Lottery Funded Merit Scholarships: Some Lessons from the Florida Bright Futures Scholarship Program

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Essentially, the FBF Scholarship Program and other lottery-funded merit scholarship programs like it, are tantamount to an income redistribution program from non-white, low-income, uneducated households to white, rich, well-educated households.

When Georgia's lottery began in 1993, state legislators were determined not to let what happened in Florida happen to them. Florida earmarked their lottery proceeds to enhance education but soon found that lottery proceeds to education were simply replacing general revenue funding for education. In fact, before the lottery began in 1988, 60 percent of Florida's general revenues went to fund education, and by 1996, only 53% of general revenues went to education. Therefore, Georgia decided to earmark the bulk of their lottery revenues to the Helping Outstanding Pupils Educationally (HOPE) scholarship program. Three years ago, Florida followed suit and created the Bright Futures Scholarships funded by the lottery. Florida Bright Futures Scholarships are merit-based scholarships that do not require the students to demonstrate financial need.

Although the Bright Futures Scholarship program is very popular with voters, public sector economists are concerned that earmarking lottery revenues for merit-based college scholarships without demonstrated financial need will make the lottery an even more regressive source of state revenue than it already is. Regressive taxes take a larger percentage share of income away from low-income citizens. It has consistently been documented that the inherent tax included in the price of a lottery ticket is indeed regressive.[1] It has also been demonstrated that state-supported higher education benefits accrue disproportionately to middle and upper income families.[2] Therefore, tying lottery revenues to merit-based college scholarships has the potential to cause serious inequities among the citizens of lottery states. This is the empirical research question that we wish to explore in this paper.

Literature Review

The literature necessary for studying lottery-financed merit scholarships has two veins – the distributional effect of the tax inherent in the purchase of a lottery ticket and the distributional effect of the benefits received from the state subsidization of higher education. There is a lengthy literature for both of these veins, but only a small number of very recent studies that put both of these veins together. Therefore, we begin with a review of previous studies that document the regressive nature of state lotteries as a means of raising government revenues. We then review the literature that examines the distributional effects of the direct benefits received from higher education. We conclude with a discussion of the as-yet unpublished studies that examine the distributional effects of the HOPE scholarship program in Georgia.

Lottery Studies

Economists analyze the implicit tax on lottery tickets in the same way that they analyze an excise tax. An excise tax is a tax that is placed on the manufacture or sale of a particular good or service. States commonly place excise taxes on such items as gasoline, cigarettes or alcoholic beverages. Lottery taxes, too, can be viewed as excise taxes because economists separate the one dollar price of a lottery ticket into three parts – the part that pays for the prize, the part that pays for the administrative costs, and the part that goes into the state's coffers, i.e., the tax portion. In Florida, a one dollar lottery ticket consists of 50 cents for the prize, 12 cents for the administrative costs and 38

cents for the tax; therefore, economists view the lottery as a 38 cent excise tax on a 62 cent product. They then examine the burden of that excise tax by looking at who is purchasing lottery tickets and thus paying the excise tax. Many studies of the lottery have found that lottery play and/or ticket purchases vary by income, race, and educational attainment. This results in the burden of the lottery tax falling disproportionately on people with differences in these demographic characteristics.

The effect that household income has on lottery purchases has been mixed in previous lottery studies. Some studies have found that lottery purchases increase slightly as income increases[3], others have found that the lottery purchases of the middle income groups are the greatest[4], and yet others have found that income has no significant effect on lottery purchases at all.[5] Although the effect of income on lottery purchases may vary, the regressivity of the lottery tax is universally documented in the economic literature about lotteries.[6] This regressivity results because even if lottery purchases increase as income increases, they increase at a much smaller rate than the increase in income. Therefore, research has shown, time and time again, that low-income households spend a greater percentage of their income on lottery tickets, and thus, they bear a greater percentage of the tax that is inherent in the price of a lottery ticket.

Most lottery studies indicate that race is a strong determinant of lottery expenditures. Clotfelter and Cook report that African Americans and Hispanics play the lottery more than non-Hispanic whites. In a New Jersey survey, they found that the participation rate of African Americans and Hispanics was twice that of whites for the daily numbers games and 30% more for Lotto.[7] Scott and Garen and Stranahan and Borg estimate separate models to identify whether a household plays the lottery, and then if the household plays, how much they spend on lottery tickets.[8] Interestingly, both pairs of researchers find that non-whites and whites have similar probabilities of playing the lottery, but non-white lottery players spend significantly more on tickets than white lottery players.

