The Impacts of the Affordable Care Act Dependent Coverage Provision on College Graduates with Student Loan Debt

[Job-Market Paper]

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Abstract

The Affordable Care Act (ACA) dependent coverage provision, implemented in 2010, requires private insurers to allow dependents to stay on parental policies until age 26. Using data from the PSID, we show that the take-up of the provision was higher among college graduates with more student loan debt. For a college graduate who is unable to benefit from the provision, we estimate that $10,000 in student loan debt is associated with a 3.1% decrease in the likelihood of having insurance and a 1.8% increase in the likelihood of skipping treatment in times of illness. On the other hand, our difference-in-difference analysis suggests that the likelihood of having insurance would increase 5.1% more after 2010 if that college graduate was eligible for the provision. Using data from the College Scorecard, we show that at the school level, a higher average eligibility for the provision led to a decrease in student loan default rate and an increase in student loan repayment rate after 2010.

JEL Classifications: I13, I18, I22
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1 Introduction

The cost of higher education has been rising rapidly in the past decades, and so has the size of student loan borrowing. For a college graduate[1] with student loan debt, the loan repayment obligation may cause significant liquidity constraint that distorts many life decisions.[2] One of the many decisions that could potentially be affected is whether to enroll in a health insurance plan. The cost of enrolling in a health insurance plan may outweigh the benefit for a young adult without affordable health insurance options. In particular, for a college graduate with student loan debt and limited repayment ability, the opportunity cost of receiving health insurance coverage may be even higher if a choice has to be made between making student loan payments and purchasing a health insurance plan. A recent survey finds that when presented such a hypothetical choice, 75% of college students with student loan debt in the sample chose the former over the latter.[3] The distortion of health insurance decisions caused by the student loan debt, if it exists, may leave college graduates uncovered in times of illness and result in large medical bills and even medical debt.[4] Following the health capital framework by Grossman (1972), the distortion can also be detrimental in the long run since lack of insurance may cause reduced health care utilization and underinvestment in health capital, leading to a higher health expenditure in the future.[5]

The Affordable Care Act (ACA) dependent coverage provision, implemented in September 2010, requires insurers to allow dependents to remain on a parental private health insur-

[1] Throughtout this paper, we define a college graduate as an individual who received a bachelor's degree.

[2] Unlike other consumer liabilities such as credit card debt, student loan debt cannot be discharged in bankruptcy and must be repaid.

[3] See the response to Question 12 on Page 6 of http://news.ehealthinsurance.com/_ir/68/20125/eHealthInsurance_2012_Grads_and_Students_Survey_-_Topline_Results.pdf. The survey is named "the College Students and Grads Survey" and was conducted by eHealth in Apr 2012.

[4] See Collins et al. (2012).

[5] In the direction of the health capital framework, Fang and Gavazza (2007) find that employees in industries with high turnover rates were much less likely to be offered health insurance through work and had higher medical expenditure after retirement.

ance plan until age 26. For dependents below age 26 who have at least one parent insured under a private plan, this mandate may drastically decrease the cost of receiving health insurance. Since most college students graduate before age 25, a significant portion of college graduates may be able to benefit from the provision. Given the high percentage of student loan debtors among college graduates[6] and the potential distortion of health insurance decisions caused by student loan debt, it is possible that the provision delivered important benefits to college graduates with student loan debt that should be seriously considered in policy evaluations.

To examine whether the potential distortion of health-related decisions exists among college graduates with student loan debt in the absence of the provision, we first document some trends and patterns based on data from the National Longitudinal Survey of Youth (NLSY97), in which the majority of the sample were unable to benefit from the provision due to the age restriction.[7] We find that a larger amount of student loan debt is associated with a lower likelihood of having insurance and that the relationship is even stronger for the college graduates who were surveyed for the first few times after graduation. For those surveyed for the first time after graduation, a $10,000 increase in student loan debt is associated with a 3.1% decrease in the likelihood of having insurance.[8] Therefore, given that most of them graduate before age 25 and the provision allows anyone below age 26 to join a private parental insurance plan, the provision has the potential to offer timely help to many college graduates with student loan debt. We also find evidence suggesting distortion of health care utilization decisions among college graduates with student loan debt in the sample. We

[6]For example, among undergraduate students ages 18 to 24 in their 4th (senior) year or above in 2011, 67.7% of them were student loan borrowers. The number is available from Column 9 in http://nces.ed.gov/programs/digest/d14/tables/dt14_331.95.asp.

[7]Around 95% of the sample were aged 26 or above as of Sept 2010 and thus too old to be eligible for the provision. We drop the few individuals in the sample who were were eligible for the provision for the purpose of our analysis.

[8]Throughout this paper, an x% decrease/increase represents a decrease/increase of x percentage points.

find that a $10,000 increase in student loan debt is associated with a 1.8% increase in the likelihood of skipping treatment in times of illness. Moreover, relative to a college graduate fully covered by health insurance in the past 12 months, a college graduate that was never insured in the past 12 months is 4.3% less likely to have health routine checks in the past 12 months given a student loan debt of $10,000.

We then estimate the impact of the provision on the likelihood of having insurance among college graduates with student loan debt in a difference-in-difference model by exploring the variation in eligibility for the provision among this population before and after 2010. Based on data from the Panel Survey of Income Dynamics (PSID),[9] we find that given a fixed student loan debt amount of $10,000, the likelihood of having health insurance increased by 5.1 percentage points more after 2010 for a college graduate eligible for the provision. We also find that among college graduates eligible for the provision after 2010, a $10,000 increase in student loan debt is associated with a 3.4% increase in the likelihood of joining a parental health insurance policy.

Given the well-documented relationship between health insurance and health care utilization in the literature,[10] there is hope that the provision can help alleviate the distortion of health care utilization decisions for debt-burdened college graduates eligible for the provision, decreasing their future health risks and expenditures that may negatively affect student loan repayment. Also, by insuring debt-burdened college graduates and protecting them from financial hardships in the event of adverse health shocks, the provision may further contribute to better student loan repayment performance among those who are eligible. Based on data from the College Scorecard, we explore the variation in percentages of college graduates in

[9]The main data elements we use are from the transition to adulthood (TAS) supplement of the PSID.

[10]For example, Anderson, Dobkin, and Gross (2012) show that lack of insurance reduced health care usage among young adults.

the eligible age range for the provision between schools and find that after 2010, the percentage became a negative predictor for cohort default rate and a positive predictor for cohort repayment rate. Since a dependent needs to be below age 26 and have a parent enrolled in a private insurance plan to be eligible for the provision, we also explore the variation in state-level private insurance coverage rates. Assuming that most students go to colleges in their own states,[11] we examine whether since 2010, the percentage of college graduates in the eligible age range for the provision became a relatively stronger predictor for student loan repayment among schools in states located in the top quartile of the private insurance coverage rate distribution. We find that given a 10% increase in percentage of college graduates in the eligible age range for the provision, the cohort repayment rate increased 0.87% more in the post-provision period for schools in a state in the top (versus bottom) quartile of the private insurance coverage rate distribution.

2 Background

2.1 Student Loan Debt and Its Impacts on College Graduates

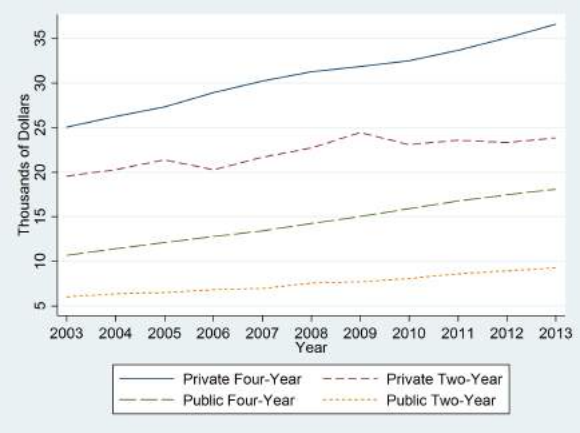
As shown in Figure 1, both college cost and student loan borrowing have been increasing steadily in the recent years. Noticeably, Figure 1b shows the trend of outstanding balance of student loan debt relative to other consumer debts (excluding mortgages) and suggests that student loans, which had been the smallest form of consumer debt until 2009, became the second highest form of consumer debt behind mortgages in 2010 thanks to its steady growth in the recent years. There are different types of student loans depending on whether the federal government is involved in the lending process; and if so, whether the funds

[11] For example, among all first-time degree/certificate-seeking undergraduates in degree-granting postsecondary institutions in Fall 2012, 82% of them were in-state students. The number is available from Column 6 in http://nces.ed.gov/programs/digest/d13/tables/dt13_309.10.asp.

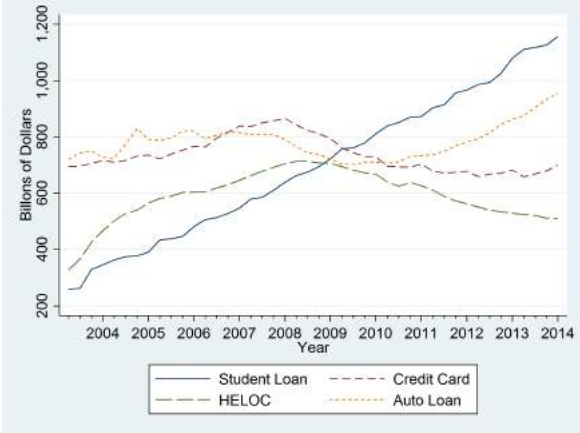
come directly from the federal government and whether the loans are subsidized.[12] In most cases, student loan repayment starts 2 to 6 months after graduation for college graduates.[13] Therefore, for those fresh out of college, the imminent loan repayment obligations may lead to liquidity constraints that distort many important life decisions.

Figure 1: The Trends of College Cost and Student Loan Borrowing, by Year

(a) The Trend of College Cost



(b) The Trend of Student Loan Borrowing



Notes: Figure 1a plots college cost by year and college type. College cost is defined as the sum of average total tuition, fees, room and board rates charged for an average full-time undergraduate student in a degree-granting institution. The figure is based on the official data on available from http://nces.ed.gov/fastfacts/display.asp?id=76. Figure 1b plots the balances of four major types of non-mortgage consumer debt including student loan debt by quarters. The numbers on the horizontal axis of Figure 1b represent the fourth quarter of each year. HELOC refers to home equity line of credit. The figure is based on the data made available by Federal Reserve Bank of New York Consumer Credit Panel/Equifax. The data is downloadable from https://www.newyorkfed.org/microeconomics/data.html.

Some studies have documented the effects of student loan debt on college graduates' life decisions. Chambers (1992) studies the career choices of law school graduates and finds that

[12]The funds come directly from the federal government in the Direct Loan program (which includes Stafford and PLUS loans). When a federal loan is subsidized, the federal government pays the interest while borrowers are enrolled at least half-time; during a six-month grace period; or during authorized periods of deferment. See http://federalstudentaid.ed.gov/site/front2back/programs/programs/fb_03_01_0010.htm for a detailed explanation for different types of federal student loans.

[13]Direct Subsidized Loans, Direct Unsubsidized Loans, Subsidized Federal Stafford Loans, and Unsubsidized Federal Stafford Loans have a 6-month grace period between the graduation date and the first repayment date. In the case of PLUS loans, repayment begins 60 days after the full amount of the loan is disbursed. See https://studentaid.ed.gov/sa/repay-loans/understand#when-begin.

those with higher amounts of student loan debt are more likely to take jobs in large private law firms instead of public service jobs. Minicozzi (2005) estimates the effect of student loan debt on the wage growth of college graduates and finds that higher student loan debt is associated with higher initial wage rate the year after finishing school and lower wage growth over the next 4 years. Rothstein and Rouse (2007) find that student loan debt causes college graduates to choose substantially higher-salary jobs and reduces the probability of choosing low-paid "public interest" jobs, which is best explained by the credit constrains young workers experience. Among studies of young adults' housing decisions, Shand (2008) finds that student loan debt is associated with reduced homeownership rates, and Dettling and Hsu (2014) find that an increase in average loan balances increases the likelihood of co-residing with a parent. To our best knowledge, none of the studies examined the potential distortions of health-related decisions among college graduates with student loan debt.

