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# The Equity Effects of the State Funding of Higher Education and Lottery-Funded Scholarships

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## ABSTRACT

Are state universities and state scholarship programs perpetuating income inequality in the United States? Using data from Florida on the number of students from each public high school in the state who attended a State University System (SUS) university and the number who received a Florida Bright Futures (FBF) scholarship, this paper attempts to answer this question. The results of the models showed that an average high school with no disadvantaged students could expect to send 124 students to SUS universities and to have 121 students receive FBF scholarships, but the same average high school with 100% disadvantaged students could expect only seven students to go to SUS universities and seven students to receive FBF scholarships. The results indicate that the distribution of the benefits of state higher education funding and FBF scholarships is regressive.

**Keywords:** higher education, equity, university admission, merit-based scholarships

Common wisdom in the United States suggests that state-financed higher education is the great income equalizer. Most people believe that the way for poor children to get out of poverty is by attending college, and the most affordable college education is provided by the state. This may have been true once, but has the downward trend in appropriations to state universities and the increase in state merit-based financial aid made the opposite true today? Are state universities and state scholarship programs making it increasingly difficult for children from poor families to attend college? Using data from Florida on the number of students from each public high school in the state who attended a State University System (SUS) university and the number who received a Florida Bright Futures (FBF) scholarship, this paper attempts to answer this question.

Since the Great Recession of 2008, the amount of state funding for higher education has decreased and the amount of tuition at state universities has increased in most states. Nationally, the amount of state funding for higher education fell by $3.4 billion between 2009 and 2019 (Jackson & Saenz, 2021). This amounted to an average cut of $1033 per student. Over this same period, tuition increased by an average of $2,576 per year (Jackson & Saenz, 2021). It is no surprise, then, that average student loan debt at graduation grew from $23,594 in 2009 to $30,464 in 2019 (Hanson, 2023).

Another trend that has disadvantaged students from lower income households is the reduction in state-financed college scholarships based solely on income. In their place, many states are now awarding merit-based scholarships, often funded by lottery revenues. Forty-nine of the 100 largest state financial aid programs are awarded based on financial need. Seventeen programs use only merit-based criteria. The remaining thirty-four programs use a combination of merit and financial need in awarding financial aid for college (Education Commission of the States, 2023). Thus, slightly over half of the largest state scholarship programs use merit as one of the criteria for awarding financial aid, and 17% use merit as the only criterion. Numerous studies (Broer et. al., 2018; Chmielewski, 2019; Destin et al., 2019) show that students from lower income households often perform more poorly in school and on standardized tests than students from higher income households. This places low-income students at a disadvantage in obtaining these merit-based college scholarships.

The federally funded Pell grants, on the other hand, are awarded solely on the basis of financial need. However, the value of the Pell grant has not increased as much as the costs of college. In 1980, the maximum value of a Pell grant was $1800 and in 2023 it was $7,395. This may sound like a large increase, but when these values are adjusted for inflation using the Consumer Price Index with 1983 as its base year, the 1980 Pell Grant award was worth $2184 and the 2023 award was worth $2430. In contrast, the average cost of tuition and fees at a public 4-year university in 1980 was $738 (Hanson, 2022) compared to $10,662 in 2023 (US News, 2023). Given these trends, it is not surprising that today's children from low-income households may not be able to improve their socio-economic status as much as older generations did.

## LITERATURE REVIEW

Research on the distributional effects of higher education began with Hansen and Weisbrod's (1969) seminal article, "The Distribution of Costs and Benefits of Higher Education: The Case of California". They concluded that the California system of financing higher education did not provide the equality of opportunity that its proponents thought it did. In fact, they concluded that the funding of the California higher education system contributed to higher, not lower income inequality. This conclusion was based on their empirical results that found that only 10.7% of the students from the lowest income households qualified for the prestigious University of California universities, whereas over 40% of the students from the highest income families did. Thus, students from the lower income households were relegated to the less prestigious and lower-funded state colleges and junior colleges. They also surmised that this was likely not a result that was limited to California, since many states funded higher education by giving the greatest support to the flagship universities, which enroll few students from low-income households.

Hansen and Weisbrod's article created a firestorm of controversy resulting in five comments on their article (Pechman, 1970; Hartman, 1970; Hansen & Weisbrod, 1971; Conlisk, 1977; McGuire, 1978). Their chief critic was Joseph Pechman (1970), who argued that Hansen and Weisbrod had not accounted for the taxes paid by households at different income levels. When he included the taxes, he estimated that households with incomes of $12,000 or less received net subsidies for higher education, and households with incomes above 12,000 paid net taxes for higher education. Hartman (1970) reconciled these two views by recognizing that both authors reach similar conclusions which are: 1) that poor households pay lower state and local taxes, but they do not have many children who attend the top universities. However, for the poor households who do have children in the top universities, their benefits are so large relative to the small amount of taxes they pay that that their income class receives net benefits, on average. 2) Wealthy households pay greater state and local taxes, and they have many children who attend the top universities. However, there are also many high-income households who do not have children, or their children attend private universities. High income households with children attending the top public universities receive net benefits from higher education. However, there are enough households without children in the top universities that pay taxes and receive no benefits, that their net taxes paid outweigh the net benefits received by the high-income group with children attending the universities, so on average, the high-income group pays net taxes. The difference between Hansen and Weisbrod's analysis and Pechman's was in how they distributed the benefits. Hansen and Weisbrod examined the benefits of higher education subsidies distributed by the type of institution the students attended, whereas Pechman examined the distribution of the *average* benefits of higher education subsidies by income distribution.

Which perspective is correct? Pechman is correct from the standpoint of traditional tax incidence analysis. If the purpose of higher education subsidies is simply to increase the number of people getting a college degree to account for the external benefits created by higher education, then Pechman's analysis should be the standard. But if the purpose of higher education subsidies is to improve income inequality by providing equality of opportunity for poor households, then Hansen and Weisbrod's approach has merit. As they write in their original paper, "…whatever the degree to which our current higher education programs are rooted in a search for equality of opportunity, the results still leave much to be desired" (p. 191).

For the last fifty years, researchers have reached much the same conclusions (Hearn & Longanecker, 1985; Hoenack, 1971; Toutkoushian & Shafiq, 2010; Windham, 1979). A survey article by Leslie and Brinkman (1988) supported Hansen and Weisbrod's assertion that the distribution of higher education benefits was like California's in many other states as well. Kane (1999), using National Post-Secondary Student Aid Survey data, found that students from high-income families received almost twice as large a subsidy for college as students from low-income families.