Education also has a significant effect on lottery expenditures. Clotfelter and Cook report that lottery expenditures fall consistently as educational attainment increases. For example, they report that a 1986 California survey showed that 49% of the respondents with less than a high school education had played the lottery in the previous week as compared to only 30% of the survey respondents who were college graduates.[9] In contrast to this California survey, Scott and Garen and Stranahan and Borg find that schooling level does not affect whether or not individuals play the lottery, but given that they play, those with less than a high school education spend the most on tickets.[10] Whether the effect of increased educational attainment is through a reduction in the probability of play or a reduction in the lottery expenditures of those who do play, the effect on the tax burden is clear. Individuals with the least amount of education will bear the greatest burden from lottery taxes.

Summarizing the results of the previous lottery studies that look at the effect of income, race and educational attainment on lottery expenditures, a disturbing pattern emerges. The people who spend the largest amount on lottery tickets, and, therefore, bear the greatest burden from the tax inherent in lottery expenditures are disproportionately from households that are low-income, non-white, and have low levels of educational attainment.

Higher Education Studies

Lee Hansen and Burton Weisbrod's seminal work on the distribution of the benefits received from state-supported higher education examined the three-tiered system of higher education in California.[11] They found that the median income of families whose children attended the University of California system of universities was $12,000 in 1964 dollars. These families received a cumulative 4-year

subsidy per student of $7,140. In contrast, the median income of the families whose children attended the California State College system (cumulative 4-year subsidy of $5800) was $10,000, and those families with children in the Junior College system (cumulative 2-year subsidy of $1440) had a median income of only $8800. The families without children in any of the systems of higher education had the lowest median family income of all – only $7900 in 1964 dollars. These simple statistics indicate that the distribution of benefits from higher education fall disproportionately on households with higher income. Many other empirical studies have documented this result in the United States and in developing nations.[12]

There is irony in this result since one reason that most states support higher education is to promote equality of opportunity for all its citizens regardless of their economic circumstances. However, the reality of the situation is that the probability that a student will go to college, especially to a premier college such as those in the University of California system, is highly dependent on family income.[13] For example, Bishop, using a national sample of 26,076 male high school juniors showed that among students who placed in the top 25% on an academic aptitude test, the students in the highest income quintile had an 84.2% probability that they would attend college; whereas, the students in the lowest income quintile had only a 56.1% probability that they would attend college.[14]

In a 1989 article that examined the relationship between parent's income and children's educational attainment, Paul Taubman reported the results of his own work with Jere Behrman and Robert Pollack as well as the results from a number of other empirical studies.[15] He concluded:

In various samples in some of which people were eligible for government guaranteed loans and/or G.I. Bill educational grants, parental income matters. The estimated coefficients are generally positive and elasticities range from .03 to .80.[16]

In this context, economists use the term "elasticity" to measure the percentage change in the number of years of schooling that a child completes which will result from a one percent change in parents' income. For example, an elasticity of .03 means that a 100% increase in parents' income at the time that a child's college decision is being made results in a 3% increase in the number of years of schooling that the child completes. The elasticity of .80 means that the same 100% increase in income would increase completed years of schooling by 80%. Another interpretation of these elasticities may be more illuminating for our purposes. Assuming that two children are identical in every way, including high school grade point averages and SAT scores, if one child resides in a household where the parents' income is $25,000 and the other resides in a household where the parents' income is $50,000. The child in the $50,000 household will complete 3 – 80% more schooling than the child in the $25,000 household.

A more recent review article by Robert Haveman and Barbara Wolfe looked at several studies that examined the educational attainment of children measured by years of schooling completed.[17] They found that household income had a positive effect on the educational attainment of children in all but one of the studies they reviewed, and the income variable was statistically significant in over half of the studies in which it was positive. However, they reported a smaller range of income elasticities than Taubman reported – only .02 - .20.[18]

The Haveman and Wolfe article also reported on the effect that parents' education levels have on children's educational attainment. They found unequivocal evidence that both parents' education levels have significant positive effects on children's educational attainment.[19] However, they found evidence that the mother's education has a stronger positive effect than father's education on the educational level obtained by the child.