2.2 The ACA Dependent Coverage Provision

The ACA dependent coverage provision, implemented on September 23, 2010, requires private insurers to allow the dependents to remain on parental health insurance policies until age 26. Previously, private insurers often dropped non-student dependents at age 19 and student dependents at age 24, although some states implemented mandates prior to 2010 making it possible for a dependent resident to remain insured under a parental policy until a later age.

Several recent studies have examined the impacts of the provision on health insurance enrollment, health care utilization and labor market outcomes. Cantor et al. (2012) show that provision led to a rapid and substantial increase in the share of young adults joining parental plans and a decrease in the share of uninsured young adults in the early months of implementation. Sommers et al. (2013) show that the provision increased health insurance

coverage for young adults and decreased the number of young adults who delayed getting care and those who did not receive needed care because of cost. Akosa Antwi et al. (2013) find evidence of a high take-up of the provision, which resulted in substantial reductions in uninsurance and other forms of coverage and an increase in labor market flexibility in the form of reduced work hours. Akosa Antwi et al. (2014) show that the provision increased young adults utilization of inpatient care related to mental health and that eligible young adults increased inpatient visits by 3.5 percent.

2.3 Literature on the Relationship between Health Insurance and Financial Well-Being

Several recent studies have examined the relationship between health insurance and financial well-being by exploring various health policy changes that made health insurance more accessible to certain population. Gross and Notowidigdo (2011) explore cross-state variation in Medicaid expansions from 1992 to 2004 and find that a 10% increase in Medicaid eligibility reduces personal bankruptcy rate by 8.4%. Mazumder and Miller (2015) find the health care reform in Massachusetts in 2006 improved credit scores and reduced personal bankruptcies, the total amount of debt that was past due, as well as the fraction of all debt that was past due. Finkelstein et al. (2011) explore exogenous variation on health insurance gains from the Oregon Medicaid lottery[14] and find that the treatment group (lottery winners) had lower medical debt and fewer bills sent to third-party collection agencies. Hu et al. (2016) find that the recent state-level Medicaid coverage expansions made possible by the Affordable Care Act significantly reduced the number of unpaid bills and the amount of debt sent to third-party collection agencies.

[14] In 2008, a group of uninsured low-income adults in Oregon was selected by lottery to be given Medicaid eligibility.

However, few work has been done to examine the implication of health insurance on the financial well-being of young adults. Based on the results of a survey conducted on young adults between ages 19 and 29 in 2011, Collins et al. (2012) present a troubling picture of the uninsured population in the sample: 60% of them reported not getting needed health care because of cost, while 50% of them reported problems paying medical bills or said they were paying off medical debt over time. Therefore, we expect that the ACA dependent coverage provision, by providing an affordable health insurance option for those who are eligible, can lead to better financial outcomes for young adults, especially college graduates under student loan repayment obligations. We examine whether the provision contributed to better student loan repayment performance among eligible college graduates in Section 5.

3 Relationship between Student Loan Debt and Health-Related Outcomes: Trends and Patterns

Our analysis focuses on the impacts of the ACA dependent coverage provision on college graduates with student loan debt because the benefits provided by the provision may be particularly important for them. Our hypothesis is that, in the absence of the provision, the liquidity constraint caused by the student loan repayment obligation may force college graduates to go uninsured, leading to reduction in health care utilization and other negative outcomes. In this section, we examine the hypothesis and show the trends and patterns of the relationship between student loan debt and health-related outcomes for those who cannot benefit from the provision.

3.1 Data and Summary Statistics

To examine the hypothesis, we base our analysis on data from the National Longitudinal Survey of Youth (NLSY97). Initiated in 1997, the NLSY97 surveys almost annually a nationally representative sample of 8,984 young people, including an oversample of 2,236 black and Latino youth.[15] Noticeably, almost no one in the sample would be able to take advantage of the provision because of the age restriction, thus allowing us to study the relationship between student loan debt and health-related outcomes in the absence of the provision.[16] The NLSY97 data contain important variables such as student loan owed at the time of college graduation[17], health insurance enrollment status, occupation, income, etc.

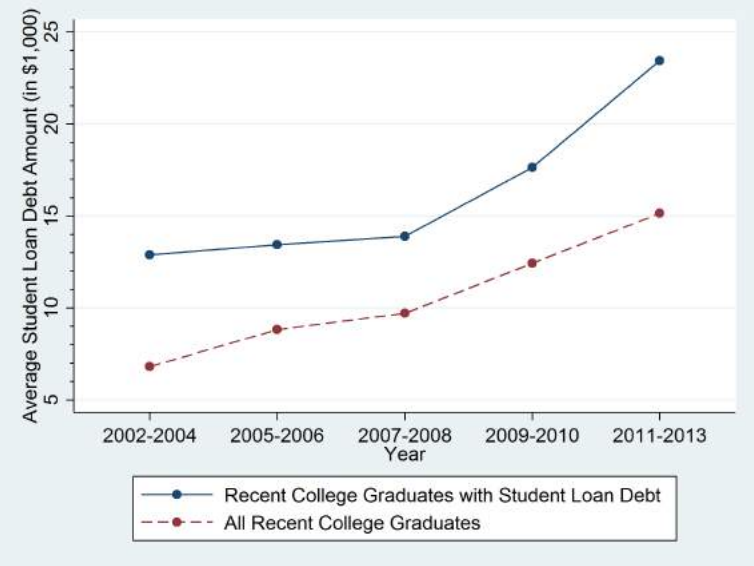
Given the panel structure of the NLSY97 sample, a college graduate may be observed for multiple times since graduation. We define "recent college graduates" in our sample as the college graduates who were observed for the first time since graduation and present the time trend of average amount of student loan debt owed by recent college graduates in Figure 2. A noticeable pattern in Figure 2 is that the average amount of student loan debt owed has been steadily increasing in the recent years for both college graduates and those who were student loan borrowers only, which is consistent with the trend in Figure 1b. We also present in Table 1 the means of the key variables for recent college graduates by health insurance status and whether or not the amount of student loan debt is positive. The comparison between Column 3 and Column 6 of Table 1 suggests that the college graduates who had student loan debt and those who did not were not too different in terms of some key characteristics such as

[15]The NLSY97 surveys have been conducted every year between 1997 and 2013 except 2012.

[16]Since the NLSY97 cohort were between ages 12 and 16 on Dec 31, 1996, they were between ages 26 and 30 on Dec 31, 2010, the end of the year when the ACA dependent coverage provision was implemented. We drop the few individuals in the sample who were a few months younger than 26 when the provision was implemented (Sept 23, 2010).

[17]Information is available regarding the amount of student loan debt owed for each term. To calculate the student loan owed at the time of college graduation, we add up the student loan owed for each term toward a bachelor's degree for each college graduate in the sample.

Figure 2: The Trends of Average Amount of Student Loan Debt Owed by Recent College Graduates, by Year



Notes: Figure plots average amount of student loan debt owed by recent college graduates by year. Given that a college graduate may be observed for multiple times since graduation, we restrict the sample to the first observation since graduation for each college graduate and define the graduates in the sample as "recent college graduates". The data of multiple years are combined when averaging student loan debt amounts so that the trends are less affected by fluctuations caused by sample size limitations.

mean annual income and composition by gender, race, employment status, etc. In addition, the comparison between Column 1 (4) and Column 2 (5) shows that similar patterns exist for both the college graduates who had student loan debt and those who did not: relative to the insured population, the uninsured population were made of higher percentages of black and hispanic college graduates and lower percentages of married, employed college graduates, and those who were offered employer sponsored insurance (ESI).[18] Table 1 also suggests that compared with insured college graduates, the uninsured college graduates on average owed larger amounts of student loan debt. In terms of health care utilization, the

[18]One difference that stands out particularly is that compared with insured college graduates, a much lower percentage of uninsured college graduates were offered ESI (17.4% versus 67.8% for college graduates with no student loan debt, and 21.5% versus 76.2% for college graduates with positive amounts of student loan debt). This suggests that ESI availability may have played an important role in college graduates' health insurance enrollment outcomes.

Table 1: Summary Statistics on the National Longitudinal Survey of Youth (NLSY97) Sample

	Observations of:					
	Recent College Graduates with No Student Loan Debt			Recent College Graduates with Student Loan Debt		
	Uninsured	Insured	Total	Uninsured	Insured	Total
Debt Amount	0.0	0.0	0.0	17.0	14.4	14.9
Annual Income	11.0	15.6	15.0	12.2	16.7	15.9
Pct Had Checkup	51.0%	59.3%	56.9%	46.9%	58.7%	53.8%
Pct Skipped Treatment	42.9%	40.9%	41.5%	47.7%	48.5%	48.1%
Pct Male	41.3%	47.5%	46.6%	46.7%	41.0%	42.0%
Pct Married	10.9%	16.3%	15.5%	8.4%	20.2%	18.1%
Pct Black	19.6%	9.5%	10.9%	25.2%	19.6%	20.6%
Pct Hispanic	26.1%	8.5%	10.9%	15.0%	11.9%	12.5%
Pct Employed	71.7%	88.8%	86.5%	70.1%	93.3%	89.2%
Pct Offered ESI	17.4%	67.8%	61.0%	21.5%	76.2%	66.4%
Pct in School	10.9%	18.3%	17.3%	18.7%	17.0%	17.3%
N Observations	46	295	341	107	495	602

Notes: Reported values are the means of key variables for recent college graduates with no student loan debt (columns 1-3) and recent college graduates with student loan debt (columns 4-6). Since a college graduate may be observed for multiple times since graduation, the summary statistics on the "recent college graduates" are calculated by restricting the sample to the first observation since graduation for each college graduate. Variables "Debt Amount" and "Annual Income" are measured in $1,000s, and "Debt Amount" refers to the student loan debt amount owed at the time of college graduation and does not vary with time. "Uninsured" and "Insured" refer to the health insurance enrollment status at the time of survey in the calculation of conditional means of key variables except "Pct Had Checkup" and "Pct Missed Treatment". For "Pct Had Checkup" and "Pct Missed Treatment", which capture health care utilization information in the 12 months prior to the survey, "Uninsured" refers to no or partial health insurance coverage in the past 12 months, and "Insured" refers to full health insurance coverage in the past 12 months.

comparison of Column 3 and Column 6 suggests that relative to college graduates who did not have student loan debt, a lower percentage of college graduates with student loan debt had routine checkups while a higher percentage of them skipped treatment in times of illness in the past 12 months. In addition, the comparison between Column 1 (4) and Column 2 (5) shows that a higher percentage of insured college graduates had routine checkups in the past 12 months, suggesting that health insurance availability may also have played a role in college graduates' utilization of certain health care services.

3.2 Relationship between Student Loan Debt and Health Insurance Enrollment

The purpose of this section is to examine the hypothesis that a larger amount of student loan debt is associated with a lower likelihood of having health insurance. Although the evidence from unconditional summary statistics in Table 1 is consistent with the hypothesis, it is only based on the sample of recent college graduates who were surveyed for the first time since graduation. Also, the evidence may potentially confound the effects of interest with heterogeneity in other factors such as income, gender, race, etc. To account for this, we estimate the following fixed effects model using the full sample of college graduates:

$$Ins_{it} = \alpha DebtAmt_i + \beta X_{it} + \gamma Z_i + p_t + \epsilon_{it} \tag{1}$$

where Ins_{it} is a binary variable indicating whether individual i had insurance at the time of survey in year t, $DebtAmt_i$ is the total amount of student loan debt individual i owed at the time of college graduation, X_{it} includes annual income and indicators for marital status, parental status, student status, ESI availability, as well as indicators for region, occupation, levels of self-reported health, and the number of survey since college graduation,[19] Z_i includes binary indicators for male, black, hispanic, as well as levels of self-reported risk aversion regarding health, and p_t is a vector of year fixed effects. If college graduates with higher amounts of student loan debt are less likely to receive health insurance coverage, we would expect α to be negative.

