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THE RELATIONSHIP BETWEEN STATE FUNDED MERIT SCHOLARSHIPS AND STUDENT LOAN DEBT

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ABSTRACT

This article uses a sample of 13,643 students attending a 4-year state university in Florida to estimate a selection-bias corrected quantile regression of loan debt at graduation. The study investigates whether the debt levels of students who received the Florida Bright Futures (FBF) scholarship are significantly different from the debt levels of students who did not receive the scholarship. The empirical results show that FBF recipients accumulate higher debt, on average, than similar students who did not receive the award. However, for students from the lowest income households and with the highest levels of debt, the FBF scholarship award does reduce the overall amount of debt they accumulate.

Keywords: student debt; merit-based scholarships; public finance

Over the last few decades there has been a dramatic shift in the way higher education has been financed in the US. Since 2000, most state and local governments have significantly reduced funding for higher education resulting in significant tuition inflation and an explosion of federally subsidized student loan debt that has generated concern across many sectors (Federal Reserve Bank, 2019). Multiple states, including Florida, have further shifted the funding formula for undergraduate student aid toward

merit-based scholarships for high performing graduating seniors (Lederman, 2018). Not surprisingly, research suggests this pronounced shift from need-based to merit-based funding benefits higher socioeconomic families (Heller & Marin, 2004).

The phenomenon of rising student debt has been highly publicized by the media. In 2020, Americans owed over $1.64 trillion in student loan debt, an amount that is approximately $587 billion more than credit card debt (Studentloanhero.com, 2020). The Pew Research Center reported that student loan originations increased by 326% between 1990 and 2014 (Fry, 2014). During roughly the same time, forty-one states and the District of Columbia instituted merit-based scholarships for college undergraduate students beginning with the Georgia Helping Outstanding Pupils Educationally (HOPE) scholarship in 1993. In 2018, 15 states and the District of Columbia awarded a larger amount of money in merit-based scholarships than in need-based scholarships, and Georgia awarded no need-based scholarships at all. It is interesting to note that these states, except Alaska, Utah, and the District of Columbia, rank in the bottom half of the median household income distribution for US states and territories in 2018. They are as follows (with their rank in the income distribution shown in parentheses): Alaska (9), Arkansas (50), Florida (38), Georgia (29), Kentucky (45), Louisiana (48), Mississippi (51), Montana (39), Nevada (30), New Mexico (49), South Carolina (43), South Dakota (33), Tennessee (42), Utah (13), West Virginia (52), and the District of Columbia (1) (Inside HigherEd, 2018). It seems ironic that the states with the greatest financial need are the most likely to award more merit-based aid than need-based aid.

Using a sample from a large public university where 50% of students qualify for Florida Bright Futures (FBF) merit-based scholarships and 50% do not, our study explores whether college graduates who did not qualify for the merit scholarship in high school accrue significantly more debt during college. For students who do qualify for FBF scholarships, we examine which groups of students are more likely to use the scholarship funds to avoid debt.

LITERATURE REVIEW

We could find very little previous research that examined the relationship between student debt burdens and merit-based scholarships, but we did find plenty of research on the two subjects separately. Therefore, we discuss the topics separately and then make some conjectures about how the two might be related.

Several studies examine how student loan debt affects the behavior of students while they are in college. Poplaski et al. (2019) found that students who had student debt were more likely to report being financially stressed during college, and they were also more likely to report that the stress was affecting their overall health. The authors hypothesize that this may be part of the reason that several researchers (Gross et al., 2013; Jackson & Reynolds, 2013, Letkiewicz et al., 2015; Robb et al., 2012, Robb, 2017) have found that students with high debt burdens take longer to finish their degrees and are more likely to drop-out before finishing.

The consequences of student debt for recent college graduates are not any better. Baum and Saunders (1998) found that the students with the highest levels of debt

were less likely to go to graduate or professional school after graduation. Research also shows that highly indebted students were more likely to live with their parents after graduation and were not able to move to other cities to further their education or find better employment (Millet, 2003; Houle & Warner, 2017). Several studies found that graduates who took out more debt were also less likely to be married, less likely to have a child, and were more likely to have a negative net worth (Aldo et al., 2019; Min & Taylor, 2018; Velez et al., 2019). Research has also shown that heavily indebted students were not as likely to buy homes as their less-indebted counterparts (Anderson et al., 2021; Baum & O'Malley, 2002; Mezza et al., 2020). Despard et al. (2016) found that debtors from low- and moderate-income households had a 51% higher probability of experiencing material hardships, a 19% higher probability of experiencing medical hardships and a 27% higher probability of experiencing financial difficulty after graduation than their counterparts without student debt. These studies conclusively show that graduating with a substantial amount of student debt causes financial hardships that affect the most important life decisions of young adults.

There are also several studies that show racial and ethnic differences in the distribution of student debt. Several recent studies show that Black students are more likely to take on debt and take on heavier debt burdens when they do acquire debt than their counterparts from other races (Goldrick-Rab et al., 2014; Grinstein-Weiss et al., 2016; Houle, 2014; Jackson & Reynolds, 2013; Kim et al., 2016; Jimenez & Glater, 2020; Price, 2004;). In fact, Jackson and Reynolds (2013) found that Black students disproportionately have higher student debt loads, are more likely to acquire debt and not finish college and are more likely to default on their loans. Grinstein-Weiss et al. (2016) found that the average amount of debt held by Black students in their sample of low- and moderate-income students was $7721 more than the debt of the non-Black students. A study by Elliot and Lewis (2015) found that 77% of Hispanic college graduates had student debt compared to 64% of White graduates and 59% of Asian graduates. Only Black students surpassed them, with 82% having student debt upon graduation (Elliot & Lewis, 2015). Beal et al. (2019) found racial and ethnic differences in both the decision to borrow and the amount of the student loan when the student did borrow. Asian students were significantly less likely to take out student loans, but if they did take out a loan, there was no difference in the amount of loans they acquired. Hispanic students were as likely to take out a loan as other students, but when they did, the loan was significantly smaller. Blacks were significantly more likely to take out a loan, but when they did, it was also significantly smaller.

The socio-economic status (SES) of the student's household, which includes both income and parents' education, affects a student's probability of attending college and the probability of acquiring student debt during that process. As expected, there is an inverse relationship between parents' income and the amount of student debt that their children acquire (Houle, 2014). This is because higher income households have been shown to provide more money for their children's education, to save more for their children's college education, and to spend more for the room and board and social activities of their college-age children (Choy & Berker, 2003; Flaster, 2018;

Nam, 2021; Quadlin & Conwell, 2020; Schoeni & Ross, 2005; Steelman & Powell, 1991)

Similarly, higher parental education levels are also associated with lower levels of student debt (Flaster, 2018; Houle, 2014). One reason may be because more highly educated parents are better equipped to navigate the labyrinth of financial aid forms and scholarship applications that accompany college attendance (Hossler & Vesper, 1993), and they are also more aware of true college costs and tuition discounting schemes (Grodsky & Jones, 2007). More educated parents are also more likely to financially plan, save, and go into debt for their children's college educations (Cha et al., 2005; Charles et al., 2007; Cataldi et al., 2018; Steelman & Powell, 1991).