TABLE 1
Racial Makeup of the United States Compared to the Racial Makeup of Students Attending Four-Year Institutions of Higher Education in 1997.

Race	Percent of the United States Population	Percent of the United States Population 20-24 Years Old	Percent Enrolled in Four-Year Institutions of Higher Education
White, Non-Hispanic	72.7	66.3	76.3
Black, Non-Hispanic	12.1	14.1	10.5
Hispanic	10.9	14.7	6.2
Asian or Pacific Islander	3.8	4.3	6.1
American Indian/Alaskan Native	0.9	1.1	0.8

Source: Population Estimates Program, Population Division, U.S. Census Bureau, Washington, D.C.
U.S. Department of Education, National Center for Education Statistics, Washington, D.C.

Earlier studies had shown similar effects. Corrazzini, Dugan, and Grabowski looked at college enrollment rates for two samples of high school students in the 1960's -- a national sample of 10th graders and a sample of 4000 Boston area high school seniors. Their empirical results showed that the father's education level had a significant positive effect on college enrollment rates. When they separated their sample into four socioeconomic status (SES) groups, they found that the positive effect of father's education on college enrollment rates was strongest for the lowest SES group.[20] Robert Mare found that both mother's and father's education had a positive and significant effect on their son's decision to attend college. However, only the mother's education level had a positive and significant effect on the likelihood that the son would complete college. The mother's education level had a positive and significant effect on her son's decision to pursue post-graduate education, as well.[21]

More recently, Thomas Kane showed that parental education has a very strong and positive effect on the college enrollment of black youth. In his study, he found that black youths whose parents were both college graduates had an 85% probability of entering college, over twice the probability of a black youth whose parents were both high school dropouts. These results were obtained from an empirical model that held family income and family size constant. The education effect would have been even greater if these variables had not been held constant.[22]

Race also plays a role in the probability of attending college. In spite of almost thirty years of affirmative action policies in college admissions, African Americans and Hispanics are still under-represented in college enrollments. Table 1 shows the racial makeup of the United States compared to the racial makeup of students enrolled in four-year institutions of higher education in 1997 (the latest year in which college enrollment data are available). Whites and Asian-Americans are over-represented in U.S. colleges and universities, and Non-Hispanic Blacks and Hispanics are under-

represented. Native Americans are only slightly under-represented.

Although it seems at first glance that the student's race, itself, is causing these discrepancies in college attendance, the situation is actually more complex. African Americans and Hispanics are under-represented in colleges and universities primarily because they come disproportionately from households with low-income and low levels of parental education. In studies that control for household income, parent's education, and other family background variables, being African American often has a positive and significant effect on college attendance.[23]

Taken together, these empirical studies suggest that households with the lowest income and with parents who have the least amount of education are the *least* likely to have children that go to college. In addition, the households with low income and low levels of parental education are disproportionately African American and Hispanic. Combining these results with the results from lottery studies leads to an obvious conclusion: the households that spend the most on the lottery are the same households that are least likely to send children to college and, thus, receive the benefits of lottery-funded college scholarships.

Lottery Funded Scholarship Studies

The HOPE scholarship program, funded entirely by revenues from the Georgia Lottery, began in 1993. The HOPE Scholarship provides the full cost of tuition, mandatory fees and a $150 per semester book allowance at all Georgia public colleges and universities. The HOPE Scholarship provides $3000 towards the tuition and fees at Georgia's private universities and colleges in addition to the $1050 Georgia Tuition Equalization Grant that all Georgia residents who attend Georgia private colleges and universities receive. The HOPE Scholarship also pays all tuition and fees and a $100 book allowance for eligible students who attend a Georgia Public Technical Institute. To be eligible for the Hope Scholarship, students must be residents of Georgia and must have graduated from a Georgia high school with a "B" average. Unlike Florida's Bright Futures Scholarship, there are no minimum SAT or ACT scores that students must have achieved in order to be eligible for the HOPE scholarship. In theory, this aspect of the eligibility requirements should make the HOPE scholarships more equitably distributed throughout the student population than Florida's Bright Futures Scholarships, which require a minimum SAT or ACT score in addition to a minimum high school GPA.