Column 1 of Table 2 presents the results of the model and suggests that a $10,000 increase in student loan debt is associated with a 0.9% decrease in the likelihood of having

[19] We use the term "number of survey since college graduation" instead of "year since college graduation" because NLSY97 is not strictly an annual survey and the survey date might not have been fixed each year for a given respondent.

Table 2: The Relationship between Student Loan Debt Amount and Likelihood of Having Health Insurance for College Graduates

Dependent Variable:	Have Health Insurance			
	(1)	(2)	(3)	(4)
Debt Amount	-0.0009***	-0.0031***	-0.0021**	-0.0004
	(0.0003)	(0.0009)	(0.0009)	(0.0008)
Survey(s) since College Graduation	All	First	Second	Third
Pct of Predicted Value between 0 and 1	90.0%	81.7%	90.6%	86.3%
Mean Dep. Var.	0.9013	0.8377	0.8841	0.8838
N Observations	8,177	906	1,035	1,050
N Clusters	1,666	906	1,035	1,050
Adj. R Sq.	0.2457	0.2501	0.2023	0.2062

Notes: Estimates are from linear fixed effects regressions and all models include year effects and other controls represented by X_{it} and Z_i from Equation 1. Student loan debt amount is measured in $1,000s. The observations are based on individual-year units and the sample is made of all college graduates in column 1, and college graduates surveyed for the first, second, and third time since college graduation in columns 2-4. Standard errors are heteroskedasticity-robust and clustered by individual. * indicates significance at the 0.10 level, ** indicates significance at the 0.05 level, *** indicates significance at the 0.01 level.

insurance. To examine whether the relationship between student loan debt amount and the likelihood of having insurance is stronger for college graduates who graduated more recently, we estimate the same model on restricted samples made of college graduates surveyed for the first, second, and third time since graduation respectively. The estimated coefficients in Columns 2-4 suggest that an increase in student loan debt is associated with the bigger decrease in the likelihood of having insurance for more recent college graduates. For example, a $10,000 increase in student loan debt is associated with a 3.1% decrease in the likelihood of having insurance for college graduates surveyed for the first time since graduation. However, the same amount of increase in student loan debt is only associated with a 0.4% decrease in the likelihood of having insurance for college graduates surveyed for the third time since graduation, and the result is no longer significant. This suggests that college graduates' insurance enrollment decisions might be more affected by student loan debt for those who graduated 1-2 years ago. Since most college students graduate before age 25 and the provision

allows anyone below age 26 to join a private parental insurance plan, the provision could be a powerful and timely tool for college graduates with student loan debt to receive health insurance.

3.3 Relationship between Student Loan Debt and Health Care Utilization

We show in the previous section that a larger amount of student loan debt is associated with a lower likelihood of having health insurance. Given the relationship between health insurance and health care usage recorded in the existing literature[20] and the evidence from unconditional summary statistics in Table 1, it is possible that a larger amount of student loan debt is also associated with a lower likelihood of utilizing certain health care services. In this section, we examine the hypothesis and estimate the following fixed effects model using the full sample of college graduates in NLSY97:

$$HadCheckup_{it} = \alpha DebtAmt_i + \beta X_{it} + \gamma Z_i + p_t + \epsilon_{it} \tag{2}$$

$$SkippedTreatment_{it} = \theta DebtAmt_i + \delta X_{it} + \lambda Z_i + p_t + \epsilon_{it} \tag{3}$$

where $HadCheckup_{it}$ and $SkippedTreatment_{it}$ are binary variables indicating whether individual i had any routine health checkup or skipped any doctor visit in times of illness in the 12 months prior to the survey in year t, $DebtAmt_i$ is the total amount of student loan debt individual i owed at the time of college graduation, X_{it} includes annual income and indicators for marital status, employment status, student status, health insurance enrollment

[20] For example, Anderson, Dobkin, and Gross (2012) show that lack of insurance reduced health care usage among young adults.

status,[21] as well as indicators for region, levels of self-reported health, the number of survey since graduation, Z_i includes binary indicators for male, black, hispanic, as well as levels of self-reported risk aversion regarding health, and p_t is a vector of year fixed effects. If college graduates with higher amounts of student loan debt are less likely to utilize routine health checkup and more likely to skip treatment in times of illness, we would expect α to be negative and θ to be positive.

Table 3: The Relationship between Student Loan Debt Amount and Likelihood of Utilizing Certain Health Care Services for College Graduates

Dependent Variables:	Had Checkup in the Past 12 Months		Skipped Treatment in the Past 12 Months	
	(1)	(2)	(3)	(4)
Debt Amount	0.0005	0.0012**	0.0018**	0.0016*
	(0.0006)	(0.0006)	(0.0008)	(0.0009)
Debt Amount*Never Insured		-0.0043***		-0.0001
		(0.0016)		(0.0028)
Debt Amount*Partially Insured		-0.0018		0.0012
		(0.0011)		(0.0018)
Pct of Predicted Value between 0 and 1	88.6%	47.0%	84.4%	55.7%
Mean Dep. Var.	0.6030	0.6030	0.4598	0.4598
N Observations	9,066	9,066	4,021	4,021
N Clusters	1,710	1,710	1,361	1,361
Adj. R Sq.	0.1668	0.1676	0.0378	0.0375

Notes: Estimates are from linear fixed effects regressions and all models include year effects and other controls represented by X_{it} and Z_i from Equation 2/Equation 3. Student loan debt amount is measured in \$1,000s. The observations are based on individual-year units and the sample includes all college graduates. There are fewer observations in columns 3-4 because fewer observations exist for outcome variable $SkippedTreatment$. "Never Insured" is a binary variable indicating whether individual i never had any health insurance in the 12 months prior to the survey in year t, and "Partially Insured" is a binary variable indicating whether individual i was only partially insured in the 12 months prior to the survey in year t. Standard errors are heteroskedasticity-robust and clustered by individual. * indicates significance at the 0.10 level, ** indicates significance at the 0.05 level, *** indicates significance at the 0.01 level.

Columns 1 and 3 of Table 3 present the results of the model and suggest that a \$10,000

[21]The health insurance enrollment status refers to the enrollment status in the 12 months prior to the survey in year t. Specifically, there are three types of health insurance enrollment status: a) never insured in the past 12 months ; b) partially insured in the past 12 months; c) fully insured in the past 12 months.

increase in student loan debt is associated with a 1.8% increase in the likelihood of skipping treatment in times of illness and no significant change in the likelihood of having checkup in the past 12 months. To examine the relationship between student loan debt and health care utilization among college graduates with different health insurance enrollment statuses, we estimate a similar model with two additional terms that interact student loan debt amounts with binary variables "Never Insured" and "Partially Insured" respectively. "Never Insured" indicates whether individual i never had any health insurance in the 12 months prior to the survey in year t, and "Partially Insured" indicates whether individual i was only partially insured in the 12 months prior to the survey in year t. The estimated coefficients of the interaction terms in Columns 2 and 4 suggest that compared with a college graduate fully covered by health insurance in the past 12 months, a college graduate that was never insured in the past 12 months is 4.3% less likely to have health routine checks in the past 12 months when the amount of student loan debt increases by $10,000. On the other hand, the extent by which the likelihood of skipping treatment in the past 12 months responds to the amount of student loan debt does not change significantly when a college graduate goes from fully insured to uninsured.[22]

4 Did the ACA Dependent Coverage Provision Help Debt-Burdened College Graduates Receive Health Insurance?

The suggestive evidence from the previous section shows that a higher amount student loan debt is associated with a lower probability of having health insurance and lower utilization of certain basic health care services. Although we make no attempt to draw any causal

[22] A possible explanation for this is that the cost of routine checkup is relatively more sensitive to health insurance enrollment status.

conclusions, the patterns of the correlations between student loan debt amount and health-related outcomes are consistent with the existing literature on the impacts of student loan debt on college graduates. If the ACA provision helped more debt-burdened college graduates receive health insurance, we would expect changes to the patterns right after 2010 among college graduates who were eligible for the provision relative to those who were not. In this section, we perform an individual-level analysis to test this hypothesis and examine how college graduates with student loan debt responded to the provision.

4.1 Data and Summary Statistics

The dataset we use for the individual-level analysis is the Panel Survey of Income Dynamics (PSID) data. The PSID is based on a sample of around 3000 nationally representative households and around 2000 low-income families, which were first interviewed in 1968. The members of these households have been surveyed annually or biannually since then. People who entered an existing household or left a household to start a new one are also tracked. Therefore, it is possible to identify "kid-parent" pairs and link the parental income and private health insurance enrollment status information to the information of the kids.

To study the kids in the sample who are college graduates, we base our analysis on the Transition to Adulthood Supplement (TAS) of the PSID. As a follow-on to the PSID Child Development Supplement (CDS), the TAS interviews were launched in 2005 when the oldest CDS respondents reached age 18, and have subsequently been conducted in 2007, 2009, 2011, and 2013.[23] The TAS sample is nationally representative,[24] and is the only sample in the PSID data containing information of student loan amount in the pre- and post-provision periods. The TAS also collects detailed information of health insurance type,[25] thus allow-

[23] See McGonagle and Sastry (2015) for a detailed discussion of the CDS and TAS studies.

[24] The only exception is that immigrants arriving after 1997 are not fully represented.

[25] For example, if an individual answered "private health insurance" or "employer sponsored health insur-

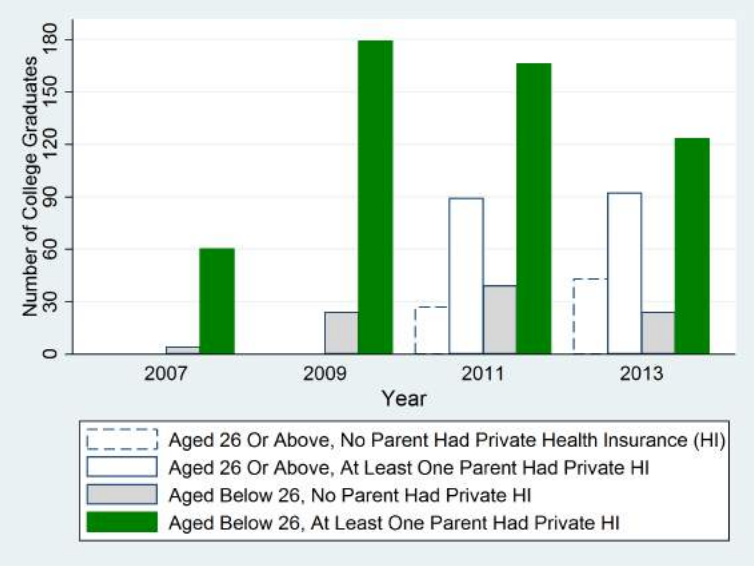
ing us to determine whether a dependent was insured under a parental health insurance plan.

Since being below age 26 and having a parent enrolled in a private insurance plan are the two prerequisites for being eligible for the provision, we show in Figure 3 the decomposition of college graduates in the four most recent surveys by whether the two eligibility requirements were satisfied. As suggested by Figure 3, the TAS sample are younger than the NLSY sample: no one in the TAS sample was aged 26 or above in the pre-provision period; and even in the post-provision period, the age restriction did not prevent the majority of the sample from taking advantage of the provision. Given the two dimensions of ineligibility (parental private health insurance status and dependent's age relative to 26) and the lack of variation in the age dimension in the pre-provision period, we restrict the sample to college graduates below age 26 to compare the outcome of the eligible and ineligible population in the pre- and post-provision periods.

Table 4 presents the summary statistics on the TAS sample restricted to college graduates below age 26, for whom the only reason of being ineligible for the provision is not having any parent insured under a private health insurance plan. Specifically, it shows the means of the key variables for college graduates who were/were not eligible for the provision in the pre- and post-provision periods, as well as college graduates who joined/did not join a parental health insurance plan among those who were eligible in the post-provision period. Table 4 suggests that compared with the pre-provision period, the percentage of insured college graduates increased among those who were eligible and decreased among those who were ineligible. This is consistent with our hypothesis that the provision helped the eligible population receive health insurance. Also, compared with the pre-provision period, the amount of student loan debt increased in the post-provision period among college graduates

ance" in an interview during the post-provision period, a subsequent question would be asked about whether the policy holder was a parent.