Johnson (2006) provided evidence to support Pechman's conclusion that when taxes are factored in, the net benefits of higher education are not regressive. Thus, the equity of higher education subsidies still boils down to whether the subsidies are meant to account only for the external benefits of higher education or are meant to provide equality of opportunity for children from low-income households.

A new wrinkle has been added to the equality of opportunity debate by the prevalence of lottery-financed merit scholarships such as the HOPE scholarship in Georgia and the Bright Futures scholarship in Florida. Some context is needed here to understand the reason states began using lottery money to fund college scholarships. When Florida proposed a state lottery in the early 1980s, a constitutional amendment was needed because lotteries were forbidden in the state constitution. Many of the lottery's proponents feared that a majority of voters in the state would vote down the lottery amendment because they held religious objections to gambling. They hoped that by earmarking the revenues generated by the lottery solely to education, it would improve the probability of passing the amendment, and it did. The amendment approving the Florida Education Lottery passed in November of 1986. Unfortunately, the citizens of Florida quickly realized they had been bamboozled when as soon as lottery revenue began coming into the education budget, general revenue funding for education began leaving (Borg & Mason, 1990). State funds are fungible, and it is often the case that politicians give with one hand and take away with the other. When Georgia started their lottery in 1992, they wanted to avoid this fungibility problem, so they created an entirely new educational program to be funded by the lottery. This new program was the HOPE scholarship. If a program had never been funded with general revenues, then those funds could not be taken away. They advertised their scholarship as a way to help students afford college and keep the best and the brightest of their high school graduates in the state for college. It worked so well that Florida copied it a few years later when it created the Florida Bright Futures scholarships.

Lottery funded scholarships were extremely popular with the voting public, especially voters in the middle and upper quintiles of the income distribution whose children attended the types of schools and engaged in the kind of educational activities that made it easy for them to earn these scholarships. The scholarships were found money for households who had already planned to send their children to college and had begun saving for it. Anecdotal stories abounded about families whose children had been accepted to Ivy League colleges, but their parents promised to buy them luxury cars and European vacations if they would stay in state and go to the state's flagship university. It is no coincidence that the competition to get into the state's top universities increased exponentially when these scholarships came into being.

Although the middle-and upper-class public loved these lottery-funded scholarships, public policymakers who cared about equity were appalled. It is a well-known fact in public finance that lotteries are a regressive way to raise revenues. The poor and the elderly have much more to gain by playing the lottery than more affluent people, and so they spend a greater proportion of their income on lottery tickets than higher income people. It is also a well-known fact that children from wealthier families make better grades and do better on standardized tests, on average, than children from poorer households. When you combine these well-known facts, merit-based scholarships funded by lottery revenues are tantamount to robbing from the poor to give to the rich, a reverse Robin Hood effect. Soon there was much scholarly evidence to support this view (Rubenstein & Scafidi, 2002; Stranahan & Borg, 2004; Duffourc, 2006; Borg & Borg, 2007; Mckinney, 2009). Policymakers may not have intentionally set out to create the most regressive policy they could think of to fund higher education,  but once they realized they had, they certainly did nothing to stop it.

This paper is unique in the fact that it explores the intersection of the equity effects of lottery-funded merit scholarships with the equity effects of the state funding of higher education. Many years ago, scholars began to suspect that the way states funded higher education was probably giving more benefits to the wealthy than to the poor, but adding merit-based scholarships funded by lotteries to the mix is most likely adding fuel to the fire.

## DATA AND METHODOLOGY

Two models are estimated in this paper. The first is a Tobit model that estimates the proportion of students from each Florida public high school who registered at a Florida SUS university in the fall of 2020. If the number of students who registered from any high school was less than ten, then an asterisk was recorded for that observation. This was done to protect the privacy of the students. Since the data are censored by a lower limit of ten, the Tobit model is used for estimating the SUS registration equation. The Tobit model can be written as a latent variable regression model, with a continuous outcome variable $y_i^*$ that is either observed or unobserved. The equation is as follows:

$$y_i^* = \beta(x_i) + \varepsilon_i \text{ , where}$$

$$y_i^* = \begin{cases} y_i & \text{if } y_i \geq 10 \\ 0 & \text{if } 0 \leq y_i \leq 9 \end{cases}$$

$x_i$ = vector of demographic and socio-economic characteristics of the school

$\varepsilon_i$ = errors that are independent with distribution N (0, σ2) for i = 1, 2, . . . , n.

In this model, $y_i^*$ is the latent variable representing the true value of the dependent variable, and $y_i$ is the observed value of the variable. The independent variables, represented by the x vector, are the socioeconomic and demographic characteristics of the high school. Tobit regression coefficients are interpreted like OLS regression coefficients; however, the linear effect is on the uncensored latent variable, not the observed outcome.

The second model in the paper estimates the number of Florida Bright Futures scholarships received in the zip code in which the high school resides. Since this data is not censored, it can be estimated with a standard linear regression model expressed as follows:

$y_i = \beta(x_i) + \varepsilon_i$, where

$y_i$ = the number of FBF scholarships received in the school's zip code

$x_i$ = vector of demographic and socio-economic characteristics of the school

$\varepsilon_i$ = errors that are independent with distribution N (0, σ2) for i = 1, 2, . . . , n.

The estimates from the second model serve as a proxy for the number of students at the high school who receive a Florida Bright Futures Scholarship. Thus, they supplement the results of the Tobit regression by allowing an examination of not only which high schools send the largest of number of students to SUS universities, but also which high schools have the largest number of students who receive additional funding to attend those universities.

The data for this project came from the Florida Department of Education (FDOE). They provided the FTIC application status by State University System institution and by high school for the fall of 2020. These data included the application status of the students from every high school in the US and abroad that applied to one of the twelve Florida SUS universities for admittance in the fall of 2020. The application status included how many students applied, how many were accepted, and how many registered for classes at each of the universities, although only the number of students who registered for classes was used in the analysis. These data were then matched with the high school's demographic and economic data contained in the FDOE's School Report Card (https://edudata.fldoe.org/). These data are only available for the public and charter high schools in the state, so Florida's private high schools are not included in the analysis. The Florida Department of Education also provided the number of eligible Bright Futures students by recipient zip code for 2019, the most recent year available. These data were matched to the zip codes of the high schools to get an approximation of the number of Bright Future scholarships received by the students at the high school.

