, consumer loans, and loans from a family member).

If we assume no correlation between unobservables in the distress equations ($\rho_{vu} = 0$) then our transition model collapses to a regular probit. Thus, we first we consider the impact of selecting on not being in distress in 2007 by estimating simple LPM and probit models on the selected sample. The marginal effects from the probit models (Table 8, Panel A) are generally comparable to those from Table 5.[26]

However, the unobservables in the distress equations are likely to be correlated, and the bivariate probit, Heckman, and DNV model this correlation. The bivariate probit results, though, also suggest that education loans increase the probability of transitioning to financial distress in 2009.[27] The change in probability of late payments remains positive until balances are nearly $165,000 (not shown) and the increased probability of paying bills 60 days late is 2.6 percentage points at the mean balance of education loans.[28] The increased probability at the mean is large considering that 6.9 percent of households in our transition sample had a late payment in 2009. The increase in probability of transitioning to credit denial is smaller (2.1 percentage points at the mean, while the mean of credit denial is about 21 percent in 2009 in our transition analysis sample) and the coefficient estimate is not different from zero at conventional significance levels. The estimated correlation of the unobservables in the distress equations (ρ_{vu}) is negative and significantly different from zero at conventional levels.

Heckman two-step selection model results show a similar result (Panel C). The change in probability of late payments is positive (an increase in 2.9 percentage points) at the mean balance, though the change in probability of credit denial is nearly zero at the mean and not different from zero at conventional significance levels.

The semiparametric model (Panel D) indicates a larger impact of education loans on transitions to financial distress (7.7 percentage points at the mean), though again the change in probability of credit denial is nearly zero at the mean and not different from zero at conventional

[26] Note that we use a smaller subset of variables for the probit and biprobit regressions (panels A and B in Table 9) due to convergence issues.
[27] We use the Stata biprobit postestimation prediction of being in distress in 2009, conditional on not being in distress in 2007 (where distress is measured as late payments and denial of credit).
[28] The increased probability at the mean is 4.6 percentage points if we restrict analysis to families with a 20 to 59 year old head of household.

significance levels. This estimate is very large, as 8.5 percent of households in our DNV-estimator transition sample had a late payment in 2009.[29]

5D. Education loans, income growth, and degree completion in the SCF panel

Higher levels of education are correlated with higher levels of earnings in the labor market, regardless of how the higher education was financed (Avery and Turner, 2012). In the SCF panel we can look at income growth between 2007 and 2009 for families with education loans and those without (table 9). Families with education loans saw income grow by about $7,200 more, on average, than families without education loans.[30] This pattern is true across all age groups.

The SCF panel also highlights the importance of completing a degree when financing post-secondary education. Among families with education loans, the mean income growth was small if the family had not completed a degree (less than a thousand dollars, and not different from zero at traditional significance levels) while it was nearly $11,000 if a member of the family had completed a college degree.

Further, our basic results on financial distress from table 4 differ across families that have no post-secondary degree and those that do (table 10). Families with education loans but no completed degree are much more likely to have late payments on bills and be denied credit than are families with education loans that completed a college degree.

6. Summary and Discussion

Households with education-related debt were more likely to have been late paying bills, be denied credit, and have high payment to income ratios in 2009. And, except for households with very large balances, having more education debt was also correlated with higher probability of experiencing financial distress. Including a range of additional demographic, work-status, and household balance sheet measures diminishes the strength of the correlation, but does not eliminate it. Having an average amount of education debt also increases the probability that a family transitioned to being late on debt payments. The results for being denied credit, though,

[29] As noted earlier, the DNV estimator only uses first-stage pscores in the [0,1] range and does not constrain propensity scores to be in the [0,1] range (as probit or logit first-stage estimators do). Accordingly, our analysis sample with this estimator is different (smaller) from Panels A, B and C in Table 9.

[30] Unconditionally, SCF families without education loans saw a mean decrease in income between 2007 and 2009 while families with education loans saw an increase.

are sensitive to including households also experiencing distress in 2007. When those households are excluded, the transition probability models suggest that education-related debt has only a weak and not statistically significant correlation.

These results suggest that households with greater levels of education-related debt were more likely to experience financial distress in the 2009 economic downturn, compared to otherwise equivalent households. Families with education loans but no completed degree are much more likely to experience distress than are families with education loans that completed a college degree. These findings are limited by their focus on relatively narrow and short-term measures of financial distress. They are also suggestive, at best, as the counterfactual they rely on ignores the impact of education debt on boosting attainment levels. And the SCF panel also shows positive earnings results for families with education loans.