Figure 3: The Number of College Graduates Who Were Eligible/Ineligible for the Provision, by Year



Notes: Figure plots the number of college graduates who were eligible/ineligible for the provision by year. Since a college graduate needs to be below age 26 and have a parent enrolled in a private insurance plan to be eligible for the provision, we further divide college graduates who were ineligible for the provision by reason of ineligibility: a) aged 26 or above and did not have a parent with private health insurance; b) had at least one parent with private health insurance but aged 26 or above; c) aged below 26 but did not have a parent with private health insurance.

both eligible and ineligible for the provision, which is consistent with the trend in Figure 1b. Another noticeable pattern in Table 4 is that among college graduates eligible for the provision in the post-provision period, those who joined parental health insurance policies on average owed more than twice as much student loan debt compared with those who did not. This suggests that the amount of student loan debt owed may have played a role in college graduates' decisions to join a parental health insurance plan.

Table 4: Summary Statistics on the Transition to Adulthood Supplement (TAS) Sample

	Before 2010		After 2010		After 2010	
	College Graduates Not Eligible for the Provision	College Graduates Eligible for the Provision	College Graduates Not Eligible for the Provision	College Graduates Eligible for the Provision	Among College Graduates Eligible for the Provision: Joined A Parental Health Insurance Plan?	
					Yes	No
Pct Insured	17.9%	31.4%	14.3%	56.7%	100.0%	24.7%
Debt Amount	16.7	18.3	17.2	20.6	29.1	14.4
Annual Income	3.9	6.7	3.0	4.1	4.8	3.6
Pct Male	35.7%	34.3%	33.3%	39.8%	42.3%	38.0%
Pct Married	17.9%	12.6%	20.6%	16.6%	5.7%	24.7%
Pct Black	53.6%	20.9%	27.0%	17.6%	17.9%	17.5%
Pct Hispanic	17.9%	1.7%	14.3%	2.8%	3.3%	2.4%
Pct Unemployed	10.7%	10.9%	9.5%	6.2%	8.1%	4.8%
Pct Offered ESI	21.4%	25.5%	12.7%	18.0%	15.4%	19.9%
Pct in School	25.0%	19.7%	22.2%	26.6%	35.0%	20.5%
N Observations	28	239	63	289	123	166

Notes: Reported values are the means of key variables for college graduates observed before 2010 (columns 1-2), and college graduates observed after 2010 (columns 4-6). Variables "Debt Amount" and "Annual Income" are measured in $1,000s, and "Debt Amount" refers to the student loan debt amount owed at the time of the survey. The sample is restricted to college graduates below age 26, for whom the only cause of being ineligible for the provision is not having any parent insured under a private plan.

4.2 Does Having More Student Loan Debt Increase the Likelihood of Enrolling in a Parental Health Insurance Plan?

The main purpose of this section is to examine the hypothesis that among college graduates who are eligible for the provision, those with more student loan debt are more likely to join a parental health insurance plan in the post-provision period. Although the evidence from unconditional summary statistics in Table 4 is consistent with the hypothesis, it may potentially confound the effects of interest with heterogeneity in income, gender, race, etc. To account for this, we estimate the following model using the sample of college graduates

that were eligible for the provision after 2010:

$$JoinParentalPlan_{it} = \alpha DebtAmt_{it} + \beta X_{it} + \gamma Z_i + p_t + \epsilon_{it} \tag{4}$$

where $JoinParentalPlan_{it}$ is a binary variable indicating whether individual i joined a parental health insurance plan in year t, $DebtAmt_{it}$ is the total amount of student loan debt individual i owed in year t, X_{it} includes annual income, annual parental income, and indicators for state, age, unemployment status, marital status, student status, employer sponsored insurance (ESI) availability, as well as whether the individual was living with parent(s), Z_i includes indicators for male, black, and hispanic, and p_t is a vector of year fixed effects. If college graduates with more student loan debt are more likely to join a parental health insurance plan, we would expect α to be significantly positive.

Table 5: The Impact of Student Loan Debt on Decision to Join A Parental Health Insurance Plan

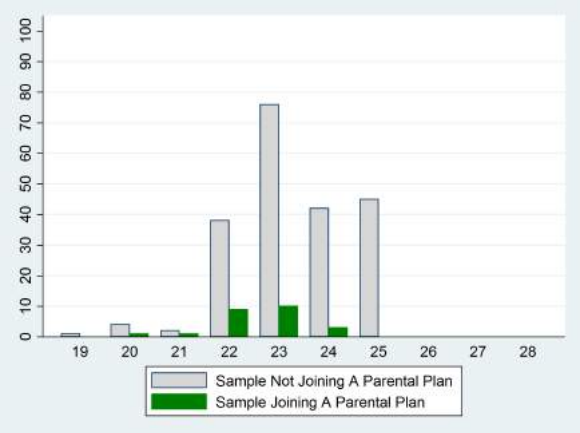
Dependent Variable:	Join Parental Plan	
	(1)	(2)
Debt Amount	0.0034***	0.0030***
	(0.0009)	(0.0009)
Debt Amount*Unemployed		0.0140***
		(0.0053)
Pct of Predicted Value between 0 and 1	91.2%	90.5%
Mean Dep. Var.	0.4170	0.4170
N Observations	283	283
N Clusters	237	237
Adj. R Sq.	0.1709	0.1885

Notes: Estimates are from linear fixed effects regressions and both models include state effects, age effects, year effects, and other control variables represented by X_{it} and Z_i from Equation 4. Student loan debt amount is measured in $1,000s. The observations are based on individual-year units and the sample includes college graduates who were eligible for the provision after 2010. Standard errors are heteroskedasticity-robust and clustered by individual. * indicates significance at the 0.10 level, ** indicates significance at the 0.05 level, *** indicates significance at the 0.01 level.

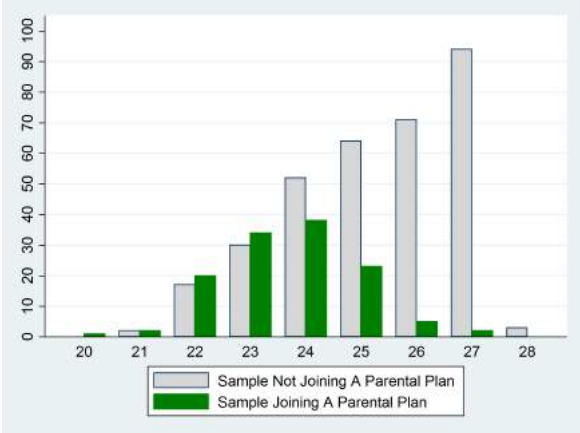
Column 1 of Table 5 presents the result of the model and suggests that a $\$10,000$ increase in student loan debt would increase the likelihood of joining a parental policy by 3.4 percentage points. To examine the impact of student loan debt on the likelihood of joining a parental insurance plan among unemployed (versus employed) college graduates, we estimate a similar model with an additional term that interacts student loan debt amounts with an indicator for unemployment status. The estimated coefficient of the interaction term in Column 2 suggests that compared with an employed college graduate, an unemployed college graduate is 14.0% more likely to enroll in a parental health insurance plan when the amount of student loan debt increases by $\$10,000$.

Figure 4: The Number of College Graduates Who Joined/Did Not Join A Parental Health Insurance Plan Before and After 2010, by Age

(a) Before 2010



(b) After 2010



Notes: Figure plots the number of college graduates who joined a parental health insurance plan and those who did not in the pre- and post-provision periods by age. The sample includes all college graduates who had at least one parent enrolled in a private health insurance plan.

Complementing the evidence that the option of receiving health insurance through a parental plan was used more heavily by college graduates with higher amounts of student loan debt in the post-provision period, we show patterns in Figure 4 suggesting that this option

was largely made available by the ACA dependent provision. Based on a restricted sample made of college graduates with at least one parent insured under a private plan, Figure 4 presents the number of college graduates who joined a parental health insurance plan and those who did not in the pre- and post-provision periods by age. The comparison of Figure 4a and Figure 4b suggests that relative to the post-provision period, fewer college graduates were insured under a parental plan in the pre-provision period, in terms of both numbers and percentages. Also, Figure 4b shows a drastic decrease in the percentage of college graduates enrolled under a parental plan at age 26, which is exactly where the provision's age restriction is set.[26]

4.3 Did Being Eligible for the Provision Increase the Likelihood of Having Health Insurance after 2010?

We show in the previous section that for a college graduate who had at least one parent insured under a private plan, the amount of student loan debt factored into the decision of whether or not to be added to a parental plan in the post-provision period. However, this additional channel for receiving health insurance would not exist if a college graduate did not have any parent insured under a private plan. Therefore, we expect that conditional on the amount of student loan debt, the likelihood of having health insurance increased disproportionately among college graduates who had at least one parent insured under a private plan after 2010. To exclude the ineligibility in the age dimension,[27] we restrict the

[26]The few dependents insured under a parental policy before 2010 and those who were insured under a parental policy after turning 26 in the post-provision period may be explained by state-level mandates and choices of private insurers. Some state-level mandates were implemented prior to 2010 making it possible for a dependent resident to remain insured under a parental policy until a certain age. For a few states, the age thresholds are greater than 26. For example, the state of Ohio "allows an unmarried, dependent child that is an Ohio resident or a full-time student to remain on parent's insurance up to age 28, or without regard to age if they are incapable of self-sustaining employment due to disability". Besides, a private insurer may voluntarily cover a dependent older than 26 under a parental plan although it is not required by the provision.

[27]We exclude the ineligibility in the age dimension because: a) as shown in Figure 3, everyone was below 26 in the pre-provision period in our sample; b) as suggested by Figure 4b, some dependents might still be

sample to college graduates below age 26 and test the hypothesis by estimating the following difference-in-difference model:

$$\begin{aligned} Ins_{it} &= \alpha DebtAmt_{it} + \beta Eligible_{it} + \gamma DebtAmt_{it} * Eligible_{it} + \theta DebtAmt_{it} * Post2010_t \\ &+ \delta Eligible_{it} * Post2010_t + \lambda DebtAmt_{it} * Eligible_{it} * Post2010_t + \phi X_{it} + \mu Z_i \\ &+ p_t + \epsilon_{it} \end{aligned} \tag{5}$$

where Ins_{it} is a binary variable indicating whether individual i had health insurance in year t, $DebtAmt_{it}$ is the total amount of student loan debt individual i owed in year t, $Eligible_{it}$ is a binary variable indicating whether individual i had at least one parent insured under a private plan in year t, $Post2010_t$ is a binary post-2010 indicator, X_{it} includes annual income and indicators for state, age, unemployment status, marital status, student status, employer sponsored insurance (ESI) availability, as well as different categories for self-reported health, Z_i includes indicators for male, black, and hispanic, and p_t is a vector of year fixed effects. If compared with college graduates ineligible for the provision, those who were eligible for the provision became more likely to be insured conditional on the student loan debt amount after 2010, we would expect λ to be significantly positive.

Table 6 presents the results of the model and suggests that given a fixed student loan debt amount of $\$10,000$, the likelihood of having health insurance would increase by 5.1 percentage points more after 2010 if that a college graduate is eligible (versus ineligible) for the provision. Based on the same model, Figure 5a presents the difference made by being eligible for the provision in the pre- and post-provision periods at different student loan debt levels. It suggests that "being eligible" had a much greater impact on the likelihood of having health insurance in the post-provision period, and that the magnitude of the impact

eligible to join a parental health insurance plan due to state-level mandates and choices of private insurers.