From this brief review of the literature related to student loan debt, we conclude that student loan debt has a detrimental effect on the social and economic outcomes of students. Furthermore, the students who are most likely to suffer from these detrimental effects are students of color and students who come from low SES households. The next section of the literature review explores the research on merit-based scholarship aid with attention given to what the research might say about whether the growth in merit-based aid exacerbates or alleviates the negative effects of student loan debt.

The research on merit-based scholarships is diverse. Much of it has examined the enrollment effects that the aid has had for in-state colleges and universities. Programs like Georgia's HOPE scholarship increase the likelihood that young people will attend college and also cause students to switch from two-year colleges to four-year colleges (Dynarski, 2000, 2002). Similar place-based scholarship programs like the Tennessee Promise and the Kalamazoo Promise scholarships had the same effect on enrollment and four-year college preference (Bartik et al., 2021; Nguyen, 2020; Page et al., 2019;). Many of the Promise scholarships also increased the likelihood that minority and disadvantaged students will complete college (Bartik et al., 2021; Bell & Gándara, 2021). There is also evidence that students who receive state merit-based scholarships are more likely to attend an in-state university (Cornwell et al., 2006; Nguyen, 2020) Cornwell et al. (2006). found that two-thirds of the increase in the first-year classes in Georgia's universities over the period from the beginning of the HOPE Scholarship (1993 to 1997) was due to students remaining in-state for college. There is also evidence that students who receive state merit-based scholarships to attend in-state schools are more likely to remain in the state after graduating (Harrington et al., 2016; Hickman, 2009).

The research on the distributional effects of state merit-based aid finds that much of the benefit goes to students who could already afford to attend college (Cornwell & Mustard, 2007; Heller, 2006, Pulcini, 2018; Gándara & Li, 2020). For example, Binder et al. (2002) found that White students received disproportionately more New Mexico Lottery Success Scholarships than students of other races and ethnicities. In addition, Binder and Ganderton (2004) found that for every low-income student awarded a New Mexico Lottery Success Scholarship almost three more went to students with higher family incomes. Florida's Bright Futures Scholarships and Michigan's Merit Award Scholarships go primarily to the students who attend the high schools in the state who had the highest college-participation rates before the

implementation of the merit-based scholarship programs (Heller & Rasmussen, 2002). These distributional effects are made even worse by the fact that many of these state merit scholarships are funded with regressive lottery taxes, leading some to call them *Reverse Robinhood* mechanisms (Borg & Borg, 2007). Stranahan and Borg (2004) analyzed the net distributional effect of the Florida Bright Futures Scholarship by estimating separate equations for household lottery expenditures and FBF scholarship benefits. They found that high socioeconomic households received a net program benefit of almost $2,200; whereas low SES households incurred a net program loss of almost $700.

A recent study from New Mexico found that in addition to detrimental monetary effects, lottery-funded scholarships may also cause academically challenged students to drop-out of college. Erwin and Binder (2020) found that academically well-prepared students increased their likelihood of graduating from the flagship University of New Mexico by 10 percentage points since the institution of the New Mexico Legislative Lottery Scholarship (NMLLS) in 1997, but academically less-prepared students decreased their likelihood of graduating by 11.6 percentage points (a 38.8 percent decrease) over the same period. The authors speculate that the scholarship program, which effectively erased the difference in tuition at two- and four-year colleges, may have caused weaker students to enroll in the more prestigious four-year institution, for which they were not prepared. On a somewhat brighter note, Klein and Perry-Sizemore (2017) found that high school graduation rates improved significantly more over the period from 1990 to 2000 in the states that instituted merit-based scholarships versus the states that did not. They hypothesize that possibility of receiving a merit-based college scholarship caused students to work harder in high school.

The literature on the distributional effects of merit-based aid does not offer much hope that the increasing trend in merit-based aid may somehow offset the increasing burden of student debt. However, the two studies that we found that looked specifically at the effect of merit-based scholarships on student debt burdens cause us to be somewhat optimistic. Chen and Weiderspan (2014) found that Georgia's state funding of merit-based aid programs reduced the debt burdens of Georgia HOPE Scholarship recipients. Beal et al. (2019) found similar results when they examined the debt burdens of Florida Bright Futures scholarship recipients. Their study found that students who received FBF scholarships had a significantly lower probability of having to take out a loan, and if they did take out a loan, the amount of the loan was significantly lower than those of students who had not received a FBF scholarship. What neither of these studies address, however, is whether the merit scholarships reduce the debt burden for all students uniformly or whether the greatest debt relief is received disproportionately by students with different household income and debt levels. Our research adds to the extant literature by estimating a quantile regression that sheds light on the relationship between merit-based scholarship funding and student loan debt for students with different levels of household income and total debt.

METHOD

Our study estimates student loan debt using a selection bias corrected quantile regression for a sample of 13,643 students attending the University of North Florida, one of the twelve universities in the Florida State University System. We were able to create the dataset because we were granted access to student data that included demographic and income information obtained from the students' Free Application for Federal Student Aid (FAFSA) records. The dependent variable is the amount of loan debt accrued at the time of graduation (year 2014). Whereas other studies analyzing student loan debt use OLS regression methods, quantile regression analysis allows a multidimensional view of whether the impact of a variable, its β value, differs across quantile levels of debt. We assess whether student socioeconomic and financial characteristics impact student borrowing behavior and if this effect differs for students facing different levels of debt at graduation. The model results in a consistent set of coefficients which may differ for each quantile. Cobas-Valdés et al. (2017) point out that quantile regression allows researchers to focus on the data at the tails of the distribution, which is often the most important target of policy. For example, we may be more concerned about the factors adversely impacting the most indebted students, rather than the average student.

We estimate a linear quantile regression of loan debt at the 10^{th}, 25^{th}, 50^{th}, 75^{th}, and 90^{th} quantiles with sample selection bias following Buchinsky (2001). Because we observe debt only for students whose benefits of borrowing outweigh the costs, we include a selection bias correction in the estimation. The conditional observed loan debt (y) for each quantile Θ is given by Equation 1 where x is the vector of explanatory variables and hΘ (x1, γ0) is the selection bias correction. Quantile regression analysis allows us to test whether the impact of a variable, β_Θ, differs depending upon the total amount of debt accrued.

$$\text{Quant}\Theta\ (y \mid x2) = x'\beta_\Theta + h\Theta\ (x1, \gamma 0) \qquad (1)$$

Our dataset contains student financial and demographic information obtained from the Free Application for Federal Student Aid (FAFSA) as well as information on students' Florida Bright Futures Scholarship awards and Pre-Paid College funding. We investigate the impact of academic and socioeconomic characteristics on a student's willingness to accrue more debt. We examine whether the impact of these predictors differs across debt quantiles. Finally, we analyze whether Florida's merit-based scholarships have any effect on student debt burdens and, if so, whether the impacts differ for students facing different amounts of debt. We further examine how Florida's merit-based scholarship awards interact with household income to impact student debt.