## IMPLICATIONS OF THE MODELS

Florida is a large state with only ten major state universities, and two smaller specialty universities, New College of Florida (enrollment 361 students in Fall 2024) and Florida Polytechnic University (enrollment 1569 students in fall 2024). Thus, admission into an SUS university in Florida is highly competitive, especially for the University of Florida (UF) and Florida State University (FSU). The middle 50 percent of admitted first time in college (FTIC) students at UF and FSU had an SAT that ranged from 1370 to 1490 and GPAs that ranged from 4.35 to 4.45. The other SUS universities are less selective, but the average SAT scores of the middle 50% of their first-year students still ranged from 1134 to 1281 and their GPAs ranged from 3.83 to 4.34 (State University System [SUS] Admissions Matrix, 2024). Although Florida does have a talented 20 program that helps some students from lower-ranked high schools gain admission into the SUS universities, it guarantees that graduates in the top 20% of their Florida high school class will have a place at one of the SUS universities, but not one of the flagship universities.

Furthermore, to receive a Florida Bright Futures scholarship, students must have extremely high SAT or ACT scores as well as a very high weighted[1] GPA. The requirements to receive the highest valued Florida Academic Scholarship is an SAT score of 1330 and a weighted GPA of 3.50. Even to receive the lower valued Florida Merit Scholarship, a student must have an SAT score of 1210 and a weighted GPA of 3.00. This is in a state where the overall mean SAT score in 2022 was 983, and the mean for students in the top income quintile was only 1122 (College Board, 2022a). Thus, most of the students receiving these scholarships in Florida are in the very top income brackets.

Because the requirements to receive a FBF scholarship and the admission requirements for Florida's SUS universities are equally rigorous, the demographic and socio-economic characteristics of the schools are expected to have the same effect in both models. The characteristics that represent the racial distribution of students at a school and the different socio-economic levels of the students at a school have been shown in numerous studies to affect the academic performance of students (Battle & Lewis, 2002; Caldas & Bankston, 1997; Willie, 2001). Specifically, the students attending schools with higher proportions of Black and Hispanic students and greater proportions of students from lower-socioeconomic backgrounds are expected to have lower standardized test scores, on average, than the students attending high schools with low proportions of Black, Hispanic, and low-income students. Also, the high minority, high poverty high schools are likely to be rated lower in state school ranking schemes, such as the one in Florida, that rely on student test scores to give them grades from A through F. Standardized test scores are a crucial criterion for both admission into an SUS university and the awarding of a Florida Bright Futures Scholarship. Thus, the model predicts that high schools with higher proportions of Black and Hispanic students and higher proportions of students who qualify for free or reduced lunches will have fewer of their students get into an SUS university and receive a Bright Futures Scholarship.

## RESULTS

### SUS Enrollments

The description and the descriptive statistics for the variables used in the analyses are shown in Tables 1 and 2. Two different samples of the data were used in the analyses. The first sample includes all the public high schools in the state, but the second sample, used to estimate the FBF scholarship model, excludes the charter and magnet schools from the sample of Florida high schools. This was necessary because the magnet schools and charter schools are not neighborhood schools. Unfortunately, the

[1] A weighted GPA gives additional points to AP and International Baccalaureate classes and removes some classes like physical education, chorus, and band from the GPA calculation.

data on FBF scholarships were available only by zip code and not by school. In magnet and charter schools, there may not be a connection between the school's zip code and the zip codes where their students live. However, this connection is much stronger in the neighborhood high schools. For the FBF analysis to be valid, the students and the schools need to be in, or at least close to, the same zip codes so that the schools and the neighborhoods will reflect the same socioeconomic and demographic characteristics. Therefore, Table 1 shows the values of the descriptive statistics for the total sample, and Table 2 shows the descriptive statistics for the sample that excludes the magnet and charter high schools.

**Table 1: Descriptive Statistics of the Total Sample (n = 526)**

| Variable | Description | Min | Max | Mean | Std. Dev. |
|---|---|---|---|---|---|
| Charter | 1 if a Charter High School, 0 if not | 0 | 1 | 0.14 | 0.35 |
| Magnet | 1 if a Magnet High School, 0 if not | 0 | 1 | 0.38 | 0 |
| FAMUprop | Proportion of students attending FL Agric. & Mech. Univ. from each HS | 0 | 0.013 | 0.00016 | 0.001 |
| FAUprop | Proportion of students attending FL Atlantic Univ. from each HS | 0 | 0.06 | 0.002 | 0.007 |
| FGCUprop | Proportion of students attending FL Gulf Coast Univ. from each HS | 0 | 0.10 | 0.002 | 0.009 |
| FIUprop | Proportion of students attending FL Intl. Univ. from each HS. | 0 | 0.24 | 0.004 | 0.019 |
| FPolyprop | Proportion of students attending FL Polytech. Univ. from each HS | 0 | 0 | 0 | 0 |
| FSUprop | Proportion of students attending FL State Univ. from each HS | 0 | 0.098 | 0.003 | 0.008 |
| NCFprop | Proportion of students attending New College FL from each HS | 0 | 0.006 | 0.00001 | 0.003 |
| UCFprop | Proportion of students attending Univ. of Central FL from each HS | 0 | 0.13 | 0.006 | 0.012 |
| UFprop | Proportion of students attending Univ. of Florida from each HS | 0 | 0.09 | 0.004 | 0.009 |
| UNFprop | Proportion of students attending Univ. of North Florida from each HS | 0 | 0.07 | 0.002 | 0.007 |
| USFprop | Proportion of students attending Univ. of South Florida from each HS. | 0 | 0.15 | 0.004 | 0.010 |
| UWFprop | Proportion of students attending Univ. of West Florida from each HS | 0 | 0.10 | 0.0009 | 0.007 |
| Systemprop | Proportion of students attending any SUS university from each HS | 0 | 0.58 | 0.04 | 0.05 |
| BFscholarprop | Proportion of BF scholarships received in HS's zip code | 0 | 2.31 | 0.06 | 0.180 |
| DisadvPct | Percentage of disadvantaged students at the high school. | 0 | 100 | 58.65 | 25.19 |
| WhitePct | Percentage of white students at the HS | 0 | 94.7 | 38.48 | 25.23 |
| BlackPct | Percentage of Black students at the HS | 0 | 92.3 | 21.43 | 20.81 |
| AsianPct | Percentage of Asian students at the HS | 0 | 35.9 | 2.84 | 3.65 |
| HispPct | Percentage of Hispanic students at the HS | 0 | 98.1 | 33.46 | 24.19 |
| HSenroll | Student enrollment at the HS | 58 | 4838 | 1532.03 | 858.71 |