These results are also unexpected in the sense that student loans can be deferred when the borrower experiences some types of financial adversity, thus lessening the repayment hardship. Further, the 2007-09 SCF panel is representative of the 2007 non-institutional population. Thus, our work has little to say about the degree of hardship faced by more recent college graduates.

This comparison does, however, give a sense of some potential benefits of great reliance on non-loan financial aid. Our findings suggest that greater use of grants, in place of loans, would reduce some measures of financial distress during recessionary periods. We do not develop any estimates of the costs of grants relative to loans, however, so we cannot make any comment on the net gains of this sort of reform. In addition, our findings could also be seen as suggestive of the potential benefits of income-based repayment plans for student loans, which have become increasingly common in recent years.

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Figure 1. Impact of Education Debt on Household Financial Distress in 2009, by Debt Level and Distress Measure

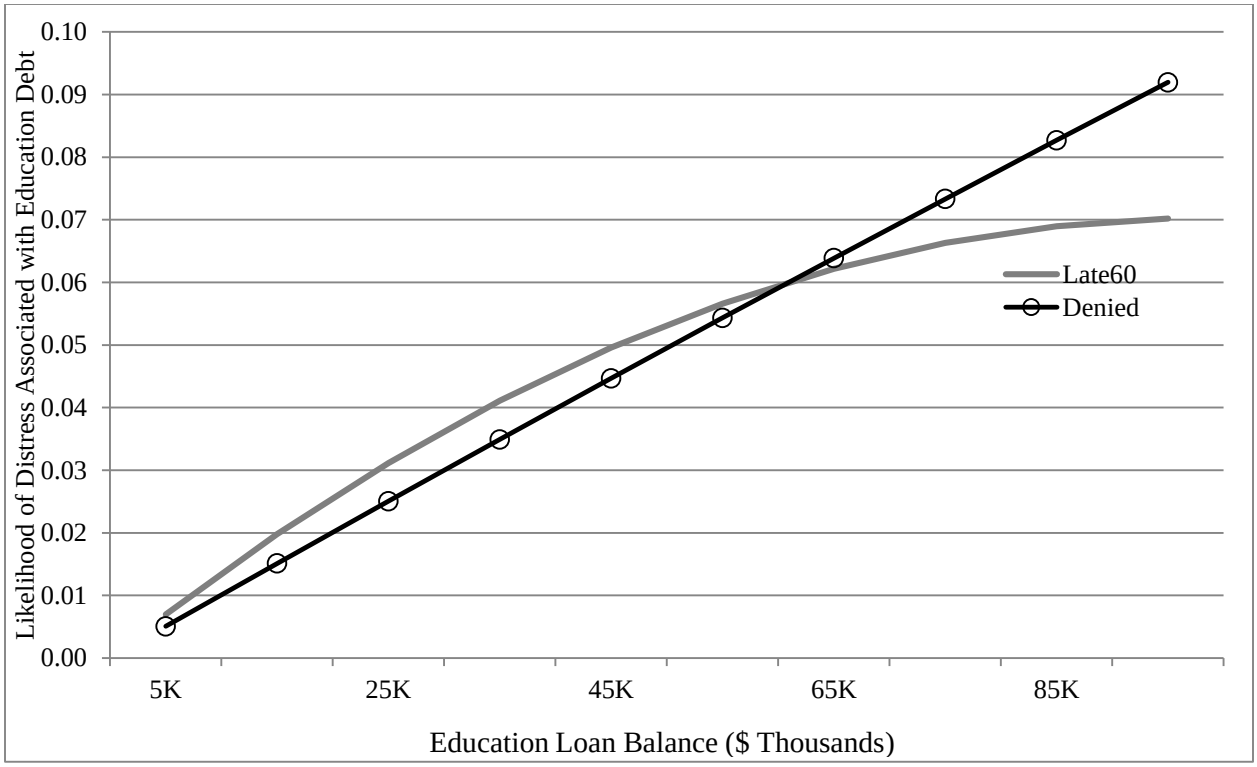

Table 1. Trends in Education Debt in the Survey of Consumer Finances

	1989	1992	1995	1998	2001	2004	2007	2010
Total Educational Debt ($Billions)	$76	$109	$133	$202	$210	$291	$398	$578
Percent of Families With Education Debt	9%	11%	12%	11%	12%	13%	15%	19%
Mean Education Debt ($2010)	$9,100	$10,700	$11,300	$17,300	$16,800	$19,200	$22,500	$25,600
Education Debt to Income Ratio[1] (1. Among debt-holding families with employed head age 24 and older with income >= $10,000)	12.3%	18.9%	17.5%	22.7%	19.6%	23.9%	26.1%	31.6%
Share of Families With Education Debt in Each Debt Size Class ($2010)								
Less than $10,000	74%	72%	68%	53%	53%	49%	42%	41%
$10,000 to $25,000	20%	21%	21%	27%	28%	29%	27%	30%
$25,000 or More	6%	6%	11%	20%	19%	22%	30%	30%
Total	100%	100%	100%	100%	100%	100%	100%	100%
Share of Total Education Debt Outstanding in Each Debt Size Class ($2010)								
Less than $10,000	31%	26%	23%	13%	13%	12%	9%	8%
$10,000 to $25,000	33%	32%	28%	26%	27%	25%	20%	18%
$25,000 or More	36%	42%	50%	61%	60%	63%	72%	74%