RESULTS

Table 1 contains the descriptive statistics for all variables in the sample and for the subset of students who have loan debt. The results show that about 62% of the sample are female and 72% are White with an average age of 23. Almost 60% of the students are classified as dependents for federal tax purposes suggesting these students have stronger family financial support than students classified as independent. A small proportion of students are married or have children. The university is located close to a relatively low-cost community college system and more than 60% of students transferred from another community college or institution. About 50% of the sample received FBF scholarships and about 12% had some type of Florida Pre-Paid credits. The Florida Pre-paid College fund is a program designed to help parents of young children save for college and residence hall expenses at an in-state institution by providing a subsidized long-term payment plan years in advance of attending.

The descriptive statistics suggest that 66% of students have loan debt, but they are not very different from the entire sample in terms of average age, choice of major, ethnicity or gender. Students with loan debt are slightly more likely to be married, have children and to be transfer students. Also, those who take out loan debt have lower average family incomes, are less likely to be classified as dependents, less likely to have Florida Prepaid College funds or have been awarded Florida Bright Futures Scholarships. The descriptive statistics suggest that in contrast to the full sample, students who take out loans have more responsibilities but fewer resources to draw on while completing their degrees.

Our analysis required two stages. In the first stage, we estimated a probit model to determine which students were likely to have debt at the time of graduation. The first stage model allowed us to calculate the selection bias correction term, hΘ (x1, γ0). We do not show the results of this analysis, but the selection bias correction term, hΘ (x1, γ0), is included in the second stage regression equations as the variable INVMILL, the inverse Mills ratio. It is significant in all the second stage regression results, which indicates that the bias correction was needed to accurately estimate the loan debt at graduation for our sample of students.

Table 1: Variable Explanations and Descriptive Statistics

	All Student Graduates		Student Graduates with Loan Debt		
All Students	N Obs	Mean	Students with Loans	N Obs	Mean
Loan Debt at graduation	13643	12018	Loan Debt	9070	18078
LOAN_YES=1 if student has loans	13643	0.66	LOAN_YES	9070	1
INC1000 is household income in 1000's	13643	68.09	INC1000	9070	58.30
AGE is student age at graduation	13643	23.76	AGE	9070	24.25
FEMALE= 1 if student is female, = 0 otherwise	13643	0.62	FEMALE	9070	0.63
ASIAN = 1 if student is Asian, = 0 otherwise	13643	0.05	ASIAN	9070	0.04
BLK =1 if student is Black, = 0 otherwise	13643	0.12	BLK	9070	0.15
HISP=1 if student is Hispanic, = 0 otherwise	13643	0.08	HISP	9070	0.08
OTHER = if student is any other Ethnicity, = 0 otherwise	13643	0.03	OTHER	9070	0.03
WHITE =1 if student is Caucasian, = 0 otherwise	13643	0.72	WHITE	9070	0.70
DEPENDENT =1 if student is dependent of family, = 0 otherwise	13643	0.58	DEPENDENT	9070	0.50
MARRIED=1 if student is married, = 0 otherwise	13643	0.13	MARRIED	9070	0.15
CHILDREN=1 if student has children at home, = 0 otherwise	13643	0.12	CHILDREN	9070	0.15
TRANSFER = 1 if student did not start as a first-time freshman but transferred in from another institution, = 0 otherwise	13643	0.61	TRANSFER	9070	0.68
HEALTH =1 if student graduated in College of Health, = 0 otherwise	13643	0.15	HEALTH	9070	0.15
BUSINESS = 1 if student graduated in College of Business, = 0 otherwise	13643	0.17	BUSINESS	9070	0.16
ENGINEER =1 if student graduated from College of Engineering, = 0 otherwise	13643	0.07	ENGINEER	9070	0.07
ARTSCI = 1 if student graduated from Arts and Sciences, = 0 otherwise	13643	0.48	ARTSCI	9070	0.48
EDUC = 1 if student graduated from College of Education, = 0 otherwise	13643	0.12	EDUC	9070	0.13
FBF = amount of award for Florida Bright Futures scholarships (there are different levels of awards)	13643	2956	FBF	9070	2477
FBFyes = 1 if student had any level of Florida Bright Futures Scholarship, = 0 otherwise	13643	0.50	FBFyes	9070	0.39
FLPREPAY = amount of Florida prepaid credit	13643	795	FLPREPAY	9070	556
FLPREPAYyes = 1 if student has any level of Florida prepaid credits, = 0 otherwise	13643	0.12	FLPREPAYyes	9070	0.09

Regression Results

The regression results from this second stage are shown in Tables 2 and 3. Two sets of regression results are shown because we used two different formulations of the Florida Bright Futures (FBF) variable—the first is the dollar value of the award and the second variable (FBFyes) is a dichotomous (dummy) variable coded 1, if the student received the scholarship, and 0, if the student did not receive the scholarship. Table 2 shows the regression results that include the FBF variable measured as the award amount, and Table 3 shows the regression results that include the dichotomous FBFyes variable. In both models, we also included interaction terms, between the FBF variable and the student's household income (INC1000). In the first model, the interaction term is labeled INC*FBF and in the second model it is labeled INC*FBFyes. Both interaction terms are calculated by simply multiplying the value of the two variables together. The interaction terms allow us to determine if the effect of the FBF scholarship on a student's debt at graduation varies for students with different income levels.

The regression results in Tables 2 and 3 predict the amount of debt a student has at graduation for the sample as a whole and for five different quantiles of student debt (10%, 25%, 50%, 75%, and 90th). The results suggest that there are several important predictors of student debt, and many of these factors impact student debt accumulation differently across the various debt quantiles.

We begin by discussing the demographic and socioeconomic variables that have a significant impact on loan debt. The variables representing age, gender, marital status, race, ethnicity, and having children while in college do not significantly affect the amount of student debt at graduation, except in two of the debt quantiles. Previous research found that Black students borrowed significantly more than other races (Goldrick-Rab et al., 2014; Grinstein-Weiss et al., 2016; Houle, 2014; Jackson & Reynolds, 2013; Kim et al., 2016; Price, 2004). In contrast, our results suggest that Blacks' borrowing does not differ significantly from Caucasian students except in the highest (90th) debt quantile, and Black students borrow *less* in that highest quantile than Caucasian students. This means that when we single out the part of the sample that has the highest 10% of debt at graduation, Caucasian students have higher debt levels on average than Black students. Similarly, the debt level of Hispanic students does not differ significantly from Caucasian students except in the middle debt level (50th quantile), and as was the case with Black students, Hispanic students tend to accumulate less debt overall than Caucasian students in this middle range of debt. Finally, the loan debt of Asian students does not vary significantly from Caucasian students in any of the quantiles. Therefore, our results suggest that at most debt levels there are no significant differences in debt at graduation for any racial or ethnic groups. In the two quantile levels that do show differences (the 50th for Hispanic students and the 90th for Black students), Black and Hispanic students have less debt than Caucasian students.