Early empirical studies of Georgia's HOPE scholarship program do not confirm this *a priori* reasoning, however. Susan Dynarski uses data from the Current Population Survey to compare the college enrollment rates of Georgia students before and after the implementation of the HOPE scholarship in 1993. Using a control group of nearby states, she finds that the HOPE Scholarship increased the college attendance rates of 18-19 year-olds in Georgia by 7.5 to 8.3 percentage points. However, her results indicate that the greatest increase in attendance rates occurred among the state's white students, who experienced a 12.3 percentage point rise in their attendance rates after HOPE was implemented. Black students' attendance rates saw no statistically significant change relative to the black attendance rates in other Southeastern states.[24]

She also finds that the HOPE scholarship has widened the gap in college attendance between those from low-income and high-income families. This occurs because all families with incomes of $50,000 or more are able to apply for HOPE by completing a one-page form that requires no information about family finances except a confirmation that income is above $50,000. Families whose income is below $50,000 must complete the four-page Free Application for Federal Student Aid form that requires detailed information on the

family's income, assets, debt, and tax information. If the families qualify for federal financial aid, the amount of the federal aid reduces the amount of the HOPE scholarship dollar for dollar, except for a $400 book allowance. This means that children from families with $50,000 of income or more are much more likely to apply for HOPE. In fact, Dynarski finds that when she divides her sample into high and low income groups using $50,000 as the dividing line that the high income group increases their college attendance relative to the surrounding states control group by 12.9 percentage points. The low-income group increased their college attendance by only 2 percentage points relative to the control group. This difference in differences of 10.9 percentage points is statistically significant at the 10 percent level.[25]

Two recent papers examine the net budgetary incidence of the HOPE scholarship by examining the amount of education benefits received from the HOPE scholarship minus the amount of lottery taxes paid by Georgia citizens. Ross Rubenstein and Benjamin Scafidi use household-level survey data to estimate a model of lottery expenditures in Georgia based on household characteristics. They derive predicted lottery expenditures for each household based on this model. Secondly, they use aggregate data to estimate a model of the per capita HOPE Scholarship benefits received by the different counties of Georgia based on each county's demographic variables such as mean education, mean income, and racial makeup. Next, they use the estimated coefficients of the second model (estimated with the county-level data) with the household characteristics from the survey data (originally used to estimate lottery expenditures) to predict the amount of HOPE scholarship benefits received by each of the households in the survey. They then subtract the amount of predicted lottery taxes paid by each of the households in the survey from the predicted HOPE scholarship benefits received by each of the households to arrive at a measurement of the net benefits received from the lottery-funded HOPE scholarship.[26] Cornwell and Mustard use a very similar methodology to examine the same issue; however, they estimate both the model of lottery expenditures and the model of HOPE scholarship benefits using county-level data.[27]

Both papers reach similar conclusions. Rubenstein and Scafidi find that non-white households and households with the lowest income spend a greater amount on lottery products and receive fewer benefits from lottery-funded programs. HOPE scholarships go disproportionately to households with higher income and with higher levels of education for the household heads.[28] Cornwell and Mustard find that counties with the highest percentages of African Americans play the lottery at disproportionately high rates, and, conversely, counties with the highest percentages of white residents receive a disproportionately high number of HOPE scholarships. Interestingly, Cornwell and Mustard find that county income levels do not significantly affect lottery playing, but the counties with the highest levels of unemployment compensation have higher lottery expenditures. Conversely, counties with the lowest unemployment compensation levels and the highest income levels receive a significantly greater share of HOPE scholarships.[29] Thus, the early empirical evidence suggests that tying lottery revenues to merit-based college scholarships will redistribute income from the lower income households to higher income households and from African Americans to whites.

An Empirical Examination of the Florida Bright Futures Scholarship Program

In this section, we examine the net benefits (benefits received less lottery taxes paid) that accrue to Florida Bright Futures scholarship recipients. This is similar to the studies by Cornwell and Mustard and Rubenstein and Scafidi; however, with some significant differences. The first major

difference between our study and theirs is that we will test our empirical models with household level data. Both Cornwell and Mustard and Rubenstein and Scafidi acknowledge that ideally they need individual household data with which to test their models; however, since none was available they used county level data to estimate at least one of their empirical models.