**Table 2: Descriptive Statistics of the Sample that Excludes Magnet and Charter High Schools (n = 252)**

| Variable | Description | Min | Max | Mean | Std. Dev. |
|---|---|---|---|---|---|
| Charter | 1 if a Charter High School, 0 if not | 0 | 0 | 0 | 0 |
| Magnet | 1 if a Magnet High School, 0 if not | 0 | 0 | 0 | 0 |
| FAMUprop | Proportion of students attending FL Agric. & Mech. Univ. | 0 | 0.009 | 0.00016 | 0.001 |
| FAUprop | Proportion of students attending FL Atlantic Univ. | 0 | 0.06 | 0.0015 | 0.005 |
| FGCUprop | Proportion of students attending FL Gulf Coast | 0 | 0.10 | 0.002 | 0.009 |
| FIUprop | Proportion of students attending FL Intl. Univ. | 0 | 0.24 | 0.0035 | 0.023 |
| FPolyprop | Proportion of students attending FL Polytech. Univ. | 0 | 0 | 0 | 0 |
| FSUprop | Proportion of students attending FL State Univ. | 0 | 0.10 | 0.004 | 0. |
| NCFprop | Proportion of students attending New College FL | 0 | 0 | 0 | 0 |
| UCFprop | Proportion of students attending Univ. of Central FL | 0 | 0.13 | 0.007 | 0.15 |
| UFprop | Proportion of students attending Univ. of Florida | 0 | 0.09 | 0.004 | 0.01 |
| UNFprop | Proportion of students attending Univ. of North Florida | 0 | 0.06 | 0.002 | 0.007 |
| USFprop | Proportion of students attending Univ. of South Florida | 0 | 0.15 | 0.003 | 0.011 |
| UWFprop | Proportion of students attending Univ. of West Florida | 0 | 0.05 | 0.001 | 0.005 |
| Systemprop | Proportion of students attending any SUS university | 0 | 0.58 | 0.04 | 0.07 |
| BFscholarprop | Proportion of BF scholarships received in HS's zip code | 0 | 0.80 | 0.04 | 0.18 |
| DisadvPct | Percentage of disadvantaged students at the high school | 0 | 100 | 58.05 | 26.10 |
| WhitePct | Percentage of white students at the HS | 1.7 | 94.7 | 48.33 | 22.63 |
| BlackPct | Percentage of Black students at the HS | 0 | 92.2 | 16.95 | 15.95 |
| AsianPct | Percentage of Asian students at the HS | 0 | 11.4 | 2.51 | 2.56 |
| HispPct | Percentage of Hispanic students at the HS | 0 | 97.5 | 27.37 | 20.57 |
| HSenroll | Student enrollment at the HS | 119 | 4838 | 1630.3 | 825.53 |

Separate Tobit models were estimated for the proportion of students from each high school who enrolled at any of the SUS universities (System) and the proportion of students who enrolled at each of the individual SUS universities. The only individual universities not included in the models were New College of Florida and the Florida Polytechnic University because their enrollments were too low to give meaningful results. The independent variables in the models are the demographic and socio-economic information for each high school taken from the schools' Report Cards published by the FDOE. The results of the Tobit models are shown in Table 3.

Each row in Table 3 shows the results of one of the estimated Tobit equations. The first row shows the Tobit equation for the proportion of students from each high school who attended any of the SUS universities (Systemprop). The results show that having a greater percentage of Black, Asian, and Hispanic students significantly increased the proportion of students that a high school sent to the SUS universities. These results were unexpected for the Black and Hispanic student percentages, given that previous researchers found that Black and Hispanic students often perform more poorly on standardized tests (Battle & Lewis, 2002; Caldas & Bankston, 1997; Willie, 2001). It may be that the Talented 20 student admission policy helps to mitigate the effect of standardized test scores on admittance to SUS universities in this instance. On the other hand, the high schools with greater percentages of disadvantaged students sent significantly smaller proportions of students to SUS universities. The term disadvantaged refers to students who qualified for free or reduced-price lunch at the school. To be eligible for free or reduced-price lunches, a family of two can earn no more than $36,462 per year in Florida in 2023.[2] It is the disadvantaged variable that is of most interest in determining if the benefits of the SUS are distributed equitably. The negative and significant coefficient of that variable suggests that the benefit distribution is regressive, since high schools with higher percentages of disadvantaged students send significantly fewer students to the combined SUS universities than high schools with fewer disadvantaged students.

To investigate whether all the SUS universities enrolled fewer students from highly disadvantaged high schools, Tobit models were estimated for each university separately. The results show that the disadvantaged variable was negative and significant in all ten of the individual university equations. This implies that the negative effect of attending an SUS university if you graduated from a Florida high school with a high percentage of economically disadvantaged students applies to all the universities, even the ones that are considered less competitive.

There were also some interesting effects based on racial and ethnic differences in the high schools. It should be noted that the racial effects are relative to the percentages of White students and multiracial students in the high schools, which were the omitted race variables in the model. High schools with high percentages of Asian students placed more students in the SUS overall, and in the most prestigious universities in the system. The AsianPct variable was positive and significant in the equations for the flagship universities of UF and FSU, and the R1, research-oriented universities, USF, UCF, and FIU. This result confirms what other researchers have found in studies of Asian students' high academic achievements (Kao, 1995; Liu & Xie, 2016; Sue & Okazaki, 2022.) The high schools with the highest percentages of Black students placed significantly more students in the system overall, and at FAMU, which is an HBCU, and at FAU in Boca Raton, FIU in Miami, and UNF in Jacksonville. The latter three universities are in urban areas of Florida that have higher Black populations. On the other hand, the high schools with the highest percentages of Black students placed significantly *fewer* students at Florida Gulf Coast University in Ft Myers, which is a retirement destination in the southwest part of the state and has a relatively smaller Black population. The high schools with high percentages of Hispanic students placed significantly more students in the system overall and at UF. They also placed more students at FIU, FAU, and UCF, all areas of the state with large Hispanic populations. However, the HispPct variable was negative and significant in the equations for UNF and UWF. These results are not surprising for UNF (Jacksonville) and UWF (Pensacola), which are in the regions of Florida with the smallest Hispanic populations (US Census, 2022).

[2] The 2023 eligibility requirements for different family sizes can be found at https://www.floridahealth.gov/programs-and-services/childrens-health/child-care-food-program/_documents/income-eligibility.pdf.