Table 6: The Change of Marginal Effect of Student Loan Debt on the Likelihood of Having Health Insurance Among Eligible College Graduates after 2010

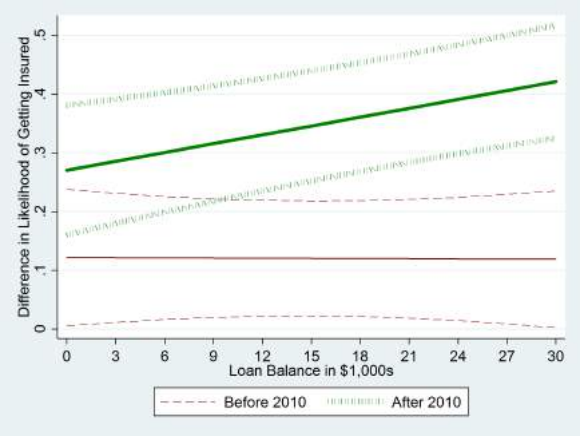
Dependent Variable:	Have Health Insurance
Debt Amount	-0.0000
	(0.0021)
Eligible	0.1214**
	(0.0594)
Debt Amount*Eligible	-0.0001
	(0.0022)
Debt Amount*Post 2010	-0.0015
	(0.0024)
Eligible*Post 2010	0.1490*
	(0.0777)
Debt Amount*Eligible*Post 2010	0.0051**
	(0.0025)
Pct of Predicted Value between 0 and 1	81.3%
Mean Dep. Var.	0.4087
N Observations	619
N Clusters	433
Adj. R Sq.	0.5173

Notes: Estimates are from linear fixed effects regressions and the model includes state effects, age effects, year effects, and other control variables represented by X_{it} and Z_i from Equation 5. Student loan debt amount is measured in $1,000s. The observations are based on individual-year units and the sample includes college graduates who were below age 26. Therefore, the only cause of being ineligible for the provision is not having any parent insured under a private plan. Standard errors are heteroskedasticity-robust and clustered by individual. * indicates significance at the 0.10 level, ** indicates significance at the 0.05 level, *** indicates significance at the 0.01 level.

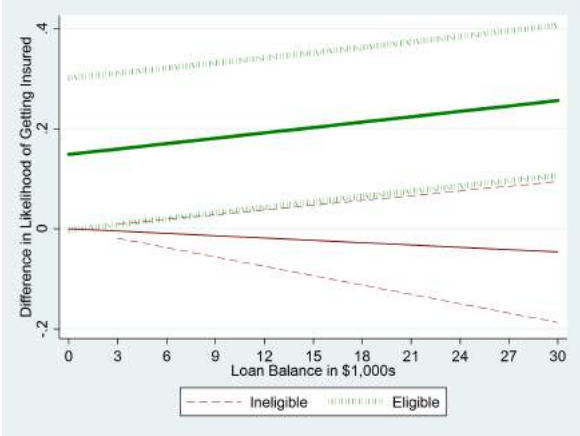
increases with the amount of student loan debt. Figure 5b presents change of the likelihood of having health insurance after 2010 for the ineligible and eligible population at different student loan debt levels. It suggests that the likelihood of having health insurance only increased for the eligible population after 2010, and the magnitude of the change was greater for college graduates with more student loan debt.

Figure 5: The Contrast of Point Estimates, by Eligibility and Time

(a) Eligible Compared to Ineligible



(b) Post 2010 Compared to Pre 2010



Notes: Figure 5a presents the differences in point estimates of Ins_{it} in Equation 5 for eligible college graduates relative to ineligible college graduates before and after 2010, at different student loan levels. Figure 5b presents the differences in point estimates of Ins_{it} for post-provision period relative to pre-provision period among eligible and ineligible college graduates, at different student loan levels. Both figures are based on a difference-in-difference model (Equation 5) in which observations are college graduates who were below age 26. This implies that not having any parent insured under a private plan is the only cause for being ineligible for the provision in our sample.

5 Did the ACA Dependent Coverage Provision Improve Student Loan Repayment?

The findings of recent literature, such as Collins et al. (2012), suggest that the lack of health insurance is associated with problems of medical bill payment and medical debt accumulation. We show in the previous section that since 2010, being eligible for the provision would increase the likelihood of having health insurance conditional on the amount of student loan debt. Therefore, there is hope that the provision, by helping more debt-burdened college graduates receive health insurance, can contribute to better student loan repayment performance among those who are eligible for the provision. In this section, we perform a school-level analysis to test this hypothesis.

5.1 Data and Summary Statistics

The main dataset we use for the school-level analysis is the College Scorecard data. The College Scorecard data provide information for the performance of institutions that receive federal financial aid dollars, as well as the characteristics and outcomes of the students from those institutions. In the data, the observations are on the school-cohort level. For each entering cohort of a given school, the data contain information such as the median SAT score, the median family income, the mean earnings 6 to 10 years after college enrollment, and the percentage of students under age 20 at the time of college enrollment; for each graduating cohort of a given school, the data contains information such as the percentage of graduates by gender and race, the percentage of graduates by major, the median student loan debt amount, and student loan default and repayment rates.[28] To link the information of the entering cohort to the information of the graduating cohort, we assume it takes five academic years to receive a bachelor's degree (or equivalent).[29] Throughout our discussion, we restrict the sample to four-year colleges.

The two key outcome variables in our analysis are the two-year cohort default rate (CDR2) and the two-year cohort repayment rate (CRR2). CDR2 was calculated annually to capture the student loan repayment on the school-cohort level and used as an institutional accountability metric until 2011 when it was replaced by the three-year cohort default rate. For example, CDR2 of an institution in fiscal year[30] (FY) 2010 measures among the cohort who used federal financial aid while attending the institution and entered repayment during FY 2010, the percentage of borrowers who defaulted by the end of the following fiscal year

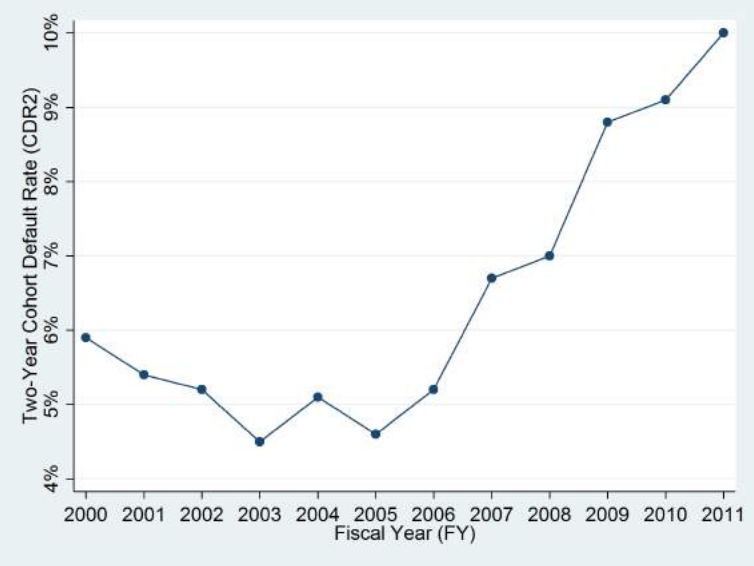
[28] Certain information such as the percentage of students under age 20 at the time of college enrollment is not directly available in the College Scorecard data. We obtain those information from the Integrated Postsecondary Education Data System (IPEDS) data, which is the source of many data elements in the College Scorecard data.

[29] According to https://nces.ed.gov/fastfacts/display.asp?id=569, the median time it took for 2008 bachelor's degree recipients to receive their degrees was 52 months, which is close to 5 academic years.

[30] Fiscal year t is defined as the period between Oct 1 in year $t-1$ and Sept 30 in year t.

(FY 2011). Figure 6 plots the trend of CDR2 aggregated across all schools receiving federal financial aid dollars over time. Noticeably, the CDR2 has been steadily increasing for the recent FY cohorts, which can be a concerning pattern for student loan lenders and borrowers, as well as the institutions involved.

Figure 6: The Trend of Two-Year Cohort Default Rate (CDR2), by Fiscal Year



Notes: Figure plots Two-Year Cohort Default Rate (CDR2) by fiscal year (FY). FY t is defined as the period between Oct 1 in year $t-1$ and Sept 30 in year t. CDR2 for FY t measures among the cohort of students who entered student loan repayment during FY t, the percentage of borrowers who defaulted by the end of the following fiscal year (FY $t+1$). The figure is based on the official CDR2 data available from https://www2.ed.gov/offices/OSFAP/defaultmanagement/defaultrates.html.

Similarly, CRR2 uses FY cohorts as observation units and measures the fraction of students who are able to pay down the initial balance of their student loan debt by at least \$1 among a given FY cohort at an institution. Due to the fact that CRR2 is pooled across two consecutive FY cohorts, we treat the CRR2 for the pooled FY t and FY $t+1$ cohorts as the CRR2 for the FY $t+1$ cohort throughout the discussion. Compared with CDR2, CRR2 is less susceptible to gaming behavior by institutions since it cannot be improved by nudging students into forbearance or deferment. Figure 7 shows for each FY cohort, the time of

college enrollment, graduation, entry into student loan repayment and the time when the student loan default/repayment status is observed, assuming that it takes 5 academic years to receive a bachelor's degree. In both Figure 7a and Figure 7b, the solid line (in green) represents the period when the ACA dependent coverage provision is in place.

Table 7: Summary Statistics on the College Scorecard Sample

	Schools in:					
	All States		States with Private Insurance Coverage Rate in the Top Quartile of the Distribution		States with Private Insurance Coverage Rate in the Bottom Quartile of the Distribution	
	2007-2009	2011-2012	2007-2009	2011-2012	2007-2009	2011-2012
$CDR2$	5.6%	7.3%	3.8%	5.4%	6.8%	8.3%
$CRR2$	80.7%	73.3%	86.9%	81.3%	76.3%	67.6%
$PctUnder20$	29.3%	28.5%	32.3%	32.1%	26.4%	25.4%
SAT Score	1061/1600	1062/1600	1073/1600	1080/1600	1042/1600	1046/1600
Earnings	38.3	35.2	41.1	37.7	38.3	35.1
Debt Amount	15.5	19.6	16.0	20.9	15.6	18.6
Family Income	49.0	48.2	60.8	61.4	40.3	39.2

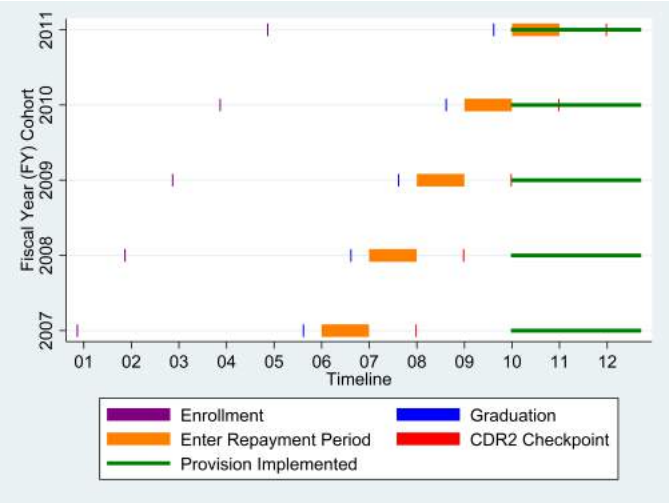
Notes: Reported values are the means of key variables for cohorts of schools located in all states (columns 1-2), states with private insurance coverage rate in the top quartile of the distribution (columns 3-4), and states with private insurance coverage rate in the bottom quartile of the distribution (columns 5-6). The years in the column headings refer to the fiscal year (FY) during which school cohorts enter the student loan repayment. Quartiles are based on the annual state-level private insurance coverage rate distribution. 2010 is omitted to avoid contaminating the sample with a cohort group that spans the pre- and post-provision periods. $CDR2$ and $CRR2$ are the two-year default and repayment rates for cohorts entering student loan repayment in a given FY. $PctUnder20$ refers to the percentage of students below age 20 at the time of college enrollment. Information included in variables $PctUnder20$, "SAT Score", and "Family Income" corresponds to the college enrollment cohorts, and is linked to the student loan repayment cohort under the assumption that it takes five years to receive a bachelor's degree. "Debt Amount" refers to the student loan debt amount owed at the time of college graduation. "Earnings" refers to the pooled annual earnings that correspond to the student loan repayment period captured by $CDR2$ and $CRR2$. Variables "Family Income", "Debt Amount", and "Earnings" are measured in $1,000s. Since $CDR2$ is not available for the FY 2012 cohort, the summary statistics of $CDR2$ in the post-provision period are collected from the FY 2011 cohort only.