Data and Methodology

Our data are from a mail survey of Florida Bright Futures (FBF) recipients during Summer and Fall 1999. We sent 2000 surveys to the families of FBF recipients attending the University of northeastern Florida (UNF) and Jacksonville University (JU). UNF has approximately 12,000 students and is a primarily undergraduate, comprehensive public university in North Florida. UNF is one of 10 public universities where the FBF scholarship pays either 100% or 75% of a student's tuition. About 10% of the sample use their Bright Futures scholarships to attend JU, a private, primarily undergraduate university of about 2000 students. FBF scholarships can be used at private universities in state, as well; however, the program pays only an amount equal to what a recipient would receive while attending a public state university. Out of the 2000 surveys sent out, 1206 were returned. We omitted observations with missing data and ended up with information on 1040 families in our final sample.

We were quite surprised to realize such a high response rate to our survey (60.3%). We believe this is due to the intense interest that families have in their children's college education, and especially in the subject of how to pay for that education. In addition, our questionnaire included several open-ended questions about the Florida Bright Futures Scholarship so that we could ascertain how the scholarship may be affecting a student's college choice. For this reason, many respondents were happy to use the open-ended questions to "brag" about their children by telling us how many college acceptances they had received before deciding to attend a Florida university because of the Bright Futures scholarship. Other respondents used the open-ended questions to complain that their child had lost the scholarship in the first year of college due to a low grade point average. At the time that our survey was sent, there was no way to regain the scholarship if a student's grade point average went up again over the remaining years of college so many parents felt that the scholarship program had duped their child into going to a Florida university. Whatever the reason, it was clear that the Florida Bright Futures Scholarship Program elicited a great deal of passion on the part of these survey respondents, and this translated into a very high response rate.

In order to determine if our sample of students from the University of North Florida and Jacksonville University were a representative sample of college students in Florida, we compared SAT scores and entering GPA's from these two universities to the averages for 16 colleges and universities in Florida.[30] We found that the average SAT scores and entering grade point averages for both UNF and JU were within one standard deviation of the comparative sample average. Specifically, the average entering GPA for the 16 school cohort was 3.36 compared to 3.1 for JU and 3.4 for UNF. The average SAT score for the comparison group was 1092, as compared to 1035 for JU and 1100 for UNF. Although income data were not available, we hypothesize that the household income of UNF students may be a little lower than the average household income of the comparison group since UNF is a regional state-supported university. The tuition at UNF is relatively low and over half of UNF's undergraduates are commuter students. JU on the other hand is a private residential university so the household income of its students is probably at or slightly above the household incomes of the comparison group.

TABLE 2
FBF Variable Definitions

Age	Age of the male head of household, unless none exists, in which case this records the age of the female head of household.
White	Dummy variable which equals 1 if the household is Caucasian, 0 otherwise
Black	Dummy variable which equals 1 if the household is African American, 0 otherwise
Hispanic	Dummy variable which equals 1 if the household is Hispanic, 0 otherwise
Other	Dummy variable which equals 1 if the household is any other ethnicity, 0 otherwise
Rural	Dummy variable which equals 1 if the student's family lives in a rural area, 0 otherwise
City	Dummy variable which equals 1 if the student's family lives in a city with a population over 100,000, 0 otherwise
Suburb	Dummy variable which equals 1 if the student's family lives in a small city or suburb of a large city, 0 otherwise
Married	Dummy variable which equals 1 if the head of household is married, 0 otherwise
Widowed	Dummy variable which equals 1 if the head of household is widowed, 0 otherwise
Divorced	Dummy variable which equals 1 if the head of household is single or divorced.
Less than HS	Dummy variable which equals 1 if the male head of household highest educational attainment is less than a high school education, 0 otherwise. This records the female head of households education level if no male head of household exists.
HS Graduate	Dummy variable which equals 1 if the male head of household highest educational attainment is high school graduate, 0 otherwise. This records the female head of households education level if no male head of household exists.
Some College/ Comm. College	Dummy variable which equals 1 if the male head of household highest educational attainment is some college or community college graduate, 0 otherwise. This records the female head of households education level if no male head of household exists.
College Grad.	Dummy variable which equals 1 if the male head of household highest educational attainment is college graduate, 0 otherwise. This records the female head of households education level if no male head of household exists.
Post Graduate Work	Dummy variable which equals 1 if the male head of household highest educational attainment some post graduate work or a post graduate degree, 0 otherwise. This records the female head of households education level if no male head of household exists.
Professional	Dummy variable which equals 1 if the male head of household has an occupation identified as Professional or Upper Management, 0 otherwise. This records the female head of households occupation if no male head of household exists.
Sales	Dummy variable which equals 1 if the male head of household has an occupation identified as Sales, 0 otherwise. This records the female head of households occupation if no male head of household exists.
Home	Dummy variable which equals 1 if the male head of household has an occupation identified as Retired, Homemaker, or Student, 0 otherwise. This records the female head of households occupation if no male head of household exists.
Other Occupations	Other occupations include Self Employed, Office Worker, Middle Management, Tradesman, Hourly Worker, Teacher or Military.
Income Less than 20k	The household income of FBF recipient is less than $20,000
Income 20-40k	Household income is between $20,000 and $40,000
Income 40-60k	Household income is between $40,000 and $60,000
Income 60-80k	Household income is between $60,000 and $80,000
Income Greater than 80K	Household income is greater than $80,000
Household Size	Number of people in the household
Employed	Dummy variable which equals 1 if the male head of household is currently employed. This records the female head of households employment status if no male head of household exists.
Monthly Lotto Expenditure	Monthly household expenditure on Lotto game
Monthly Expenditure on All Other Games	Monthly household expenditure on all games except Lotto. These include Fantasy 5, Play 4, Cash 3 (these are all daily games) and instant games (scratch off tickets).
Play Lotto	Dummy variable which equals 1 if the respondent plays Lotto, 0 otherwise.
Play Other Games	Dummy variable which equals 1 if the respondent plays any other lottery games (except for Lotto), 0 otherwise.