**Table 3: The Estimated Tobit Models for the SUS and Individual Universities (n = 526)**

| Dependent Variable | Constant | DisadvPct | BlackPct | AsianPct | HispPct | $X^2$ |
|---|---|---|---|---|---|---|
| System | 0.061*** | -0.0008*** | 0.0003* | 0.003*** | 0.0007*** | 178.20*** |
| | (0.008) | (0.00009) | (0.0001) | (0.0007) | (.0001) | |
| UFprop | 0.002 | -0.0004*** | 0.00003 | 0.002*** | 0.0001** | 162.38*** |
| | (0.003) | (0.00006) | (0.00007) | (0.0003) | (0.00005) | |
| FSUprop | 0.005 | -0.0004*** | 0.00003 | 0.001*** | 0.00004 | 131.36*** |
| | (0.003) | (0.00006) | (0.00007) | (0.0003) | (0.00005) | |
| FAMUprop | -0.026*** | -0.0002* | 0.0004*** | 0.0003 | -0.0002 | 44.68*** |
| | (0.01) | (0.0001) | (0.0001) | (0.0004) | (0.00014) | |
| FAUprop | -0.015*** | -0.0005*** | 0.0005*** | 0.0004 | 0.0002** | 53.94*** |
| | (0.005) | (0.0001) | (0.0001) | (0.0004) | (0.00008) | |
| FIUprop | -0.177*** | -0.0009*** | 0.001*** | 0.003*** | 0.003*** | 192.52*** |
| | (0.026) | (0.0002) | (0.0003) | (0.001) | (0.0003) | |
| FGCUprop | -0.037*** | -0.0005** | -0.0007** | -0.0004 | 0.0002 | 20.32*** |
| | (0.014) | (0.0002) | (0.003) | (0.0013) | (0.0002) | |
| UCFprop | -0.009*** | -0.0005*** | 0.00007 | 0.001*** | 0.0002*** | 135.78*** |
| | (0.004) | (0.00006) | (0.00007) | (0.0003) | (0.00005) | |
| UNFprop | -0.001 | -0.0006*** | 0.0003** | 0.0006 | -0008*** | 91.62*** |
| | (0.006) | (0.0001) | (0.0001) | (0.0004) | (0.0002) | |
| USFprop | -0.0008 | -0.0004*** | -0.00016 | 0.002*** | -0.00009 | 105.21*** |
| | (0.004) | (0.00008) | (0.0001) | (0.0004) | (0.00008) | |
| UWFprop | 0.014 | -0.0007** | 0.00001 | -0.0023 | -0.0045*** | 42.09*** |
| | (0.024) | (0.00036) | (0.0004) | (0.0024) | (0.0015) | |

In Tobit regression equations, the dependent variable is the unobserved continuous latent variable $y^*$, instead of the actual observed variable y, which is censored at 0. Because of this, it is difficult to interpret the magnitudes of the coefficient estimates in the same way that one would interpret the coefficient estimates in a standard regression model. To get around this difficulty, it is useful to estimate the marginal effects of each of the independent variables estimated at the sample means of each independent variable. These marginal effects are shown in Table 4.

**Table 4: Marginal Effects in the Tobit Models Evaluated at the Sample Means of the Independent Variables (Evaluated at Average HS size = 1532)**

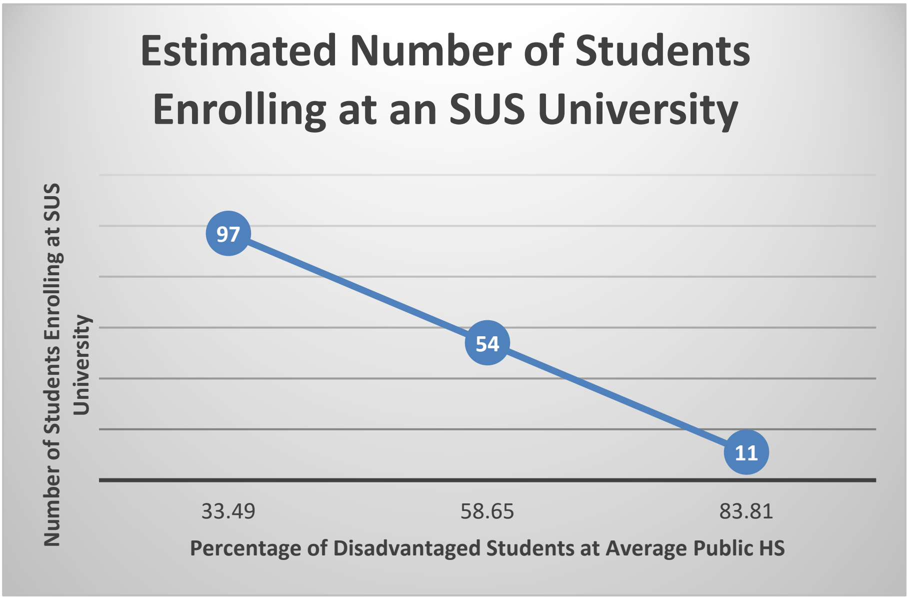
| | Independent Variables | | | |
|---|---|---|---|---|
| Dependent Variable | DisadvPct | BlackPct | AsianPct | HispPct |
| Systemprop | -0.0008*** | 0.0002** | .0025*** | 0.0005*** |
| | (-1.23 students) | (0.30 student) | (3.83 students) | (0.766 student) |
| UFprop | -0.0001*** | 0.0000007 | 0.0004*** | 0.00003** |
| | (-0.15 student) | (0.001 student) | (0.613 student) | (0.05 student) |
| FSUprop | -0.00009*** | 0.000007 | 0.0002*** | -0.000009 |
| | (-0.14 student) | (0.01 student) | (0.30 student) | (0.01 student) |
| FAMUprop | -0.0000004 | 0.0000009 | 0.0000007 | -0.0000004 |
| | (-.0006 student) | (0.0014 student) | (0.001 student) | (0.0006 student) |
| FAUprop | -0.00006*** | 0.00006*** | 0.00005 | (0.00002*** |
| | (-0.09 student) | (0.09 student) | (0.08 student) | (0.03 student) |
| FIUprop | -0.00007*** | 0.00003 | 0.0004*** | 0.00002 |
| | (-0.11 student) | (0.05 student) | (0.61 student) | (0.03 student) |
| FGCUprop | -0.00003** | -0.00004** | -0.00003 | 0.00001 |
| | (-0.05 student) | (-0.06 student) | (-0.05 student) | (0.02 student) |
| UCFprop | -0.0002*** | 0.00003 | 0.0004*** | 0.00005*** |
| | (-0.31 student) | (0.05 student) | (0.61 student) | (0.08 student) |
| UNFprop | -0.00002*** | 0.00001** | 0.00003 | -0.00004*** |
| | (-0.03 student) | (0.02 student) | (0.05 student) | (-0.06 student) |
| USFprop | -0.00007*** | -0.00004 | 0.00036*** | -0.00002 |
| | (-0.11 student) | (-0.05 student) | (0.55 student) | (0.03 student) |
| UWFprop | -0.0000003 | -0.000000005 | -0.000001 | -0.000003 |
| | (-0.0005 student) | (0 students) | (-0.002 student) | (-0.005 student) |