Since being below age 26 and having a parent enrolled in a private insurance plan are the two prerequisites for being eligible for the provision, we also explore the rate of private insurance coverage (among persons under age 65) by state in the following analysis.[31]

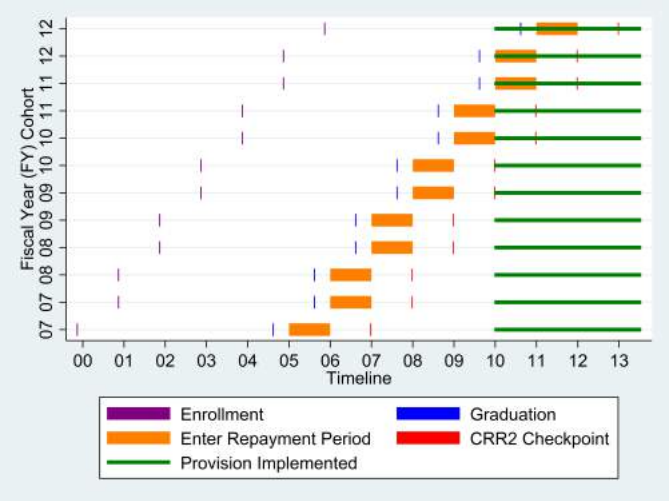
[31]This variable is included in "HIB-6 Health Insurance Coverage Status and Type of Coverage by State–

Figure 7: The Timing of the Student Loan Repayment Measures: CDR2 and CRR2

(a) The Timing of Two-Year Cohort Default Rate (CDR2)



(b) The Timing of Two-Year Cohort Repayment Rate (CRR2)



Notes: Figure 7a and Figure 7b explain how CDR2 and CRR2 measure the student loan repayment for each cohort assuming that it takes 5 years for a college student to receive a bachelor's degree. The numbers on the horizontal axis represent the Oct 1 of each year since Fiscal Year (FY) t is from Oct 1 in year $t-1$ to Sept 30 in year t. Since CRR2 is pooled across two consecutive FY cohorts, we refer to the 2-year repayment rate of the pooled FY t and FY $t+1$ cohorts as the repayment rate of the FY $t+1$ cohort for convenience. Therefore, for both CDR2 and CRR2, the FY 2010 cohort is the first cohort that may benefit from the ACA dependent coverage provision.

Table 7 presents the summary statistics on the College Scorecard sample. Specifically, it

Persons Under 65", which is downloadable from http://www.census.gov/library/publications/2013/demo/p60-245.html.

shows the means of the key variables for schools which are located in states in the top and bottom quartiles of the distribution of private insurance coverage rate, before and after the provision. A noticeable pattern in Table 7 is that compared with the pre-provision period, the amount of student loan debt increased and the performance of student loan repayment became worse by both measures (CDR2 and CRR2) in the post-provision period. This is consistent with the trend in Figure 1b and Figure 6, despite the fact that the CDR2 is systematically lower in our restricted sample made of four-year colleges only. Also, Table 7 suggests that family income in states with private insurance coverage rate in the top quartile of the distribution is significantly higher than the national average, while the opposite is true for states with private insurance coverage rate in the bottom quartile of the distribution. The percentage of students below age 20 at the time of college enrollment, measured by the variable "$PctUnder20$", remained stable in the pre- and post-provision periods, suggesting that it would not be a main source of variation behind any change in CDR2 or CRR2 after FY 2010.[32]

5.2 Empirical Analysis

If the provision helped improve student loan repayment, we would expect that starting from FY 2010, the performance of student loan repayment improved more for schools with a higher percentage of graduates who would be eligible to enroll in parental policies. To test the hypothesis, we estimate the following fixed effects models:

$$CDR2_{it} = \alpha PctUnder20_{it} + \sum_{k=2007}^{2011} \beta_k PctUnder20_{it} * \mathbf{1}\left[Year = k\right] + \gamma X_{it} + m_i + p_t + \epsilon_{it} \quad (6)$$

[32]The mean of the variable "$PctUnder20$" is around 30% in our samples. It is consistent with the age distribution of enrollment in all degree-granting postsecondary institutions in 2007, 2009, and 2011, which is available from http://nces.ed.gov/programs/digest/d12/tables/dt12_225.asp.

$$CRR2_{it} = \sigma PctUnder20_{it} + \sum_{k=2007}^{2012} \theta_k PctUnder20_{it} * \mathbf{1}\left[Year = k\right] + \mu X_{it} + m_i + p_t + \epsilon_{it} \quad (7)$$

where the outcome variable is either CDR2 or CRR2 that corresponds to the cohort that attended school i and entered student loan repayment in FY t, $PctUnder20_{it}$ is the percentage of students in the cohort that were below age 20 at the time of college enrollment, X_{it} includes SAT score and median family income observed at the time of college enrollment, percentages by major, percentages by gender and race, and median student loan debt observed at the time of college graduation, as well as mean earning observed in the repayment period, m_i is a vector of school fixed effects, and p_t is a set of year fixed effects.[33]

The key parameters of interest from this model are the β_ks and θ_ks. Under our hypothesis, there should be both a negative break in the pattern of $\hat{\beta}_k$ estimates and a positive break in the pattern of $\hat{\theta}_k$ estimates at FY 2010, suggesting that since the implementation of the provision, the cohort default rate became lower and the cohort repayment rate became higher for schools with higher percentages of graduates in the eligible age range for the provision. Since a dependent needs to be below age 26 and have a parent enrolled in a private insurance plan to be eligible for the provision, we expect that during the post-provision period, the relationship between student loan repayment performance and percentage of graduates being in the eligible age range for the provision is even stronger for schools in states with the rate of private insurance coverage in the top quartile of the distribution, given that most students go to colleges in their own states.[34] Therefore, we restrict the sample to schools in states with private insurance coverage rate in the top quartile of the distribution each

[33]Information included in variables $PctUnder20$, "SAT Score", and "Median Family Income" corresponds to the college enrollment cohorts. It is linked to the student loan repayment cohort under the assumption that it takes five years to receive a bachelor's degree.

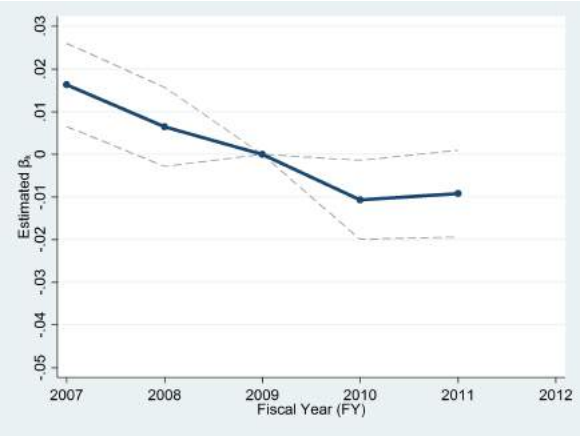
[34]For example, among all first-time degree/certificate-seeking undergraduates in degree-granting postsecondary institutions in Fall 2012, 82% of them were in-state students. The number is available from Column 6 in http://nces.ed.gov/programs/digest/d13/tables/dt13_309.10.asp.

year and run the same two regression models. If the ACA dependent coverage provision is the mechanism behind better student loan repayment performance for schools with higher percentages of graduates in the eligible age range for the provision since FY 2010, then this mechanism would be even stronger for schools in those states. Therefore, we expect a greater negative break in the pattern of $\hat{\beta}_k$ estimates and a greater positive break in the pattern of $\hat{\theta}_k$ estimates at FY 2010 for the regressions on the restricted sample.

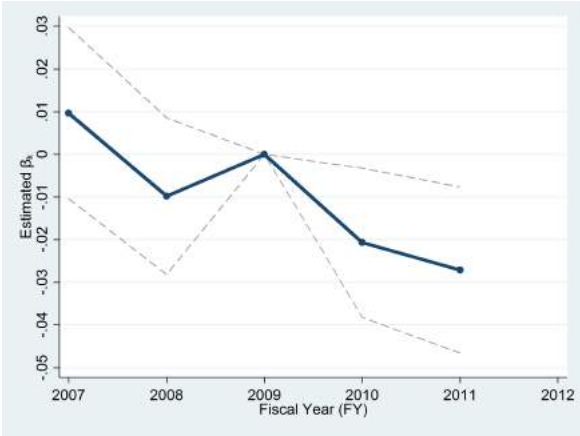
Figure 8 plots the pattern of $\hat{\beta}_k$ estimates and $\hat{\theta}_k$ estimates in the full and restricted sample, with FY 2009 set as the reference year, its coefficient normalized to zero. Figure 8a shows that the percentage of college graduates in the eligible age range ($PctUnder20$) is a significantly positive predictor of CDR2 in the pre-provision period, and becomes a significantly negative predictor of CDR2 in the pre-provision period. When the sample is restricted to schools in states with private insurance coverage rate in the top quartile of the distribution, we observe an even stronger impact of $PctUnder20$ in the post-provision period, as shown in Figure 8b. In contrast to Figure 8a, Figure 8b displays a much more stable pre-period estimates and suggests a stronger impact of $PctUnder20$ in FY 2011 than in FY 2010. This is consistent with the hypothesis that the ACA dependent coverage provision improved student loan repayment because as suggested by Figure 7a, almost everyone in the FY 2011 cohort entered student loan repayment after the implementation of the provision, while the opposite is true for the FY 2010 cohort. Similarly, the comparison of Figure 8c and Figure 8d suggests that the post-provision impact of $PctUnder20$ on repayment rate is stronger when the sample is restricted to schools in states with private insurance coverage rate in the top quartile of the distribution. The gradually increasing impact of $PctUnder20$ from FY 2010 to FY 2012 in Figure 8d is consistent with the fact that the repayment periods of the latter cohorts overlapped more with the post-provision period, as suggested by Figure 7b.

Figure 8: The Relationship between CDR2/CRR2 and Percentage of College Graduates in the Eligible Age Range for the Provision in the Full and Restricted Sample, by Fiscal Year

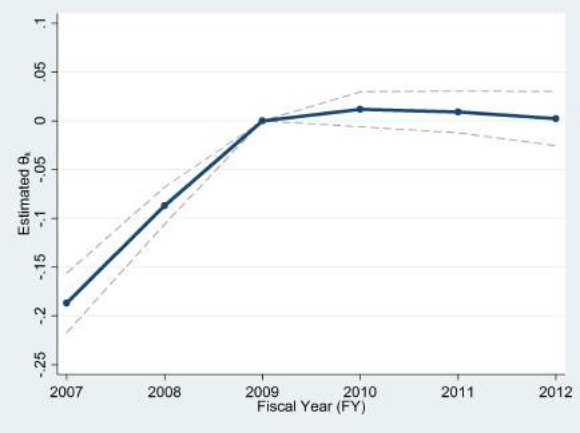
(a) CDR2, Full Sample



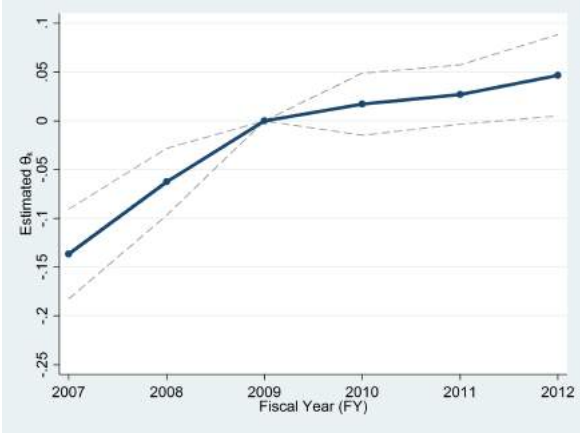
(b) CDR2, Restricted Sample



(c) CRR2, Full Sample



(d) CRR2, Restricted Sample



Notes: Figure 8a and Figure 8b plot the estimated values of β_k from Equation 6 along with 95% confidence intervals. Figure 8c and Figure 8d plot the estimated values of θ_k from Equation 7 along with 95% confidence intervals. In Figure 8b and Figure 8d, the sample is restricted to schools in states with private insurance coverage rate in the top quartile of the distribution only. In all figures above, standard errors are heteroskedasticity-robust and clustered by school, and year corresponds to the fiscal year during which a given cohort enter student loan repayment. The reference year, 2009, is normalized to zero.