TABLE 3
Descriptive Statistics

Variable Names	Bright Futures Means	Bright Futures Std. Deviations	Florida Sample Means	Florida Sample Std. Deviation
Age	**48.90**	6.1	**47.14**	16.98
White	**.897**	.304	**.780**	.415
Black	**.038**	.190	**.088**	.283
Hispanic	**.021**	.144	**.095**	.293
Other	**.046**	.210	**.038**	.190
Rural	**.078**	.268	**.207**	.405
City	**.459**	.498	**.313**	.464
Suburb	**.463**	.499	**.480**	.50
Married	**.858**	.349	**.562**	.496
Widowed	**.016**	.127	**.072**	.259
Divorced	**.126**	.332	**.366**	.482
Less than HS	**.018**	.134	**.059**	.235
HS Graduate	**.149**	.356	**.281**	.449
Some College/ Comm. College	**.339**	.474	**.308**	.462
College Grad.	**.277**	.448	**.194**	.395
Post Graduate Work	**.215**	.411	**.159**	.366
Income Less than 20k	**.042**	.201	**.164**	.371
Income 20-40k	**.142**	.349	**.314**	.464
Income 40-60k	**.256**	.436	**.264**	.441
Income 60-80k	**.230**	.421	**.181**	.385
Income Greater than 80K	**.324**	.468	**.076**	.265
Household Size	**3.94**	1.05	**2.70**	1.47
Employed	**.844**	.363	**.618**	.548
Monthly Lotto Expenditure	**9.83**	20.07	**7.532**	17.09
Monthly Expenditure on All Other Games	**5.44**	16.81	**7.93**	29.91
Play Lotto	**.633**	.482	**.489**	.5001
Play Other Games	**.291**	.455	**.273**	.445

In order to get an idea about the demographic makeup of these families, Table 3 shows a comparison of the mean characteristics of our FBF sample with characteristics of Florida families from the population as a whole. We obtained information on a typical Florida family from the monthly surveys conducted by the Florida Bureau of Economic and Business Research at the University of Florida. The data that they shared with us was collected from telephone interviews conducted during November and December 1998. The sample was chosen randomly based upon population densities within each county within the entire state of Florida. A total of 2014 observations were collected and 1359 respondents remained in this data set after eliminating all observations with missing data.

Not surprisingly, the families of FBF recipients are more likely to be white, urban,

highly educated, and have higher incomes than the population as a whole. Further, they are more likely to live in households where the parents are married and have at least one parent who is employed. These results are consistent with much of the literature examining factors associated with children's educational attainment. As mentioned, numerous studies have shown that educational success, using a wide variety of outcome measures, tends to be strongly associated with higher socioeconomic status.[31] Furthermore, given the demographic profile of our FBF sample, the lottery literature suggests that these families are not likely to be heavy lottery players.