Total	100%	100%	100%	100%	100%	100%	100%	100%

Source: 1989-2010 SCF.

Table 2. Incidence of Financial Distress in 2009 by Student Loan Status

	Payment Late 60 Days or More	Denied Credit or Feared Denial	High Payments to Income Ratio	Moved due to Foreclosure	Bankruptcy during 2007-09
Education Loan Balance in 2007?					
No	6.9	21.2	10.4	1	1.9
Yes	12.6	32.4	15.3	1.7	2.8
Total	7.8	23.1	11.2	1.1	2

Note: All SCF families. Moved due to foreclosure reflects homeowners in 2007 who no longer owned or resided in their home due to foreclosure.

Table 3. Incidence of Distress and Presence of Education Loans by Age

	Distress in 2009			Share with any Student Loan in
Age in 2007	Late 60	Denied	High PIR	2007
<35	10.9	37.5	12.6	35.7
35-44	12.4	33.7	12.8	15.7
45-54	9.3	21.5	12.1	14.8
55-59	4.8	16.4	12.0	14.2
60+	2.0	7.1	7.8	3.0

Note: SCF panel families.

Table 4. Key Coefficients from LPM for Education Debt, by Financial Distress Measure

	Late 60			Denied			High PIR		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A: Binary Education Loan Measure									
Any Ed. Debt	0.0565	0.0520	0.0420	0.1120	0.0545	0.0365	0.0486	0.0473	0.0377
	(0.0141)	(0.0152)	(0.1557)	(0.0183)	(0.0189)	(0.0188)	(0.0130)	(0.0128)	(0.0131)
Obs	3,862	3,862	3,862	3,862	3,862	3,862	3,862	3,862	3,862
R2	0.01	0.06	0.09	0.01	0.14	0.16	0	0.03	0.05
Panel B: Education Debt in Level and Square									
Ed. Debt ($K)	0.0018	0.0018	0.0014	0.0029	0.0016	0.0010	0.0017	0.0018	0.0013
	(0.0007)	(0.0007)	(0.0007)	(0.0009)	(0.0009)	(0.0009)	(0.0009)	(0.0009)	(0.0009)
Ed. Debt ($K)^2	-0.000010	-0.000009	-0.000007	-0.000012	-0.000003	0.000000	0.000002	0.000002	0.000002
	(0.000005)	(0.000005)	(0.000004)	(0.000007)	(0.000008)	(0.000007)	(0.000008)	(0.000008)	(0.000008)
Obs	3,862	3,862	3,862	3,862	3,862	3,862	3,862	3,862	3,862
R2	0	0.06	0.07	0	0.14	0.16	0.01	0.03	0.06
Controls:	Yes	No	No	Yes	No	No	Yes	No	No
Demographic	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
HHD Finance	No	No	Yes	No	No	Yes	No	No	Yes

Standard errors in (). Standard errors incorporate both variance due to multiple imputation of SCF data and variance due to sampling mechanism. Variance due to sampling is calculated using 999 bootstrap replicate weights.