The results in Table 2 also suggest that family support impacts student debt burdens in an unexpected way. Household income has a positive and significant effect

Table 2: Quantile Regression of Loan Debt with Selection Bias Correction and Variable FBF

DEPENDENT VARIABLE: LOAN DEBT	Heckman 2nd Stage Total Sample	Heckman 2nd Stage Quantile10	Heckman 2nd Stage Quantile25	Heckman 2nd Stage Quantile50	Heckman 2nd Stage Quantile75	Heckman 2nd Stage Quantile90
INC1000	18.41***	6.589**	9.807**	7.406	14.61**	59.02***
	(4.202)	(3.163)	(4.434)	(5.264)	(5.992)	(9.016)
INC*FBF	0.00541***	0.00186***	0.00432***	0.00687***	0.00653***	0.00379**
	(0.000704)	(0.000530)	(0.000743)	(0.000882)	(0.00100)	(0.00151)
AGE	20.81	-26.67	59.56	118.7**	56.62	-44.73
	(46.97)	(35.36)	(49.57)	(58.85)	(66.99)	(100.8)
MALE	118.3	300.7	-201.9	517.0	665.6*	296.1
	(267.9)	(201.7)	(282.7)	(335.6)	(382.0)	(574.8)
ASIAN	54.30	243.8	197.4	-26.73	603.3	476.1
	(745.1)	(560.9)	(786.3)	(933.5)	(1,063)	(1,599)
BLK	-1,035**	-278.5	332.4	-300.4	-974.3	-2,398**
	(505.7)	(380.7)	(533.7)	(633.6)	(721.3)	(1,085)
HISP	-835.0*	-447.2	-752.1	-1,223**	164.3	-523.4
	(434.0)	(326.7)	(458.0)	(543.7)	(618.9)	(931.2)
OTHER	408.4	87.22	618.1	590.4	1,403	601.7
	(671.0)	(505.1)	(708.2)	(840.7)	(957.0)	(1,440)

DEPENDENT VARIABLE: LOAN DEBT	Heckman 2nd Stage Total Sample	Heckman 2nd Stage Quantile10	Heckman 2nd Stage Quantile25	Heckman 2nd Stage Quantile50	Heckman 2nd Stage Quantile75	Heckman 2nd Stage Quantile90
DEPENDENT	-3,447***	-637.6*	-2,328***	-3,376***	-5,736***	-7,639***
	(434.7)	(327.2)	(458.7)	(544.6)	(619.9)	(932.7)
MARRIED	-579.1	-218.5	-389.7	-510.3	-136.3	-1,050
	(396.2)	(298.2)	(418.1)	(496.3)	(565.0)	(850.1)
CHILDREN	17.29	108.7	-148.3	463.6	-286.9	-705.4
	(393.9)	(296.5)	(415.8)	(493.5)	(561.8)	(845.3)
TRANSFER	-6,037***	-354.9	-1,593***	-4,805***	-9,200***	-10,798***
	(379.4)	(285.6)	(400.4)	(475.4)	(541.1)	(814.2)
HEALTH	-858.0**	261.9	13.53	-8.461	-1,092*	-2,808***
	(436.3)	(328.4)	(460.5)	(546.6)	(622.3)	(936.3)
ENGINEER	1,197**	705.6*	1,274**	1,484**	1,280*	911.4
	(544.6)	(410.0)	(574.8)	(682.3)	(776.7)	(1,169)
ARTSCI	-292.6	39.33	354.3	479.1	-835.0	-1,175
	(359.9)	(270.9)	(379.8)	(450.8)	(513.2)	(772.2)
EDUC	-1,029**	65.55	287.0	463.7	-1,513**	-4,159***
	(500.0)	(376.3)	(527.6)	(626.4)	(713.0)	(1,073)
FBF	-0.453***	-0.105**	-0.257***	-0.394***	-0.486***	-0.453***
	(0.0665)	(0.0500)	(0.0701)	(0.0833)	(0.0948)	(0.143)

DEPENDENT VARIABLE: LOAN DEBT	Heckman 2nd Stage Total Sample	Heckman 2nd Stage Quantile10	Heckman 2nd Stage Quantile25	Heckman 2nd Stage Quantile50	Heckman 2nd Stage Quantile75	Heckman 2nd Stage Quantile90
FLPREPAY	0.133**	0.0869*	0.155**	0.165**	0.229**	0.262*
	(0.0667)	(0.0502)	(0.0704)	(0.0836)	(0.0952)	(0.143)
INVMILL	-16,139***	-6,240***	-10,020***	-15,243***	-17,979***	-26,589***
	(2,061)	(1,551)	(2,175)	(2,582)	(2,939)	(4,422)
Constant	30,945***	8,688***	14,403***	25,365***	40,529***	56,059***
R^2	0.080					
Observations	9,070	9,070	9,070	9,070	9,070	9,070

Standard errors in parentheses: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 3: Quantile Regression of Loan Debt with Selection Bias Correction and Variable FBFyes

	2nd Stage Quantile Regression with FBFyes Dummy& FBFyesINC1000 Interaction				
	(1)	(2)	(3)	(4)	(5)
VARIABLES	q10	q25	q50	q75	q90
INC1000	6.703**	11.80***	9.200	17.72***	59.32***
	(3.020)	(4.085)	(6.283)	(5.610)	(9.619)
FBFyes	94.00	-92.40	1,164	1,978**	2,776*
	(725.2)	(1,017)	(1,247)	(804.1)	(1,608)
FBFyes*INC1000	4.649*	6.310	25.54***	29.97***	6.179
	(2.720)	(4.190)	(4.619)	(7.301)	(15.85)
AGE	4.145	131.1**	153.1***	157.0***	108.1
	(44.00)	(60.72)	(48.62)	(59.19)	(76.75)
MALE	145.0	-86.31	316.0	682.6	358.3
	(140.8)	(270.6)	(366.3)	(420.2)	(484.3)
ASIAN	74.05	-491.4	-11.36	1,127**	1,027
	(300.6)	(813.6)	(891.2)	(524.9)	(1,435)
BLK	101.0	767.1	-40.75	-351.5	-1,035
	(397.4)	(605.4)	(520.5)	(532.5)	(902.8)
HISP	-418.6	-864.4*	-1,249***	469.1	138.1
	(284.7)	(505.3)	(422.3)	(833.9)	(576.6)
OTHER	94.10	533.2	776.6	1,836*	964.1
	(791.4)	(675.8)	(737.1)	(1,010)	(1,431)
DEPENDENT	-980.9***	-2,780***	-4,456***	-7,094***	-9,135***
	(357.5)	(498.0)	(651.0)	(598.8)	(796.1)
MARRIED	-257.6	-493.8	-687.8	-394.4	-951.2
	(367.9)	(460.2)	(436.7)	(697.8)	(861.5)