But rather than assuming this is so, we estimate a model of the lottery expenditures of these FBF recipient households. We will then compare the present value of the lifetime lottery taxes paid by these FBF families (assuming that their yearly lottery expenditures remain the same throughout the remainder of the household head's life expectancy) with the monetary benefits received from the Florida Bright Futures scholarship. It is necessary to compute the present value of future lottery taxes paid because money that is spent in the present is more valuable than money that is spent in the future. This is because money that is available in the present can be invested and will earn interest, which will make the money more valuable in future years. Thus, the lottery tax dollars that are spent today are more valuable than the lottery tax dollars that will be spent in the future. To take account of this fact, the value of future lottery taxes are discounted to a present value amount by using an appropriate discount rate. By using this discounting procedure, the sum of total future lottery taxes paid will be transformed into a present value that is comparable to the time period in which the education benefits will be received by the household.

Taking this present value approach, will allow us to determine if the lottery taxes paid by families whose children receive FBF scholarship will ever equal or exceed the benefit that these families receive from a FBF scholarship.

Estimated Lottery Expenditures

We have used sophisticated statistical techniques to estimate the amount of lottery expenditures for the households whose children received the Florida Bright Futures Scholarship.[32] We estimated separate models for Lotto expenditures and expenditures on all other lottery games (Pick 3 and Pick 4 daily numbers games, instant scratch-off games, and the daily Fantasy Five game) because many studies have found that the tax incidence on Lotto is different than the tax incidence of the other games. Specifically, many researchers have found that Lotto is less regressive than the other games.[33]

Our model that explains which households are the most likely to play Lotto indicates that both Caucasian and African American FBF households are less likely to play Lotto than the 6.7% of the households in the sample who are other races, including Hispanic. It also shows that households with heads who are high school graduates or have some college are more likely to play Lotto than households with heads who are college graduates or have undertaken graduate education. The income variables are of interest because they indicate that households with the highest income levels are *more* likely to play Lotto than the households in the sample with incomes under $40,000. This is the first indication that Lotto may be less regressive than the other lottery games.

The model that explains the expenditures of the households that play Lotto shows that households located in the rural parts of Florida and households with heads who are either retired, homemakers, or students have higher Lotto expenditures than other Lotto-playing households. We hypothesize that the results on the rural variable may be due to the availability of fewer opportunities for other kinds of gambling in rural areas. We believe that the

result on the retired/homemaker/student variable may actually be a proxy for age since most of the respondents in that category are retired, and other studies have shown that lottery expenditures increase with age.[34] As expected, the model indicates that expenditures are higher for Lotto-playing households with heads who have the least amount of education, but unexpectedly, the estimated model shows that households in the highest income category ($80,000 and above) have higher Lotto expenditures than Lotto-playing households in the lower income categories. This result, combined with the result from the earlier model that higher income households are more likely to play Lotto, support the previous research that finds Lotto is less regressive than other lottery games.

The model explaining the decision to play all lottery games other than Lotto indicates that Caucasian households and households in the highest income category are significantly *less* likely to play other lottery games. On the other hand, married households and households headed by persons without college degrees or graduate education are more likely to play these other lottery games. The model explaining the expenditures of the households that play these non-Lotto games indicates that rural households and households headed by a person without a high school diploma have significantly higher expenditures on other games relative to the other players of these games. Larger households and households headed by someone with a professional occupation have lower expenditures on non-Lotto games than the other players in the sample. These results taken together imply that the incidence of the tax on lottery games other than Lotto will be more regressive since the higher income and higher education households are less likely to play the games in the first place, and the households who spend the most on tickets are headed by non-professionals and persons in the lowest education category.

The estimated models enable us to predict the amount of money that households with particular characteristics will spend on lottery tickets. We then take 38% of their total expenditures, which represents the tax portion of their lottery expenditures, and assume that the household will continue to spend that same amount on lottery taxes over the remaining life expectancy of the household head.[35] Assuming a discount rate of 6.16%, we then calculate the discounted present value of the future lottery tax receipts for these households.[36]

For comparison's sake, we created three typical households by putting specific values of the independent variables into the estimated lottery equations. The first typical household is the sample average and is created by putting the sample mean value of each of the independent variables into the estimated models. The second household is the lower socioeconomic status (SES) household. The relevant values of the independent variables for that household are a 48 year-old, African American, and single household head, rural residence, blue collar occupation, high school graduate, household size of three, and household income in one of the lowest two income categories (the omitted categories). The third household is the high SES household which has the following values for the independent variables: 48 year-old, Caucasian and married household head, suburban residence, professional or upper management occupation for the male household head, female head stays at home, both household heads are college graduates, household size of four, and household income in the highest category.