Table 5. Debt and Distress, by Distress Measure and Age Group

	Late				Denied				HighPIR			
	20-39	40-49	50-59	20-59 (all)	20-39	40-49	50-59	20-59 (all)	20-39	40-49	50-59	20-59 (all)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Ed. Debt ($K)	0.0015	0.0017	0.0018	0.0015	0.0020	0.0066	0.0002	0.0014	0.0008	0.0017	0.0004	0.0015
	(0.0009)	(0.0029)	(0.0015)	(0.0007)	(0.0012)	(0.0043)	(0.0021)	(0.0009)	(0.0011)	(0.0036)	(0.0015)	(0.0008)
Ed. Debt ($K)^2	-0.00001	-0.00002	-0.00001	-0.00001	-0.00001	-0.00006	0.00001	0.00000	0.00001	0.00002	0.00000	0.00000
	(0.00001)	(0.00004)	(0.00001)	(0.00000)	(0.00001)	(0.00010)	(0.00002)	(0.00001)	(0.00001)	(0.00006)	(0.00002)	(0.00001)
Obs	911	841	904	2,656	911	841	904	2,656	911	841	904	2,656
R2	0.10	0.11	0.08	0.08	0.10	0.10	0.08	0.07	0.10	0.10	0.08	0.07
Controls:												
Demographic	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
HHD Finance	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Standard errors in (). Standard errors incorporate both variance due to multiple imputation of SCF data and variance due to sampling mechanism. Variance due to sampling is calculated using 999 bootstrap replicate weights.

Table 6. Debt and Distress, by Distress Measure, Type of Loan and Age Group

	Late				Denied				HighPIR			
	20-39	40-49	50-59	20-59 (all)	20-39	40-49	50-59	20-59 (all)	20-39	40-49	50-59	20-59 (all)
	Panel A: Non-education installment loans											
Other Install	-0.0019	0.0002	0.0001	-0.0001	-0.0027	0.0008	0.0005	0.0003	0.0040	0.0011	0.0000	0.0008
Loans ($K)	(0.0016)	(0.0007)	(0.0003)	(0.0003)	(0.0023)	(0.0010)	(0.0007)	(0.0004)	(0.0015)	(0.0012)	(0.0005)	(0.0005)
Other Install	0.000005	0.000000	0.000000	0.000000	0.000019	0.000000	0.000000	0.000000	-0.000020	0.000000	0.000000	0.000000
Loans ($K)^2	(0.000014)	(0.000005)	(0.000000)	(0.000000)	(0.000027)	(0.000003)	(0.000000)	(0.000000)	(0.000017)	(0.000002)	(0.000000)	(0.000000)
	Panel B: Credit Card Debt											
Credit Cards	-0.0011	0.0027	-0.0016	0.0009	-0.0003	0.0024	-0.0007	0.0011	0.0094	0.0034	0.0018	0.0056
($K)	(0.0025)	(0.0025)	(0.0013)	(0.0011)	(0.0033)	(0.0026)	(0.0028)	(0.0014)	(0.0042)	(0.0020)	(0.0026)	(0.0013)
Credit	0.000045	0.000005	0.000011	0.000000	0.000037	-0.000008	0.000077	0.000032	-0.000066	-0.000017	0.000037	-0.000019
Cards ($K)^2	(0.000055)	(0.000045)	(0.000020)	(0.000014)	(0.000078)	(0.000049)	(0.000031)	(0.000021)	(0.000102)	(0.000027)	(0.000029)	(0.000016)