Significance levels: *10%, **5%, ***1%

Since the model estimates the *proportion* of the students at the school who attend an SUS university, the marginal effect was multiplied by the average high school size (1532 students) to give a more intuitive interpretation of the effect. These estimates are shown in parentheses below the estimated marginal effect. The marginal effect of the DisadvPct variable when System is the dependent variable indicates that a one percentage point increase in disadvantaged students at an average public high school (a high school with the mean value of all the independent variables) reduces the number of students who attend any SUS university by about 1.23 students. Looking at the marginal effects in the individual universities, a one percentage point increase in disadvantaged students reduces the number of students who attend UCF by almost 1/3 (-.31) of a student, and by .15 and .14 of a student at UF and FSU, respectively). The remaining significant marginal effects are smaller, ranging from about 1/10 of a student at FIU (-.11), USF (-.11), and FAU (-.09) to -.05 of a student at FGCU and -.03 of a student at UNF. Although these numbers are small, the percentage of disadvantaged students ranges from 0 to 100 in Florida's public high schools, so these differences often result in very large differences between actual high schools.

The graph in Figure 1 helps the reader understand the full effect of an increase in disadvantaged students on the number of students who attend an SUS university. It shows the predicted number of students who will attend an SUS university from an average public high school with percentages of disadvantaged students at the mean of the disadvantaged variable (58.65%) and at one standard deviation above (83.81%) and below (33.49%) the mean. If the average public high school has the average percentage of disadvantaged students in its student body, it can expect to send approximately 3.5% of its students to an SUS university, which at the average high school size of 1532 is about 54 students. If its percentage of disadvantaged student's is one standard deviation below the average (33.39%), then it can expect to send 6.3 percent of its students to the SUS or about 97 students. If it has a percentage of disadvantaged students that is one standard deviation above the average (83.81%), then the percentage of its students that can expect to go to an SUS university falls to 7/10 of one percent or only about 11 students of its 1532 student body. This is a very steep decline, and it supports the view that the distribution of SUS subsidies is regressive.

**Figure 1: Estimated SUS Enrollments from an Average Public HS with the Average % of Disadvantaged Students + / - One Standard Deviation**




**Bright Futures Scholarship Recipients and SUS Enrollment**

This section of the paper explores the intersection between the students attending SUS universities and the students receiving Florida Bright Futures scholarships. This analysis is more speculative than the preceding analysis because the data do not include the number of Bright Futures scholarships received by the graduating students in each high school, however, the data do include the number of FBF scholarships received in the high school's zip code. To the extent that the students in the high school live in or near the same zip code as the high school they attend, these data should be a good approximation of the number of students in the high school that receive a FBF scholarship. To make this assumption more reasonable, all the charter and magnet schools have been eliminated from the sample. Because the number of scholarships received in the zip codes was not truncated, the FBF scholarship model is estimated with Ordinary Least Squares regression. To ensure an apple to apples comparison, the Tobit model of SUS enrollment is now estimated with the sample that excludes Magnet and Charter schools. The results of the two models are shown side by side in Table 5.

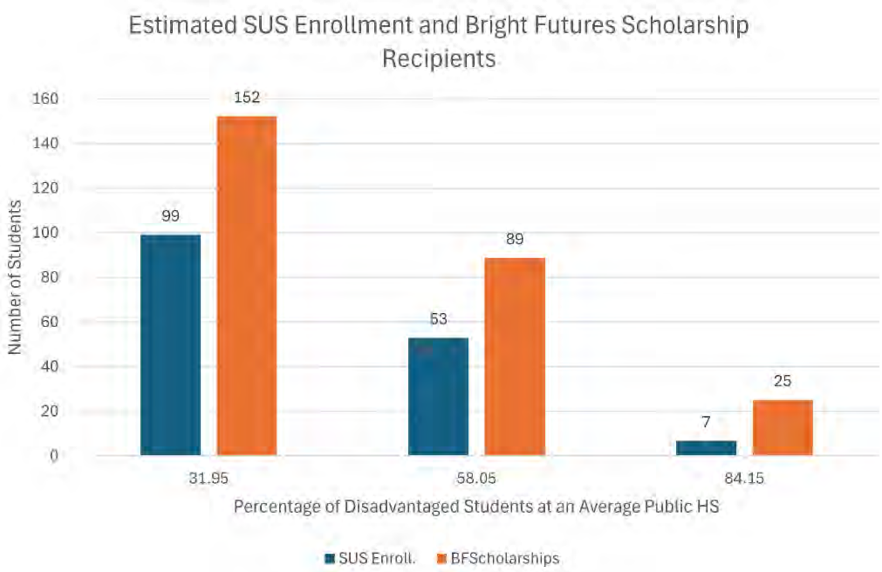
It is almost uncanny how similar the two models are. Most of the coefficient estimates in both models have the same signs, and the same variables are significant in both models. The SUS Enrollment model is very similar to the one that was estimated with the full sample, so it needs no additional explanation. In the Bright Futures scholarship model, the percentage of disadvantaged students has a significant negative effect on the proportion of scholarships received in the high school's zip code. Just as is the case in the SUS enrollment model, the percentage of Asian students and the percentage of Hispanic students have a positive and significant effect on the proportion of FBF scholarships received in the high school's zip code.

**Table 5: The Estimated Results of SUS Enrollment and FBF Scholarships in Florida Public High Schools (Excluding Magnet and Charter Schools, n = 252)**

| Independent Variables (1) | Dependent Variable: Sysprop (Proportion of Students from HS who enroll in SUS Universities) (2) | Dependent Variable: BFprop (Proportion of FBF Scholarships Received in HS's Zip Code) (3) |
|---|---|---|
| Constant | 0.038 *** | .0759** |
| | (0.014) | (.0388) |
| % Disadvantaged Students in the HS | -0.001*** | -.00149*** |
| | (0.0002) | (.00055) |
| % Black Students in the HS | 0.0003 | -.0000879 |
| | (0.0003) | (.00077) |
| % Asian Students in the HS | 0.007*** | -.00957)* |
| | (0.002) | (.0051) |
| % Hispanic Students in the HS | 0. 0013*** | .003319*** |
| | (0.0002) | (.00055) |
| Adjusted $R^2$ (Column 3) | | 0.1369 |
| $X^2$ statistic (Column 2) | 114.97*** | |
| F-statistic (Column 3) | | 10.96*** |
| Significance levels: *10%, **5%, ***1% | | |

Using the sample means of the independent variables, I estimated the SUS enrollments and the number of FBF scholarships received at an average high school with the average percentage of disadvantaged students (58.05) and one standard deviation above (84.15) and below (31.95) that average. The chart in Figure 2 shows these amounts. For example, the average high school with the average percentage of disadvantaged students can expect to send 53 students to SUS universities, and it can expect that 89 students in its zip code will receive a Bright Futures scholarship. However, an average high school with only 31.95 percent disadvantaged students can expect to send about 99 students to SUS universities and to have about 152 students in its zip code receive FBF scholarships, but the same average high school with 84.14% of disadvantaged students could expect only about 7 students to go to SUS universities and about 25 students in its zip code to receive FBF scholarships. These results are very detrimental to students from low-income households. Not only is most of the state funding for Florida's top-tier educational institutions going to the students from high income households, but they are also getting additional scholarship money from the state to pay for their tuition and fees.