	2nd Stage Quantile Regression with FBFyes Dummy& FBFyesINC1000 Interaction				
	(1)	(2)	(3)	(4)	(5)
VARIABLES	q10	q25	q50	q75	q90
CHILDREN	95.37	-5.528	465.9	-82.94	-470.2
	(365.2)	(529.0)	(614.6)	(791.9)	(816.9)
TRANSFER	-112.2	-1,304***	-4,529***	-7,757***	-8,591***
	(251.8)	(273.5)	(417.5)	(487.7)	(818.1)
HEALTH	344.1	227.9	-54.99	-1,180*	-2,492***
	(259.4)	(300.2)	(706.4)	(668.8)	(829.0)
ENGINEER	862.7**	1,435***	1,791***	1,095	1,299
	(391.3)	(448.8)	(486.6)	(762.5)	(1,028)
ARTSCI	23.82	724.9***	653.6	-512.5	-521.0
	(228.9)	(197.7)	(440.2)	(687.6)	(750.7)
EDUC	155.2	740.8	550.7	-1,304*	-3,719***
	(263.1)	(460.4)	(559.5)	(675.4)	(833.8)
FLPREPAY	0.0794*	0.107	0.184**	0.222**	0.153
	(0.0451)	(0.0765)	(0.0849)	(0.0907)	(0.0987)
INVMILL	-4,710***	-6,957***	-15,933***	-18,500***	-23,282***
	(1,588)	(2,449)	(3,306)	(2,705)	(4,779)
Constant	6,989***	10,595***	24,035***	35,649***	47,365***
	(1,054)	(1,969)	(1,798)	(1,913)	(2,984)
R^2	0.080				
Observations	9,070	9,070	9,070	9,070	9,070

on the amount of debt at graduation for the total sample and for all the quantiles of debt except the middle (50^{th}) quantile. This means that, in general, the students with the highest household incomes accumulate more debt than their lower-income counterparts. The only exception to this is for the sample of students with the average level of debt (the 50^{th} quantile). At first this result seems counterintuitive, but it makes sense when we consider that students with lower incomes may qualify for more need-based aid, and so they do not need to borrow as much as their higher income counterparts. Another possible explanation is that higher income parents have different expectations of what their child's college experience should entail. They may expect their child to live on campus, study abroad, and experience the social aspects of college life as well as the educational aspects; whereas lower income households may expect students to live at home and work while attending college. Higher income households may also expect their children to go into higher paying occupations (as they did), and so they will have the income they need to pay off the debt in the future. Whatever the explanation may be, it is encouraging to discover that the greatest student debt burdens are not being borne by the students with the least income, at least in our sample of students.

Another key indicator of family support is whether the student is classified as dependent (designated for federal tax credit purposes) or independent. As expected, the results suggest that students who are dependents receive support from their families that enables them to avoid the highest loan debt. This effect, the amount of debt avoided by dependents, becomes larger for students in the highest quantiles of debt. Finally, the Florida Prepaid College fund is another indicator of family support for higher education. Our results on this variable, like the results on household income, at first seem counterintuitive. We find that students with Florida Prepaid College funds have higher student loan debts than students who did not have these funds. The result holds for the overall model and for students in the 50^{th} and 75% debt quantiles. The explanation for this is the same as the explanation for why debt levels increase with higher household income. The students whose parents or grandparents could afford to contribute to these funds for many of their pre-college years are less likely to qualify for need-based aid, or they have more expensive expectations of college life than students who did not have pre-paid college funds.

Choices that students make about where to attend college initially and which major to choose also affect student debt. Students who transfer from another college accrue significantly less student loan debt than students who entered the university as first time in college (FTIC) students. This result reflects the fact that most of the transfer students in our sample started their undergraduate studies at a less-expensive community college. Although every major requires the same number of credits to graduate, loan debt differs significantly across college majors. No doubt expected income at graduation, which differs by major and occupation, helps explain differences in students' willingness to accrue debt while in college. For example, our results show that education majors take on less debt at every quantile level than engineering majors.

The regression results in Table 3 are substantially the same as the regression results in Table 2 because the only difference in the two models is the specification

of the FBF scholarship variable and the interaction term between the FBF variable and income. Therefore, we forgo a detailed discussion of the Table 3 results and proceed to the interpretation of the two formulations of the FBF variable and their effects on student debt in the next section.

The Effect of FBF Scholarships on Student Debt

The FBF scholarship program has existed for decades, and in 2018-19, it provided more than 100,000 scholarships to the highest performing Florida students, spending over $540 million that year alone. FBF represents the greatest share of state grant aid for undergraduates in Florida (Florida Bright Futures, 2018); thus, it should have an important impact on student debt levels. *A priori*, we would expect that non-recipients, who are generally from lower SES households, would graduate with more loan debt after college than students who received the FBF scholarship.

We use the quantile regression results in Table 3 to create Figure 1, which shows the impact of receiving the Florida Bright Futures scholarship (FBFyes) on student loan debt. The results show that FBFyes and the interaction term FBFyes*INC1000 are both significant predictors of total loan debt. This means that receiving the FBF scholarship does significantly affect a student's loan debt and that the loan debt of FBF recipients versus non-recipients will be different at different income levels. To understand exactly how receiving the scholarship affects the loan debt of students from different income levels and with different levels of debt, we must calculate $\beta\Theta$, which is the partial derivative of Loan Debt with respect to receiving or not receiving the FBF scholarship (FBFyes). However, a knowledge of partial derivatives is not necessary to understand $\beta\Theta$. It can be understood as a shift parameter whose value increases or decreases (depending upon whether $\beta\Theta$ is greater than or less than zero) the amount of loan debt for students who have received a FBF scholarship. If the student has not received a FBF scholarship, then the value of $\beta\Theta$ is zero.

Table 2: Quantile Regression of Loan Debt with Selection Bias Correction and Variable FBF

DEPENDENT VARIABLE: LOAN DEBT	Heckman 2nd Stage Total Sample	Heckman 2nd Stage Quantile10	Heckman 2nd Stage Quantile25	Heckman 2nd Stage Quantile50	Heckman 2nd Stage Quantile75	Heckman 2nd Stage Quantile90
INC1000	18.41***	6.589**	9.807**	7.406	14.61**	59.02***
	(4.202)	(3.163)	(4.434)	(5.264)	(5.992)	(9.016)
INC*FBF	0.00541***	0.00186***	0.00432***	0.00687***	0.00653***	0.00379**
	(0.000704)	(0.000530)	(0.000743)	(0.000882)	(0.00100)	(0.00151)
AGE	20.81	-26.67	59.56	118.7**	56.62	-44.73
	(46.97)	(35.36)	(49.57)	(58.85)	(66.99)	(100.8)
MALE	118.3	300.7	-201.9	517.0	665.6*	296.1
	(267.9)	(201.7)	(282.7)	(335.6)	(382.0)	(574.8)
ASIAN	54.30	243.8	197.4	-26.73	603.3	476.1
	(745.1)	(560.9)	(786.3)	(933.5)	(1,063)	(1,599)
BLK	-1,035**	-278.5	332.4	-300.4	-974.3	-2,398**
	(505.7)	(380.7)	(533.7)	(633.6)	(721.3)	(1,085)
HISP	-835.0*	-447.2	-752.1	-1,223**	164.3	-523.4
	(434.0)	(326.7)	(458.0)	(543.7)	(618.9)	(931.2)
OTHER	408.4	87.22	618.1	590.4	1,403	601.7
	(671.0)	(505.1)	(708.2)	(840.7)	(957.0)	(1,440)
DEPENDENT	-3,447***	-637.6*	-2,328***	-3,376***	-5,736***	-7,639***
	(434.7)	(327.2)	(458.7)	(544.6)	(619.9)	(932.7)
MARRIED	-579.1	-218.5	-389.7	-510.3	-136.3	-1,050
	(396.2)	(298.2)	(418.1)	(496.3)	(565.0)	(850.1)