Similar to the comparison of the estimates from the restricted sample and the full sample in Figure 8, we directly compare schools in states with high and low rates of private insurance

coverage by estimating the following difference-in-difference models:

$$CDR2_{it} = \nu TopHalf_{s(i),t} + \alpha PctUnder20_{it} + \eta TopHalf_{s(i),t} * PctUnder20_{it}$$
$$+ \sum_{k=2007}^{2011} \phi_k TopHalf_{s(i),t} * \mathbf{1}\left[Year = k\right] + \sum_{k=2007}^{2011} \beta_k PctUnder20_{it} * \mathbf{1}\left[Year = k\right]$$
$$+ \sum_{k=2007}^{2011} \delta_k TopHalf_{s(i),t} * PctUnder20_{it} * \mathbf{1}\left[Year = k\right] + \gamma X_{it} + m_i + p_t + \epsilon_{it} \quad (8)$$

$$CRR2_{it} = \tau TopHalf_{s(i),t} + \sigma PctUnder20_{it} + \rho TopHalf_{s(i),t} * PctUnder20_{it}$$
$$+ \sum_{k=2007}^{2012} \psi_k TopHalf_{s(i),t} * \mathbf{1}\left[Year = k\right] + \sum_{k=2007}^{2012} \theta_k PctUnder20_{it} * \mathbf{1}\left[Year = k\right]$$
$$+ \sum_{k=2007}^{2012} \lambda_k TopHalf_{s(i),t} * PctUnder20_{it} * \mathbf{1}\left[Year = k\right] + \mu X_{it} + m_i + p_t + \epsilon_{it} \quad (9)$$

where $TopHalf_{s(i),t}$ is equal to 1 if the state that school i is in is located in the top half of the private insurance coverage rate distribution in year t, and 0 otherwise. Equation 8 and Equation 9 slightly differ from Equation 6 and Equation 7 with the addition of $TopHalf_{s(i),t}$ and its interactions with the key variables, and allow the further testing of the hypothesis that the provision contributed to better student loan repayment performance for the schools with higher percentages of eligible population. Given the two dimensions of eligibility (i.e. parental private insurance status and dependent's age) represented by $TopHalf_{s(i),t}$ and $PctUnder20_{it}$, an increase in one dimension would lead to a greater repayment improvement measured by $CDR2$ and $CRR2$ when the other dimension is at a higher level following our hypothesis. Therefore, we expect that the δ_ks and λ_ks, representing the differences in the responsiveness of $CDR2$ and $CRR2$ to a fixed increase in $PctUnder20_{it}$ between schools in states with private insurance coverage rate in the top/bottom halves of the distribution, would show breaks from their pre-provision patterns since FY 2010.

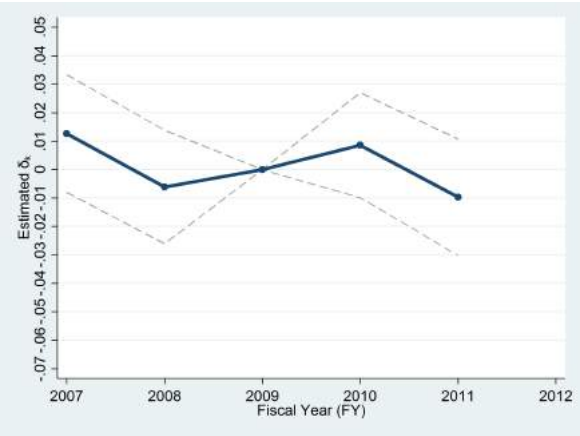
As a robustness check, we also run a restricted sample regression on the schools in states with private insurance coverage rate in the top and bottom quartiles of the distribution only. Under this specification, $TopHalf_{s(i),t}$ allows a sharper contrast in the dimension it represents by comparing schools in states with private insurance coverage rate in the top/bottom quartiles of the original distribution.[35] Therefore, we would expect greater differences in the impacts of a change from the other dimension ($PctUnder20$) on $CDR2$ and $CRR2$ between the two groups of schools in the post-provision period.

Figure 9 plots the pattern of $\hat{\delta}_k$ estimates and $\hat{\lambda}_k$ estimates in the full and restricted sample, with FY 2009 set as the reference year, its coefficient normalized to zero. In both Figure 9a and Figure 9b, the estimates for the pre-provision period are stable, and the estimates for FY 2010 do not suggest a negative break. This could be because the FY 2010 cohort is a transitional cohort in the sense that the provision was not in place when they entered their repayment period, as suggested by Figure 7a. However, the estimate for FY 2011 is significantly negative in Figure 9b, suggesting that in the post-provision period, $PctUnder20$ is a stronger predictor of CDR2 for schools in states where the private insurance coverage rates are higher. Similar to Figure 9a and Figure 9b, Figure 9c and Figure 9d display stable estimates for the pre-provision period and muted breaks in FY 2010. However, in Figure 9c we find a significant positive break in the pattern of $\hat{\lambda}_k$ estimates in FY 2011 and FY 2012, and a larger estimate for FY 2012 than FY 2011, which can be explained by the fact that the repayment periods of the FY 2012 cohort overlapped more with the post-provision period, as suggested by Figure 7b. Despite sharing a very similar pattern with Figure 9c, Figure 9d displays much larger estimates in the post-provision period, which suggests that $PctUnder20$ is an even stronger predictor of CDR2 for schools in states located in the top (versus the

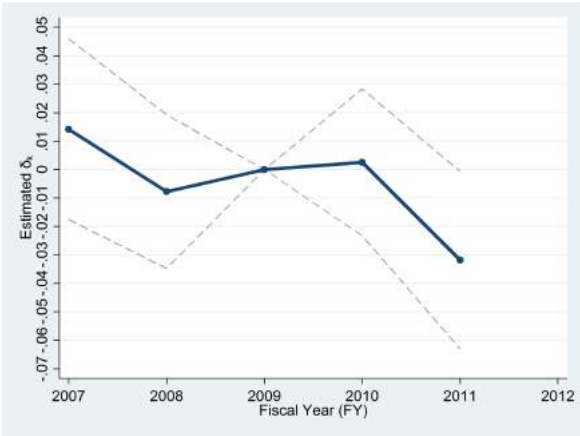
[35] When we drop the sample located between 25 percentile and 75 percentile of the distribution, the top half of the new sample is the top quartile of the original sample, and the bottom half of the new sample is the bottom quartile of the original sample.

Figure 9: The Marginal Effects of Percentage of College Graduates in the Eligible Age Range for the Provision on CDR2/CRR2 for Schools in States at the Top Half of Private Insurance Coverage Rate Distribution in the Full and Restricted Sample, by Fiscal Year

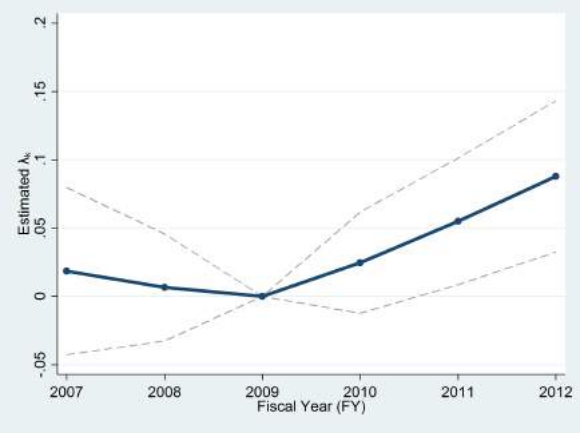
(a) CDR2, Full Sample



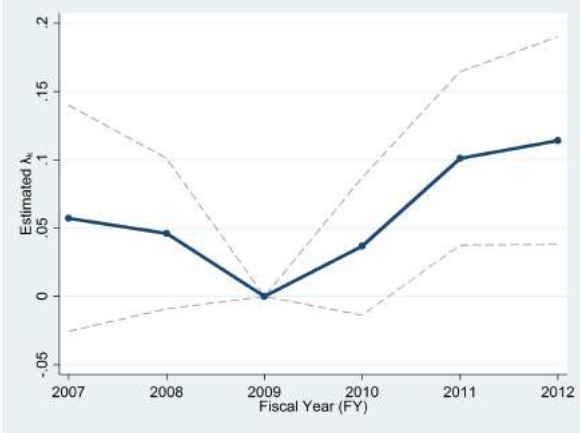
(b) CDR2, Restricted Sample



(c) CRR2, Full Sample



(d) CRR2, Restricted Sample



Notes: Figure 9a and Figure 9b plot the estimated values of δ_k from Equation 8 along with 95% confidence intervals. Figure 9c and Figure 9d plot the estimated values of λ_k from Equation 9 along with 95% confidence intervals. In Figure 9b and Figure 9d, the sample is restricted to schools in states with private insurance coverage rate in the top and bottom quartiles of the distribution only. In all figures above, standard errors are heteroskedasticity-robust and clustered by school, and year corresponds to the fiscal year during which a given cohort enter student loan repayment. The reference year, 2009, is normalized to zero.

bottom) quartile of the private insurance coverage rate distribution.

Table 8 presents estimates from a model similar to Equation 8 and Equation 9, after re-

placing the year dummies with a binary post-2010 indicator and dropping the FY 2010 cohort which span the pre- and post-provision periods. This model imposes a break point right after FY 2010, consistent with the patterns of evidence from the more flexible specifications in Figure 9. The coefficients of the interaction term $TopHalf_{s(i),t} * PctUnder20_{it} * PostFY2010_t$ are negative in Columns 1 and 2, positive in Columns 3 and 4, and significant except for Column 1. Also, compared with Columns 1 and 3, the coefficients in Columns 2 and 4 are of greater magnitude. This suggests that after FY 2010, an increase in percentage of college graduates in the eligible age range for the provision led to better student loan repayment performance for a school if the school is in a state with the private insurance coverage rate in the top (versus bottom) half of the distribution, and that the relative improvement is even more pronounced when the comparison is between schools in states in the top and bottom quartiles of the distribution. For example, the coefficient in Columns 3 and 4 implies that given a 10% increase in percentage of college graduates in the eligible age range for the provision, the CRR2 would increase 0.66% more in the post-provision period if the school is in a state in the top (versus bottom) half of the distribution of private insurance coverage rate, and 0.87% more if the school is in a state in the top (versus bottom) quartile of the distribution.