**Figure 2: The Combined Effect of SUS Enrollment and FBF Scholarships Received**




To make a comparison with Pechman's (1970) analysis of the benefits of state support for higher education which includes the taxes paid by the recipients of the benefits, I calculated the net benefits of SUS enrollment and the FBF scholarship for average high schools with varying percentages of disadvantaged students. I used the U.S. Census Bureau's American Community Survey estimates of median household income in each zip code to add income to the data. I then arranged the data from bottom to top by the percentages of disadvantaged students in each school. The high schools that had 31.95% (one standard deviation below the mean) or less of disadvantaged students had an average median household income of $88,480. The high schools that had 84.15% (one standard deviation above the mean) or more of disadvantaged students had an average median household income of $43,056. I estimated the median household income of the high schools in the middle of the distribution by estimating the average household median income for the high schools within one standard deviation (+ and -) of the mean level of disadvantaged students. Their average median income was $62,678.

I multiplied these three levels of median income by the Florida average local and state tax rates for each respective income level obtained from the Institute of Taxation and Economic Policy (ITEP, 2018). These were 8.4% for the median household income of $88,480, and 9.5% for the income levels of $62,678 and $43,056. The amount of tax paid is shown in column 4 of the top portion of Table 6. Next, I calculated the portion of those taxes that were used to support the SUS and FBF scholarships. I assumed that the percentage of taxes used for that purpose was equal to the total expenditures for the SUS and FBF scholarships divided by the total of general revenue plus the total of lottery revenues. I used general revenues and lottery revenues because these are the two sources of funding for these programs. I multiplied these percentages by the total taxes paid by the three groups to get the total taxes paid by each group for the SUS and the FBF scholarships. These totals are shown in column 8 of the top portion of Table 6.

I then calculated the probability-weighted benefits received from the SUS and the FBF scholarships by households at the same income levels. These calculations are shown in the middle section of Table 6. The students in the high schools with 31.95% or less of disadvantaged students had a probability of attending an SUS university of 99/1630 = 0.06 (the number of students attending an SUS university from a 31.95% disadvantaged high school divided by the average high school enrollment in the sample). The same calculation for the high schools with 84.15% or more of disadvantaged students was 7/1630 = 0.01, and the probability for the students in the high school with the average amount of disadvantaged students was 53/1630 = 0.03. These probabilities were then multiplied by $12,119, which was the annual amount of SUS full time equivalent student funding in 2020 (Florida Budget Highlight, 2020). I calculated similar probabilities for receiving a Florida Bright Futures scholarship at the three different levels of disadvantaged students and found probabilities of 0.093 (152/1630), 0.055 (89/1630), and 0.015 (25/1630) for the 31.95%, 58.05% and the 84.15% disadvantaged schools, respectively. These probabilities were then multiplied by the annual benefits of a Florida Bright Futures Scholarship, which is $202 per credit hour multiplied by 30 hours of credit per year, or $6360 per academic year.

The bottom portion of Table 6 shows the net benefits of the taxes paid and the benefits received from attending an SUS university and receiving a FBF scholarship for the high schools with the three different levels of disadvantaged students. When the taxes paid are subtracted from the benefits received, the result is the net benefit received by each group. The households with students at the high schools with 31.95% or fewer of disadvantaged students receive positive net benefits of $541 per student, and the students at the high schools with the average amount of disadvantaged students receive positive net benefits of $110 per student. However, the households with students at the high schools with 84.15% or more of disadvantaged students receive negative net benefits of $284 per student, which means the taxes their households pay to support the SUS universities and Bright Futures scholarships outweigh the benefits they receive from the two programs. Thus, even using Pechman's (1970) method of calculation, the net benefits received from higher education in Florida are extremely regressive.

**Table 6: The Net Benefits of the SUS and FBF Scholarships for Three Average Florida High Schools with Different Levels of Disadvantaged Students**

| Tax Calculations | | | | | | | |
|---|---|---|---|---|---|---|---|
| High School's % of Disadv. Students | Average Income of HH | Average State and Local Tax Rate for Florida (From ITEP) | Taxes Paid | General Rev and Lottery Rev in 2020 | Spending on SUS and FBF in 2020 | % of Taxes allocated to SUS and FBF | Dollar Amount of Taxes paid for SUS and FBF |
| (1) | (2) | (3) | (4)= (3)x(2) | (5) | (6) | (7) = (6)/(5) | (8)= (7) X (4) |
| <31.95 | $88,480 | 0.084 | $7,432 | 41.44 billion | 4.4 billion | 0.106 | $788 |
| 58.05 (mean) | $62,678 | 0.095 | $5954 | 41.44 billion | 4.4 billion | 0.106 | $631 |
| >84.15 | $43,056 | 0.095 | $4,090 | 41.44 billion | 4.4 billion | 0.106 | $434 |

| Benefit Calculations | | | | | | | |
|---|---|---|---|---|---|---|---|
| High School % Disadv. Students | Prob. of student going to an SUS Univ. | Dollar Benefit of Student in SUS | Prob x SUS Benefit | Probability of student getting FBF Scholarship | Dollar Benefit of FBF $212 x 30 credit hrs. | Prob x FBF Benefit | Dollar Amount of Total Benefits |
| (1) | (2) | (3) | (4)= (2)x(3) | (5) | (6) | (7)= (5)x(6) | (8) = (4)+((7) |
| <31.95 | 99/1630= 0.06 | $12,119 | $736 | 152/1630= 0.093 | 6360 | $593 | $1329 |
| 58.05 (mean) | 53/1630= 0.031 | $12,119 | $394 | 89/1630= 0.055 | 6360 | $347 | $741 |
| >84.15 | 7/1630= 0.010 | $12,119 | $52 | 25/1630= 0.015 | 6360 | $98 | $150 |

| Net Benefit Calculations | | | | |
|---|---|---|---|---|
| High School % Disadv. Students | Taxes Paid for SUS and FBF | Benefits Received From SUS and FBF | Net Benefits | Net Benefits as a Percentage of Income |
| (1) | (2) | (3) | (4)=(3)-(2) | (5) |
| <31.95 | $788 | $1329 | $541 | 541/$88,480 =0.006 |
| 58.05 (mean) | $631 | $741 | $110 | $ 110/$62,678 = 0.0002 |
| >84.15 | $434 | $150 | $-284 | $ -167/$43,056 = -0.004 |