DEPENDENT VARIABLE: LOAN DEBT	Heckman 2nd Stage Total Sample	Heckman 2nd Stage Quantile10	Heckman 2nd Stage Quantile25	Heckman 2nd Stage Quantile50	Heckman 2nd Stage Quantile75	Heckman 2nd Stage Quantile90
CHILDREN	17.29	108.7	-148.3	463.6	-286.9	-705.4
	(393.9)	(296.5)	(415.8)	(493.5)	(561.8)	(845.3)
TRANSFER	-6,037***	-354.9	-1,593***	-4,805***	-9,200***	-10,798***
	(379.4)	(285.6)	(400.4)	(475.4)	(541.1)	(814.2)
HEALTH	-858.0**	261.9	13.53	-8.461	-1,092*	-2,808***
	(436.3)	(328.4)	(460.5)	(546.6)	(622.3)	(936.3)
ENGINEER	1,197**	705.6*	1,274**	1,484**	1,280*	911.4
	(544.6)	(410.0)	(574.8)	(682.3)	(776.7)	(1,169)
ARTSCI	-292.6	39.33	354.3	479.1	-835.0	-1,175
	(359.9)	(270.9)	(379.8)	(450.8)	(513.2)	(772.2)
EDUC	-1,029**	65.55	287.0	463.7	-1,513**	-4,159***
	(500.0)	(376.3)	(527.6)	(626.4)	(713.0)	(1,073)
FBF	-0.453***	-0.105**	-0.257***	-0.394***	-0.486***	-0.453***
	(0.0665)	(0.0500)	(0.0701)	(0.0833)	(0.0948)	(0.143)
FLPREPAY	0.133**	0.0869*	0.155**	0.165**	0.229**	0.262*
	(0.0667)	(0.0502)	(0.0704)	(0.0836)	(0.0952)	(0.143)
INVMILL	-16,139***	-6,240***	-10,020***	-15,243***	-17,979***	-26,589***
	(2,061)	(1,551)	(2,175)	(2,582)	(2,939)	(4,422)

DEPENDENT VARIABLE: LOAN DEBT	Heckman 2nd Stage Total Sample	Heckman 2nd Stage Quantile10	Heckman 2nd Stage Quantile25	Heckman 2nd Stage Quantile50	Heckman 2nd Stage Quantile75	Heckman 2nd Stage Quantile90
Constant	30,945***	8,688***	14,403***	25,365***	40,529***	56,059***
R^2	0.080					
Observations	9,070	9,070	9,070	9,070	9,070	9,070

Standard errors in parentheses: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 3: Quantile Regression of Loan Debt with Selection Bias Correction and Variable FBFyes

	2nd Stage Quantile Regression with FBFyes Dummy& FBFyesINC1000 Interaction				
	(1)	(2)	(3)	(4)	(5)
VARIABLES	q10	q25	q50	q75	q90
INC1000	6.703**	11.80***	9.200	17.72***	59.32***
	(3.020)	(4.085)	(6.283)	(5.610)	(9.619)
FBFyes	94.00	-92.40	1,164	1,978**	2,776*
	(725.2)	(1,017)	(1,247)	(804.1)	(1,608)
FBFyes*INC1000	4.649*	6.310	25.54***	29.97***	6.179
	(2.720)	(4.190)	(4.619)	(7.301)	(15.85)
AGE	4.145	131.1**	153.1***	157.0***	108.1
	(44.00)	(60.72)	(48.62)	(59.19)	(76.75)
MALE	145.0	-86.31	316.0	682.6	358.3
	(140.8)	(270.6)	(366.3)	(420.2)	(484.3)
ASIAN	74.05	-491.4	-11.36	1,127**	1,027
	(300.6)	(813.6)	(891.2)	(524.9)	(1,435)
BLK	101.0	767.1	-40.75	-351.5	-1,035
	(397.4)	(605.4)	(520.5)	(532.5)	(902.8)
HISP	-418.6	-864.4*	-1,249***	469.1	138.1
	(284.7)	(505.3)	(422.3)	(833.9)	(576.6)
OTHER	94.10	533.2	776.6	1,836*	964.1
	(791.4)	(675.8)	(737.1)	(1,010)	(1,431)
DEPENDENT	-980.9***	-2,780***	-4,456***	-7,094***	-9,135***
	(357.5)	(498.0)	(651.0)	(598.8)	(796.1)
MARRIED	-257.6	-493.8	-687.8	-394.4	-951.2
	(367.9)	(460.2)	(436.7)	(697.8)	(861.5)
CHILDREN	95.37	-5.528	465.9	-82.94	-470.2
	(365.2)	(529.0)	(614.6)	(791.9)	(816.9)
TRANSFER	-112.2	-1,304***	-4,529***	-7,757***	-8,591***
	(251.8)	(273.5)	(417.5)	(487.7)	(818.1)
HEALTH	344.1	227.9	-54.99	-1,180*	-2,492***
	(259.4)	(300.2)	(706.4)	(668.8)	(829.0)

	2nd Stage Quantile Regression with FBFyes Dummy& FBFyesINC1000 Interaction				
	(1)	(2)	(3)	(4)	(5)
VARIABLES	q10	q25	q50	q75	q90
ENGINEER	862.7**	1,435***	1,791***	1,095	1,299
	(391.3)	(448.8)	(486.6)	(762.5)	(1,028)
ARTSCI	23.82	724.9***	653.6	-512.5	-521.0
	(228.9)	(197.7)	(440.2)	(687.6)	(750.7)
EDUC	155.2	740.8	550.7	-1,304*	-3,719***
	(263.1)	(460.4)	(559.5)	(675.4)	(833.8)
FLPREPAY	0.0794*	0.107	0.184**	0.222**	0.153
	(0.0451)	(0.0765)	(0.0849)	(0.0907)	(0.0987)
INVMILL	-4,710***	-6,957***	-15,933***	-18,500***	-23,282***
	(1,588)	(2,449)	(3,306)	(2,705)	(4,779)
Constant	6,989***	10,595***	24,035***	35,649***	47,365***
	(1,054)	(1,969)	(1,798)	(1,913)	(2,984)
R^2	0.080				
Observations	9,070	9,070	9,070	9,070	9,070