Table 6, continued

Panel C: Education Loans, Other Installment Debt, and Credit Cards

Ed. Debt	0.0015	0.0016	0.0020	0.0014	0.0021	0.0064	-0.0006	0.0012	0.0003	0.0014	-0.0005	0.0012
($K)	(0.0009)	(0.0030)	(0.0015)	(0.0007)	(0.0012)	(0.0043)	(0.0021)	(0.0009)	(0.0011)	(0.0035)	(0.0015)	(0.0008)
Ed. Debt	-0.000010	-0.000026	-0.000008	-0.000009	-0.000007	-0.000056	0.000013	-0.000003	0.000009	0.000022	0.000000	0.000002
($K)^2	(0.000007)	(0.000047)	(0.000013)	(0.000005)	(0.000010)	(0.000095)	(0.000021)	(0.000007)	(0.000008)	(0.000060)	(0.000014)	(0.000007)
Other Install	-0.0020	0.0001	0.0001	-0.0001	-0.0028	0.0006	0.0004	0.0003	0.0038	0.0009	0.0000	0.0007
Loans ($K)	(0.0016)	(0.0007)	(0.0003)	(0.0002)	(0.0023)	(0.0009)	(0.0006)	(0.0003)	(0.0015)	(0.0011)	(0.0005)	(0.0004)
Other Install	0.000006	0.000000	0.000000	0.000000	0.000020	0.000000	0.000000	0.000000	-0.000019	0.000000	0.000000	0.000000
Loans ($K)^2	(0.000014)	(0.000005)	(0.000000)	(0.000000)	(0.000028)	(0.000004)	(0.000000)	(0.000000)	(0.000015)	(0.000002)	(0.000000)	(0.000000)
Credit Cards	-0.0011	0.0027	-0.0016	0.0007	-0.0006	0.0018	-0.0003	0.0009	0.0086	0.0028	0.0016	0.0053
($K)	(0.0025)	(0.0026)	(0.0014)	(0.0011)	(0.0034)	(0.0026)	(0.0028)	(0.0015)	(0.0040)	(0.0019)	(0.0027)	(0.0013)
Credit Cards	0.000043	0.000005	0.000009	0.000001	0.000040	-0.000004	0.000073	0.000033	-0.000054	-0.000014	0.000039	-0.000018
($K)^2	(0.000056)	(0.000046)	(0.000021)	(0.000014)	(0.000081)	(0.000048)	(0.000031)	(0.000021)	(0.000094)	(0.000027)	(0.000029)	(0.000016)
Obs.	911	841	904	2,656	911	841	904	2,656	911	841	904	2,656
R2	0.10	0.11	0.08	0.08	0.10	0.10	0.08	0.07	0.10	0.10	0.08	0.07
Controls:												
Demographic	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
HHD Finance	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Standard errors in (). Standard errors incorporate both variance due to multiple imputation of SCF data and variance due to sampling mechanism. Variance due to sampling is calculated using 999 bootstrap replicate weights.

Table 7: Distress Transition Matrices

Panel A: Late 60

		2009	
		No Distress	Distress
2007	No Distress	0.877	0.065
	Distress	0.045	0.014

Panel B: Denied Credit

		2009	
		No Distress	Distress
2007	No Distress	0.679	0.104
	Distress	0.090	0.127

Panel C: High PIR

		2009	
		No Distress	Distress
2007	No Distress	0.819	0.064
	Distress	0.069	0.048

Source: 2007-09 SCF panel.

Table 8. Key Coefficients from Transition Probability Models, by Age and Distress Measure

	Late 60		Denied		High PIR	
Variable	All Ages	20-59	All Ages	20-59	All Ages	20-59
Panel A: Probit						
Ed. Debt ($K)	0.0013	0.0026	-0.0003	-0.0001	0.0013	0.0015
	(0.0008)	(0.0011)	(0.0007)	(0.0009)	(0.0006)	(0.0007)
Ed. Debt ($K)^2	-0.000009	-0.000025	0.000005	0.000004	-0.000006	-0.000007
	(0.000011)	(0.000015)	(0.000006)	(0.000008)	(0.000005)	(0.000006)
Panel B: Bivariate probit						
Ed. Debt ($K)	0.0013	0.0026	-0.0006	-0.0007	0.0014	0.0016
	(0.0008)	(0.0010)	(0.0007)	(0.0009)	(0.0007)	(0.0007)
Ed. Debt ($K)^2	-0.000008	-0.000025	0.000010	0.000015	-0.000002	-0.000003
	(0.000011)	(0.000014)	(0.000007)	(0.000009)	(0.000005)	(0.000006)
Panel C: Heckman						
Ed. Debt ($K)	0.0014	0.0015	-0.0010	0.0001	0.0013	0.0013
	(0.0006)	(0.0007)	(0.0009)	(0.0011)	(0.0007)	(0.0008)
Ed. Debt ($K)^2	-0.000006	-0.000008	0.000012	0.000010	0.000001	0.000001
	(0.000004)	(0.000004)	(0.000006)	(0.000007)	(0.000005)	(0.000005)
Panel D: Das, Newey, Vella						
Ed. Debt ($K)	0.0049	0.0085	-0.0013	-0.0013	-0.0009	-0.0010
	(0.0013)	(0.0020)	(0.0014)	(0.0014)	(0.0009)	(0.0009)
Ed. Debt ($K)^2	-0.000034	-0.000062	0.000017	0.000017	-0.000004	-0.000005
	(0.000012)	(0.000015)	(0.000011)	(0.000011)	(0.000007)	(0.000007)
Power of k(·)	1st	1st	5th	5th	4th	4th
Controls:						
Demographic	Yes	Yes	Yes	Yes	Yes	Yes
HH Finance	Yes	Yes	Yes	Yes	Yes	Yes

Standard errors in (). Standard errors incorporate both variance due to multiple imputation of SCF data and variance due to sampling mechanism. Variance due to sampling is calculated using 999 bootstrap replicate weights.