## DISCUSSION AND POLICY IMLICATIONS

This research shows that merit-based scholarships without need-based requirements have exacerbated the inequity of the state funding of higher education in Florida. This result is not surprising since one of the stated goals of the scholarship when it was created was to keep academically talented students in the state. It has succeeded in doing that, but more students staying in the state for college has increased the demand for the limited number of seats available in the SUS universities. This has increased the academic requirements for entrance into the SUS universities. The only stated goal of the scholarship that appears on the Florida Bright Futures website today is that the scholarship can "make your educational goals a reality." However, this reality is much more likely to be achieved by students from high income families than by students from low-income families. This may be an unintentional outcome of the program, but it is an outcome that has major implications for income inequality.

It is important to note that these results are specific to Florida and may not apply to all states. Florida's tax system is ranked 3rd out of 50 in the list of most regressive state tax systems (ITEP 2018), so the taxes paid by the highest income households in Florida are smaller than in most states. In 2022, the College Board named Florida as one of the least expensive states in which to get a four-year college degree and as having one of the least expensive flagship universities in the country. This means that the subsidies for higher education are higher than in many other states, and there is greater competition to attend these universities. The state also has the highest eligibility requirements to receive a FBF scholarship of the eight states that award lottery-funded merit scholarships. In fact, given the confluence of these three circumstances (highly regressive state taxes, highly restrictive admission to SUS universities, and highly restrictive access to FBF scholarships), Florida is likely to be the upper bound of regressivity for the distribution of these benefits. However, it is still highly likely that in the other seven states with lottery funded scholarships, the distribution of the benefits of higher education is still regressive. More research on this issue is needed in the other states to confirm this speculation.

What can be done to make Florida's higher education funding more equitable? The most obvious policy recommendation is to fund higher education institutions less and needy students more. The first half of this policy has already been taking place in Florida as state budgets have been strained since the 2008 financial crisis. As state funding to higher education has fallen, tuition has been rising, and this has placed an extreme burden on students from low- and moderate-income families. However, there has been no increase in the amount of need-based state aid for college students to counteract this trend.

Also, as Florida's revenues have fallen, there has been a doubling down on the requirements to receive the Florida Bright Futures scholarship, especially with respect to standardized test scores. As mentioned above, the SAT score to receive even the lower-valued FBF scholarship is 1210, in a state where the average SAT score was 983 compared to the national average of 1050 in 2022 (College Board, 2022b). The way that Florida determines admission to SUS universities and receipt of FBF scholarships makes it clear that the goal of state-funded higher education in Florida is not to lift up the children from the households of the lowest income quintiles, but, instead, to reward the children of the households who have already made it into the upper quintiles. However, it does not have to be that way. For example, in Kentucky, their basic lottery-funded merit scholarships are available to all students who earn at least a 2.5 high school GPA, with extra amounts available for students with high test scores or more financial need. They also use their lottery revenues to fund need-based college access grants which are available to all students who received free or reduced lunch in high school and attend a Kentucky university. In Georgia, their lottery-funded HOPE scholarships are available to all students who earned a 3.0 high school GPA and attend a state university. Just removing the SAT score requirement, makes the scholarship much less regressive.

One issue that has not been addressed in this study is the role that state colleges in Florida play in the equity of state funding for higher education in Florida. Unfortunately, the data for this study did not include information on the number of students from each high who enrolled in state colleges, so no estimate of this effect could be made in this study. However, given the aggregate data that exist for Florida's state colleges and universities, some speculative conclusions can be made. There are 28 colleges in the Florida State College system, which was until 2009, the Florida Community College system. In 2023, these colleges enrolled 588,488 students compared to 349,547 students enrolled in the SUS. Although the state colleges enrolled 68% more students in 2023 than the SUS, they received only 56% as much state funding as the SUS in that year (Florida Board of Governors, 2023; Florida Department of Education, 2023a,b). The state colleges have much less rigorous admission requirements and much lower tuitions than the SUS universities. They are often the best option for students from lower-income households to receive a college education in Florida. In fact, the Florida State College System's website states that 65% of Florida's high school graduates begin their post-secondary education at one of the state colleges, and 82% of FTIC freshman and sophomore minority students begin college there (FDOE, 2024). If students earn an AA degree at one of the 28 state colleges, they are guaranteed admission as junior transfers into one of the state universities. Thus, this is a viable path for many low-income students, however, most of them never make it to the SUS. In 2023, only 56,541 students of the 349,547 students enrolled in the SUS universities were state college transfers. That means that only 9.6% of the students enrolled in the state college system go on to pursue bachelor's degrees at an SUS university. The state colleges have been offering their own bachelor's degrees since 2009, but they are struggling to attract students into these 4-year degree programs. In 2023, only 43,304 students were enrolled in bachelor's degree programs in the 28 state colleges, just 7% of their total enrolled students. When it comes to FBF scholarships, in 2022-23, only 8.5% of the students who received the FBF scholarship attended state colleges, whereas 83.3% attended SUS universities, and 8% attended private four-year universities in Florida (Office of Student Financial Assistance, 2023.) In summary, it seems that students who opt to attend a state college for their post-secondary education are receiving much less support from the state both for the support of the institution they attend and for their own support via a Florida Bright Futures scholarship. Since these institutions serve disproportionately more students from low-income and minority families, it is doubtful that the State College system reduces the regressivity of the net benefits of higher education in Florida, and they might even make it worse.

Is Florida's system of funding higher education fair? Perhaps, if students from the lowest income groups are offered other alternatives into a higher income bracket than they were born into. But do those alternatives exist? States have underinvested in technical and vocational schools so that many of these students must go to expensive for-profit colleges of dubious quality to get training to be a car mechanic or a dental hygienist. Besides, many of the children from low-income households have the potential to succeed in college if they could gain admittance and be given time to catch up with the students from high income households who have had the advantage of better K-12 education. It is important to replicate this study in other states to determine if this is a universal result, or a fluke of Florida's unique fiscal characteristics. If it is universal and if the United States is serious about alleviating income inequality, then higher education must be reformed to better serve the needs of the children from the lowest income brackets instead of just rewarding the children of the highest income brackets.

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