Figure 1: Difference in Loan Debt for FBF vs. Non-Recipients, ßΘ

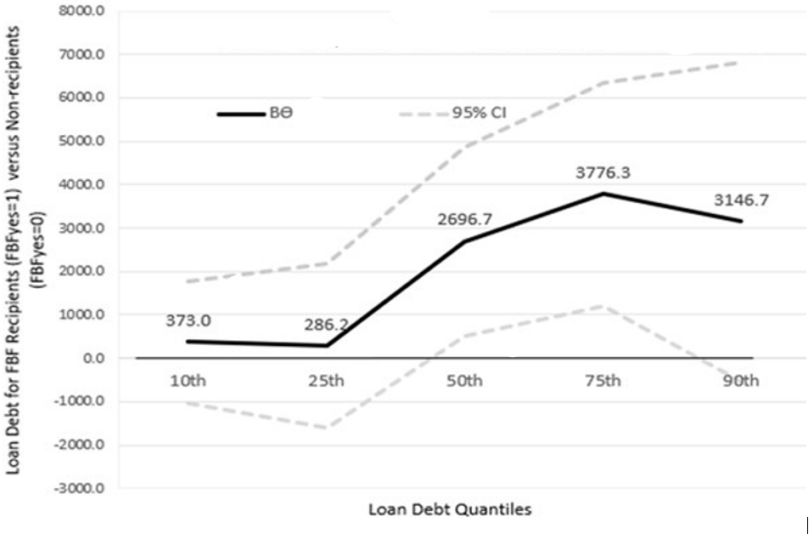


Figure 1 shows the estimate of βΘ evaluated at a household income equal to $60,000 (approximately the median value of household income in our sample) with 95% confidence limits. In other words, βΘ is the amount of difference in the loan debt of FBF scholarship recipients with $60,000 of household income compared to the loan debt for FBF non-recipients who also have $60,000 of household income. The dark line in Figure 1 shows the estimated value of βΘ for students with different debt levels. The first point on the line indicates that students who received a FBF scholarship and graduated with the lowest 10% of debt levels (and who have a household income of 60,000) will have a total debt level that is $373 dollars more than identical students who did not receive the scholarship. Moving to the students with debt levels in the 50th quantile, the students who received the FBF scholarship will graduate with $2696.70 more debt than non-recipients. In the highest debt quantile (90%), the FBF recipients have a total debt level that is $3146.70 greater than their non-recipient counterparts.

However, because these differences are estimates based on statistical sampling, we can't be 100% sure that the numbers represented on the dark line are the true values of the differences in debt between FBF scholarships recipients and non-recipients. However, the confidence limits shown by the dashed lines in the diagram allow us to say that we are 95% confident that the true value of the differences are equal to a number between the dashed lines surrounding the estimates. The graph shows that for the 10th, 25th and 90th quantiles the lower confidence limit lies below zero, and therefore, there is a 95% chance that the true value of the difference is really zero. This is too great a chance for us to say definitively that there is a *real* difference, in spite of the fact that the estimate on the dark line is greater than zero, so we must

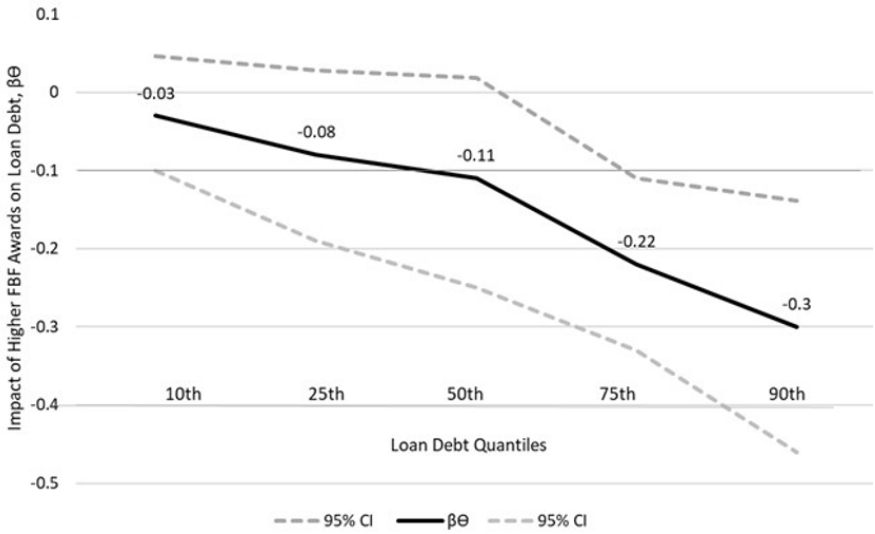
conclude that there is no statistically significant difference in debt accumulation between FBF recipients and non-recipients for students in these debt quantiles. However, between the 50th and 75th debt quantiles, the lower confidence limit is always above zero. Thus, we are 95% confident that the student loan differences between FBF recipients and non-recipients are not zero at those debt levels; they are statistically significant. In other words, we can say with only a 5% chance of being wrong, that FBF recipients in this upper midrange of debt (50th – 75th quantiles) have higher debt burdens after college than similar students who did not receive the FBF scholarship. Furthermore, we repeated our calculations of $\beta\Theta$ across different levels of household income, and we found this same result at all income levels. We estimated $\beta\Theta$ for household incomes ranging from $0 to 100,000 and the debt levels between FBF scholarship recipients and non-recipients were only significantly different between the 50th and 75th debt quantiles. At each level of household income, among the students with debt levels between the 50th and the 75th quantiles of debt, the FBF recipients had significantly higher debt levels than the non-recipients.

Why are the students who receive FBF scholarships accumulating more debt than students who do not receive the scholarship in the 50th through 75th quantiles of debt? Wouldn't they use their scholarships to reduce their loan debt rather than acquiring more? In some cases, perhaps, but our results show no evidence of this, in general. The propensity to take on more educational loan debt after receiving the FBF scholarship may be explained by the microeconomic theory of in-kind subsidies (Rosen & Gayer, 2013). This theory predicts that when the in-kind subsidy (in this case, money that can only be spent on higher education at one of Florida's universities or colleges) is relatively small compared to the overall expenditures on the good, the recipients of the subsidy will consume the same amount or more of the good being subsidized compared to the amount they were spending before the subsidy. For example, this is the case with Supplemental Nutritional Assistance Program (SNAP) benefits, previously called Food Stamps. Most SNAP recipients spend all their SNAP money as well as some of their own income on approved grocery items. It is also consistent with Susan Dynarski's (2000, 2002) results that found that the Georgia HOPE scholarship caused students to switch from two-year colleges to four-year colleges. The increase in education resources provided by the scholarship caused them to consume more education and, in some cases, students needed to acquire more debt to increase their educational spending.

Next, we explore whether the size of the FBF award impacts borrowing behavior among scholarship recipients. Table 2 shows that both the amount of the award (FBF) and the interaction term between the amount of the award and household income (INC1000*FBF) are significant predictors of loan debt, and, as we did before in deriving Figure 1, we use both variables to calculate the marginal effects across quantiles (β_Θ). Figure 2 shows the predicted marginal effects (β_Θ) across debt quantiles for higher FBF awards, evaluated at household income (INC1000) equal to $40,000. The dark line shows the estimates of these marginal effects at different debt levels. For example, the first point on the line at the lowest debt quantile of 10% is -0.03. This means that for students with household incomes of $40,000 who accumulate overall student loan debt in the lowest 10% of the debt distribution, every

$1 of additional FBF scholarship money reduces their overall debt by three cents (-0.03). However, because the upper 95% confidence limit (the dashed line) above that estimate includes the value of 0, we must conclude that there is a 95% chance that the true value of this marginal effect may be zero, or in other words, there is no statistically significant effect on the debt level caused by an increase in the FBF award. In fact, Figure 2 shows that the size of the FBF award has no significant effect on student debt levels in the 10th, 25th or 50th quantiles of debt since zero is within the upper confidence limit for those debt quantiles. This suggests that the amount of the FBF award does not impact student loan debt for students with below average to average debt levels.