6 Conclusion

In this paper, we show the effects of the 2010 Affordable Care Act (ACA) provision on a variety of outcomes among college graduates with student loan debt. The provision, by requiring insurers to allow dependents to remain on parental health insurance policies until age 26, provides an affordable insurance option for young adults. We first show how this insurance option can be particularly valuable for college graduates with student loan debt

Table 8: The Marginal Effects of Percentage of College Graduates in the Eligible Age Range for the Provision on CDR2/CRR2 for Schools in States at the Top Half of Private Insurance Coverage Rate Distribution in the Full and Restricted Sample, before and after FY 2010

Dependent Variables:	Two-Year Cohort Default Rate (CDR2)		Two-Year Cohort Repayment Rate (CRR2)	
	(1)	(2)	(3)	(4)
TopHalf	-0.001		0.007	
	(0.003)		(0.008)	
PctUnder20	0.002	-0.020	-0.010	0.033
	(0.011)	(0.025)	(0.023)	(0.060)
TopHalf*PctUnder20	0.004	0.035	-0.059***	-0.096
	(0.008)	(0.027)	(0.022)	(0.065)
TopHalf*Post FY 2010	0.003	0.013**	-0.007	-0.013
	(0.004)	(0.006)	(0.008)	(0.011)
PctUnder20*Post FY 2010	-0.009	0.003	0.048**	0.013
	(0.008)	(0.013)	(0.020)	(0.028)
TopHalf*PctUnder20*Post FY 2010	-0.011	-0.037**	0.066***	0.087***
	(0.011)	(0.016)	(0.024)	(0.033)
Restricted Sample	No	Yes	No	Yes
N Observations	4,539	2,190	5,506	2,689
N Clusters	1,310	732	1,341	725
Adj. R Sq.	0.818	0.843	0.929	0.941

Notes: Estimates are from fixed effects regressions and all models include school effects, year effects, and other controls such as SAT score and median family income which are represented by X_{it} in Equations 8 and 9. The observations are based on school-year units, and the year corresponds to the fiscal year (FY) during which a given cohort enter student loan repayment. $PctUnder20$ measures the percentage of students in a FY cohort that were below age 20 at the time of college enrollment and thus in the eligible age range for the provision during student loan repayment period, and $TopHalf$ indicates whether a school is in a state located in the top half of the private insurance coverage rate distribution. The sample is restricted to four-year schools in all models, and further restricted in Columns 2 and 4 to schools in states with private insurance coverage rate in the top and bottom quartiles of the distribution only. $TopHalf$ is omitted in Columns 2 and 4 because in the restricted sample regression it no longer varies with time and becomes collinear with school fixed effects. Standard errors are heteroskedasticity-robust and clustered by school. * indicates significance at the 0.10 level, ** indicates significance at the 0.05 level, *** indicates significance at the 0.01 level.

by presenting the relationship between student loan debt and health-related outcomes in the absence of the provision. Using data from the NLSY97, we estimate that a student loan debt of $10,000 is associated with a 3.1% decrease in the likelihood of having insurance and a 1.8% increase in the likelihood of skipping treatment in times of illness. In addition, we find

that relative to a college graduate fully covered by health insurance in the past 12 months, a college graduate that was never insured in the past 12 months is 4.3% less likely to have health routine checks in the past 12 months given a student loan debt of $10,000.

Using data from the PSID, we find that among college graduates who were eligible for the provision, the likelihood of joining a parental health insurance plan increases by 3.4 percentage points when student loan debt increases by $10,000. We also find that relative to the college graduates in the sample who were ineligible for the provision, the likelihood of having insurance increased by 5.1% more after 2010 for college graduates who were eligible. Moreover, we find that the provision also improved the financial outcomes for college graduates with student loan debt. Our school-level analysis using the College Scorecard data suggests that after 2010, a higher percentage of graduates being under age 26 in the student loan repayment period led to an improvement in student loan repayment, and that the improvement was even greater for schools in states with higher private insurance coverage rates.

The contribution of our work is two-fold. First, this paper is the first to document the relationship between student loan debt and college graudates' health-related decisions. Second, this paper adds new perspectives to the debate over the ACA by showing that the ACA provision contributed to significant improvements on health insurance enrollment and student loan repayment performance among debt-burdened college graduates. Admittedly, the provision, like any other government mandate, may deviate the market from its equilibrium outcome. For example, Depew and Bailey (2015) find that relative to single-coverage plans, the provision has led to a 2.5-2.8 percent increase in premiums for health insurance plans that cover children. However, given the low health insurance coverage rate among young adults[36] and the rising trend of student loan default rate as shown in Figure 6, the benefits

[36]See http://www2.census.gov/programs-surveys/demo/visualizations/p60/245/figure09.pdf.

of the provision we show in the paper are important and should at least be considered in policy evaluations.

This paper also suggests the potential benefits of implementing more policies that help debt-burdened college graduates receive affordable health insurance. Given the high percentage of student loan debtors among college graduates and the fact that most students graduate from college at an age younger than 26, the ACA dependent coverage provision may be able to benefit a large number of college graduates with student loan debt. However, college graduates who graduate at an older age and those who do not have any parent insured under a private plan are not able to benefit from the provision and may still have to go uninsured when faced with the liquidity constraint caused by student loan debt. Therefore, we hope this paper serves as a starting point for policy discussions for ways of helping more debt-burdened college graduates receive health insurance.[37]

[37]For example, one approach would be to redesign the income criteria of Medicaid eligiblity to take into account the amounts of student loan debt owed by college graduates. Another approach would be to subsidize debt-burdened college graduates when they participate in Health Insurance Marketplace and adjust the amount of subsidy by the amount of student loan debt.

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A Appendix: Supplementary Tables and Figures

Table A.1: Probit Models: The Relationship between Student Loan Debt Amount and Likelihood of Having Health Insurance for College Graduates

Dependent Variables:	Have Health Insurance			
	(1)	(2)	(3)	(4)
Debt Amount	-0.0007***	-0.0033***	-0.0023***	-0.0008
	(0.0002)	(0.0008)	(0.0008)	(0.0007)
Survey(s) since College Graduation	All	First	Second	Third
Mean Dep. Var.	0.8991	0.8098	0.8644	0.8665
N Observations	7,800	773	885	914
N Clusters	1,654	906	1,035	1,050
R Sq.	0.3396	0.3802	0.3595	0.3327

Notes: Reported coefficients are marginal effects from Probit regressions and all models include year effects and other controls represented by X_{it} and Z_i from Equation 1. Student loan debt amount is measured in \$1,000s. The observations are based on individual-year units and the sample is made of all college graduates in column 1, and college graduates surveyed for the first, second, and third time since college graduation in columns 2-4. Standard errors are heteroskedasticity-robust and clustered by individual. * indicates significance at the 0.10 level, ** indicates significance at the 0.05 level, *** indicates significance at the 0.01 level.

Table A.2: Probit Models: The Relationship between Student Loan Debt Amount and Likelihood of Utilizing Certain Health Care Services for College Graduates

Dependent Variables:	Had Checkup in the Past 12 Months		Skipped Treatment in the Past 12 Months	
	(1)	(2)	(3)	(4)
Debt Amount	0.0005	0.0006	0.0018**	0.0018**
	(0.0006)	(0.0006)	(0.0008)	(0.0008)
Debt Amount*Never Insured		-0.0053**		-0.0000
		(0.0022)		(0.0027)
Debt Amount*Partially Insured		-0.0018*		0.0012
		(0.0011)		(0.0018)
Mean Dep. Var.	0.6027	0.6027	0.4594	0.4594
N Observations	9,059	9,059	4,018	4,018
N Clusters	1,710	1,710	1,360	1,360
Adj. R Sq.	0.1348	0.1358	0.0363	0.0364

Notes: Reported coefficients are marginal effects from Probit regressions and all models include year effects and other controls represented by X_{it} and Z_i from Equation 2/Equation 3. Student loan debt amount is measured in $1,000s. The observations are based on individual-year units and the sample includes all college graduates. There are fewer observations in columns 3-4 because fewer observations exist for outcome variable $SkippedTreatment$. "Never Insured" is a binary variable indicating whether individual i never had any health insurance in the 12 months prior to the survey in year t, and "Partially Insured" is a binary variable indicating whether individual i was only partially insured in the 12 months prior to the survey in year t. Standard errors are heteroskedasticity-robust and clustered by individual. * indicates significance at the 0.10 level, ** indicates significance at the 0.05 level, *** indicates significance at the 0.01 level.

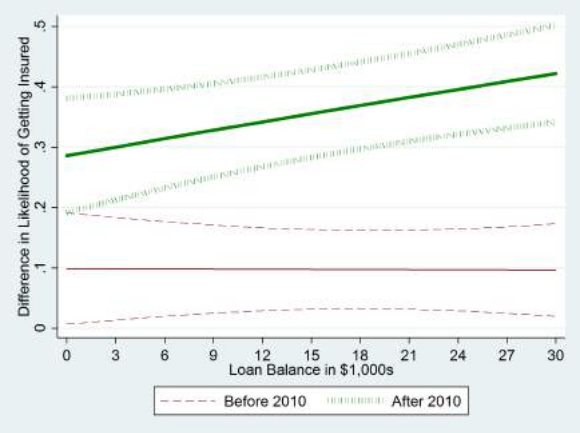
Table A.3: Probit Models: The Impact of Student Loan Debt on Decision to Join A Parental Health Insurance Plan

Dependent Variable:	Join Parental Plan	
	(1)	(2)
Debt Amount	0.0033***	0.0043***
	(0.0009)	(0.0009)
Debt Amount*Unemployed		0.0152***
		(0.0022)
Mean Dep. Var.	0.4067	0.4067
N Observations	268	268
N Clusters	223	223
Adj. R Sq.	0.2603	0.2895

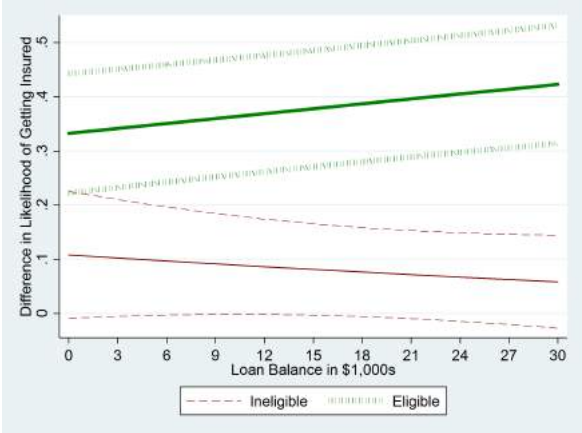
Notes: Reported coefficients are marginal effects from Probit regressions and both models include state effects, age effects, year effects, and other control variables represented by X_{it} and Z_i from Equation 4. Student loan debt amount is measured in \$1,000s. The observations are based on individual-year units and the sample includes college graduates who were eligible for the provision after 2010. Standard errors are heteroskedasticity-robust and clustered by individual. * indicates significance at the 0.10 level, ** indicates significance at the 0.05 level, *** indicates significance at the 0.01 level.

Figure A.1: Probit Model: The Contrast of Point Estimates, by Eligibility and Time

(a) Eligible Compared to Ineligible



(b) Post 2010 Compared to Pre 2010



Notes: Figure A.1a presents the differences in point estimates of Ins_{it} in Equation 5 for eligible college graduates relative to ineligible college graduates before and after 2010, at different student loan levels. Figure A.1b presents the differences in point estimates of Ins_{it} for post-provision period relative to pre-provision period among eligible and ineligible college graduates, at different student loan levels. Both figures are based on a difference-in-difference model (Equation 5) in which observations are college graduates who were below age 26. This implies that not having any parent insured under a private plan is the only cause for being ineligible for the provision in our sample.

Table A.4: Probit Model: The Change of Marginal Effect of Student Loan Debt on the Likelihood of Having Health Insurance Among Eligible College Graduates after 2010

Dependent Variable:	Have Health Insurance
Debt Amount	0.0010**
	(0.0004)
Eligible	0.2551***
	(0.0255)
Debt Amount*Eligible	0.0025**
	(0.0012)
Debt Amount*Post 2010	0.0022***
	(0.0007)
Eligible*Post 2010	0.3013***
	(0.0511)
Debt Amount*Eligible*Post 2010	0.0046**
	(0.0023)
Mean Dep. Var.	0.4150
N Observations	600
N Clusters	423
Adj. R Sq.	0.5642

Notes: Reported coefficients are marginal effects from Probit regression and the model includes state effects, age effects, year effects, and other control variables represented by X_{it} and Z_i from Equation 5. Student loan debt amount is measured in $1,000s. The observations are based on individual-year units and the sample includes college graduates who were below age 26. Therefore, the only cause of being ineligible for the provision is not having any parent insured under a private plan. Standard errors are heteroskedasticity-robust and clustered by individual. * indicates significance at the 0.10 level, ** indicates significance at the 0.05 level, *** indicates significance at the 0.01 level.