Table 9. Income change among families with education loans, by degree and age

	Income change 2007-09					
	All	by age			by degree	
	families	age <40	40 to 49	50 to 59	Degree holders	No degree
Have Ed.	7179	3035	4949	14434	10836	930
Debt	(2447)	(2511)	(5714)	(8368)	(4504)	(2695)
Obs	3,862	915	841	904	2,187	1,675
R2	0.003	0.001	0.004	0.01	0.002	0.005

Standard errors in (). Standard errors incorporate both variance due to multiple imputation of SCF data and variance due to sampling mechanism. Variance due to sampling is calculated using 999 bootstrap replicate weights. Regressors as in column (2) of Table 5, excluding degree dummies.

Table 10. Distress among education loan holders, by degree

	Distress by degree			
	Late payments		Denied credit	
	Degree holders	No degree	Degree holders	No degree
Have Ed.	0.036	0.075	0.050	0.101
Debt	(0.016)	(0.025)	(0.021)	(0.030)
Obs	2,187	1,675	2,187	1,675
R2	0.07	0.06		
Controls:				
Demographic	Yes	Yes	Yes	Yes

Standard errors in (). Standard errors incorporate both variance due to multiple imputation of SCF data and variance due to sampling mechanism. Variance due to sampling is calculated using 999 bootstrap replicate weights. Regressors as in column (2) of Table 5, excluding degree dummies.

Appendix Table 1. Summary Statistics

	Mean	St. Dev.		Mean	St. Dev.
Denied Credit 2007	0.17	0.38	Occupation Group		
Denied Credit 2009	0.12	0.33	managerial/professional	0.29	0.45
Late60 2007	0.06	0.23	technical/sales/services	0.22	0.41
Late60 2009	0.08	0.27	production, labor, farm, fish	0.21	0.41
High PIR 2007	0.12	0.32	not working	0.28	0.45
High PIR 2009	0.11	0.32	Rural	0.17	0.37
Education Debt 2007 ($)	3,713	14,539	Health Status		
Education Debt 2009 ($)	4,545	17,119	Excellent	0.27	0.44
Age-Groups			Good	0.49	0.50
<35	0.22	0.41	Fair	0.19	0.39
35 to 44	0.20	0.40	Poor	0.05	0.23
45 to 54	0.21	0.41	Family Structure		
55 to 64	0.17	0.38	not married/LWP + kids	0.13	0.33
65 and over	0.20	0.31	not marr./LWP + no kids + <55	0.14	0.34
Race			not marr./LWP + no kids + 55+	0.14	0.35
White Non-Hispanic	0.74	0.44	married/LWP+ kids	0.33	0.47
Black/African American	0.13	0.34	married/LWP + no kids	0.27	0.44
Hispanic	0.09	0.29	Recent Divorce?	0.08	0.28
Other	0.04	0.16	Female	0.27	0.45
Educational Attainment			Industry Group		
No degree	0.13	0.33	const., man.	0.18	0.38
HS degree	0.32	0.47	Transp/comm/util, whole, FIRE	0.15	0.35
Some College, No Degree	0.19	0.39	Ag., retail, svcs., pub admin	0.39	0.49
Associate's Degree	0.06	0.24	not working	0.28	0.45
BA	0.18	0.39	Number of kids	0.86	1.17
MA/MS	0.06	0.24	Have other installment debt?	0.42	0.49
PhD,MD,DDS,JD,MBA	0.06	0.23	Negative Shock in 2007	0.14	0.35
Other health-related	0.004	0.06	Negative Shock in 2009	0.20	0.40
Region			"High" income type	0.23	0.42
Northeast	0.18	0.39	Unemployment spell in 2007	0.15	0.36
Midwest	0.23	0.42	Unemployment spell in 2009	0.21	0.41
South	0.37	0.48	Income Change (‘07 to ‘09)	-8,392	385,087
West	0.22	0.41	Networth Change (‘07 to ‘09)	-114,840	2,695,779
Work Status			Income ($) in 2007	89,212	423,987
work for someone else	0.61	0.49	Saver Status in 2007	0.56	0.50
self-employed/partnership	0.11	0.31	Own any stocks in 2007	0.54	0.50
Retire/disab./stud.home.	0.24	0.42	Home Equity Change (2007-‘09)	-30,980	182,909
NILF	0.05	0.21	Debt ($) in 2007	102,549	240,769