Figure 2: Impact of Higher FBF Awards on Loan Debt Across Quantiles

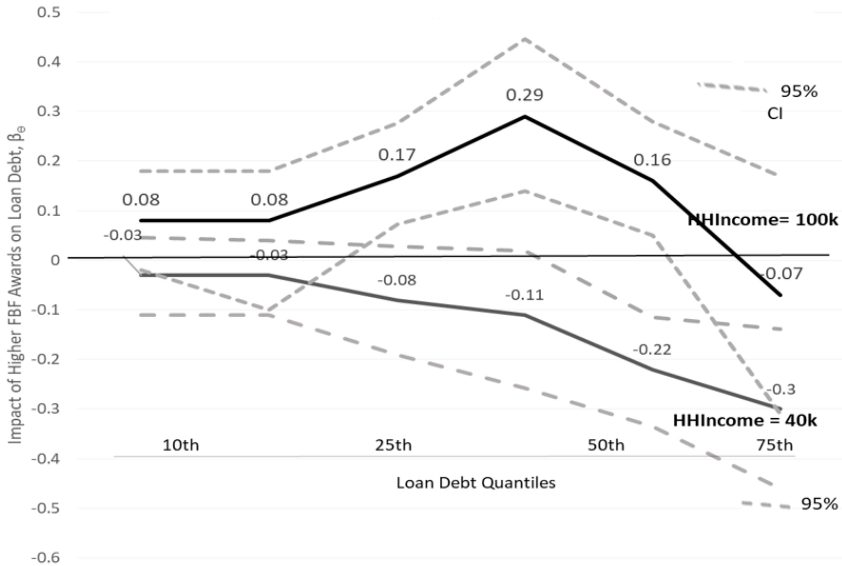


However, Figure 2 also shows that students with the highest loan burdens, the 75th and 90th quantiles, do use additional scholarship awards to significantly reduce their debt. At these debt levels, our results show that for each additional dollar of the FBF scholarship award, loan debt falls by 22–30 cents, on average. This result suggests that FBF recipients with a household income of $40,000 and the highest levels of accumulated debt do use increases in the amount of their FBF scholarships to reduce debt. Furthermore, we repeated this experiment for households at different income levels, and we found that for households earning $55,000, or less, higher FBF awards significantly reduced loan amounts for students in the 75th and 90th quantiles of debt. However, for households earning more than $55,000, this was not the case.

To demonstrate the difference in the amount of debt accumulated by FBF recipients with higher household incomes, we have added the graph for FBF recipients with $100,000 of income to the graph of FBF recipients with $40,000 of household income. These two graphs are shown together in Figure 3. The contrast

between these two graphs shows that the FBF scholarship recipients with lower household income ($40,000) use their FBF awards to reduce loan debt significantly for students in the 75th and 90th debt quantiles, but the FBF scholarship recipients with higher household income ($100,000) significantly *increase* their student loan debt in the 25th, 50th and 75th debt quantiles. Specifically, the graph of the FBF recipients with $100,000 of household income shows that for every additional dollar of FBF scholarship money, the accumulated student loan debt increases 17 cents, 29 cents, and 16 cents for students at the 25th, 50th and 75th debt quantiles, respectively. Only the high-income students with the least amount (10% quantile) and the highest amount (90th quantile) of accumulated debt had no significant change in the amount of debt they accrued from increases in the FBF award. In general, our models predict that students from lower income households are more likely to use higher FBF scholarship awards to avoid accumulating additional debt; whereas students from higher income households are more likely to increase their borrowing as scholarship awards increase.

Figure 3: Impact of Higher FBF Awards on Loan Debt by Household Income, ßo



DISCUSSION

Over the last few decades many state and local governments have dramatically reduced funding for higher education. This has resulted in tuition inflation and a surge in student loan debt. Many states, including Florida, have also shifted the funding for

undergraduate students away from need-based aid toward merit-based scholarships. These merit-based awards disproportionately benefit students who come from the highest SES households (Binder & Ganderton, 2004; Borg & Borg, 2007; Cornwell & Mustard, 2007; Heller, 2006; Stranahan & Borg, 2004). Florida Bright Futures scholarships represent the greatest share of state grant aid for undergraduates, yet only half of the students entering college in Florida meet the qualifications. One could argue that FBF scholarship recipients enter college with greater academic abilities, based on their high school grades and SAT or ACT scores, as well as greater financial resources, based on receiving the scholarship awards as well as higher household incomes, on average. Do these advantages result in FBF scholarship recipients leaving college with lower student debt burdens? Based on our research, the answer to this question is, "It depends."

One of the advantages of our data is that over the period that our data were collected, all Florida Bright Futures Scholarship recipients were required to submit a FAFSA application; therefore, our data include a much broader income distribution since many high-income households that would not normally submit a FAFSA application did so in order to receive the scholarship. One factor that determines the answer to this question is the overall debt level that students accumulate by the time they graduate. For example, there is no significant difference in the amount of debt accumulated by FBF recipients and non-recipients in the lowest and highest ends of the debt distribution (the 10^{th}, 25^{th} and 90^{th} quantiles of overall student debt levels). However, among students in the upper mid-range of the debt distribution (the 50^{th} and 75^{th} debt quantiles), FBF recipients accumulate significantly *more* loan debt than otherwise equal non-recipients. In this case, we suggest that the FBF scholarship creates an education-specific income effect inducing students to spend more on all goods including higher education when they receive the award. Our results also show that the Florida Pre-Paid College Plan, a similar in-kind higher education subsidy, has a comparable effect. Students that have pre-paid college tuition plans increase their educational investment by borrowing more than similar students without the pre-paid plans.

Household income is another factor that affects the debt accumulated by FBF scholarship recipients versus non-recipients. We find that FBF recipients from higher income households choose to borrow more for college than FBF recipients from lower income households. FBF recipients from lower income households may have access to need-based scholarships, whereas students from higher income households do not. It may also be that FBF recipients from higher income households have expectations of a more expensive college experience that includes living on campus, studying abroad, and participating in campus social life, which requires more borrowing. Whatever the reason, our results show that even though merit-based scholarships are disproportionately received by higher income students, they have not disproportionately improved the debt burdens of these students relative to their lower income counterparts.

We also examine the borrowing behavior of FBF recipients in response to changes in the FBF award amounts. Our results show that students from lower income households ($55,000 and below) in the bottom half of the debt distribution (below the

50th quantile) did *not* significantly change their debt levels in response to additional FBF award amounts; however, the lower income ($55,000 and below) students in the top half of the debt distribution (50th quantile and above) did significantly reduce debt as award amounts increased. Students from the highest income households ($100,000) in the upper midrange of the debt distribution (50th and 75th debt quantiles) actually *increased* their student debt levels as their FBF awards got larger.

In summary, our model predicts that FBF recipients accumulate higher debt, on average, than similar students who did not receive the award. However, for students from the lowest income households and with the highest levels of debt, the FBF scholarship award does reduce the overall amount of debt they accumulate. This means that FBF scholarship recipients are at no significant advantage relative to non-scholarship recipients when it comes to student debt accumulation for students from high income households. However, in the specific case of low-income students with the highest debt levels, they do receive significant debt relief from their FBF scholarships.

The policy implications of our research are straight-forward. If states wish to use their merit scholarship programs to help reduce student debt burdens, they should target those scholarships at lower income households, perhaps by giving higher awards to low-income students and lower awards to high-income students.

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