Table 4 shows that the lottery taxes paid by the high and low SES households are quite different. Specifically, there is a stark contrast between the taxes paid on the lottery games other than Lotto by the two groups. Lower SES households pay $97.67 per year in taxes on the non-Lotto lottery games compared to only $16.40 per year in taxes on non-Lotto games by the high SES households. This difference is not counteracted by the taxes on Lotto since the lower SES households spend slightly more on Lotto taxes, as well, although the

TABLE 4
Predicted Annual Tax Receipts and Lifetime Tax Receipts from Other Games, Lotto, and Total Lottery for Florida Bright Futures Recipients

	LOTTO		OTHER GAMES		TOTAL LOTTERY	
	Annual Lottery Tax	Present Value of Lifetime Lottery Tax	Annual Lottery Tax	Present Value of Lifetime Lottery Tax	Annual Lottery Tax	Present Value of Lifetime Lottery Tax
Sample Average	$45.89	$670.54	$22.59	$330.08	$68.48	$1000.62
Lower SES	$40.08	$585.64	$97.67	$1427.14	$137.75	$2012.79
Higher SES	$36.67	$535.82	$16.40	$239.64	$53.07	$775.45

difference is much smaller ($40.08 per year compared to $36.67 per year for the high SES household). Furthermore, the differences in these yearly amounts are compounded when we calculate the lifetime total of taxes paid by both groups. Differences like these between the taxes paid on Lotto and the taxes paid on non-Lotto lottery games are the reason that other studies have found Lotto to be less regressive than other lottery games. In other words, Lotto seems to be the lesser of two evils from a public finance standpoint.

The Estimated Benefits from the Bright Futures Scholarship

Although all of the households in our sample have children who received Bright Futures Scholarships, only about 1/3 of the sample received the Florida Academic Scholarship that pays for 100% of the tuition and fees at a Florida State University System university or a state community college in addition to giving the student a $600 educational allowance. The remaining 2/3 of the sample received the Florida Merit Scholarship that pays 75% of the tuition and fees at a state university or community college. We have estimated a statistical model to predict the probability that a household in our sample has a child who receives the 100% scholarship versus the 75% scholarship.[37]

The estimated model is actually a model of the child's educational attainment, since the factors that determine whether a child receives the 100% Florida Academic Scholarship or the 75% Florida Merit Scholarship are the child's high school GPA and standardized test scores. The 100% Florida Academic Scholarship goes to any student who graduates from a Florida high school with a 3.5 GPA and a 1270 SAT score or a 28 ACT score. A Florida high school student who graduates with a 3.0 GPA and a 970 SAT or 20 ACT is eligible for the 75% Florida Merit Scholarship. Equivalent monetary amounts are given to Florida graduating seniors who meet these qualifications and decide to attend a private college or university in Florida.

The estimated model indicates that Caucasian households and households in which the female head is a college graduate are significantly more likely to have children whose educational attainment in high school qualifies them for the 100% scholarship. They also indicate that households in the lowest income category are significantly less likely to have children who receive the 100% scholarship. These results are consistent with the results from other published studies that show that household income and mother's education are

TABLE 5
Expected Value of the Benefits Received from the Florida Bright Futures Scholarship

Type of Household	1 Year Scholarship	2 Year Scholarship	3 year Scholarship	4 year Scholarship
Sample Average	$2046.56	$4093.12	$6139.68	$8186.24
Lower SES	$1791.80	$3583.60	$5375.40	$7167.20
Higher SES	$2162.36	$4324.72	$6487.08	$8649.44

often positively related to children's educational attainment.[38] The result on the race variable is also consistent with other published studies that show that standardized test scores are often lower for non-whites.[39]

We use the model to predict the probability that children living in three typical households within our sample will receive the 100% scholarship. We create these households by putting specific values of the independent variables into the estimated model. Once again, the typical households represent the sample average, a lower SES household and a higher SES household. The sample average household has the mean value of each of the independent variables as its profile. The lower socioeconomic status (SES) household has a 48 year-old, African American, and single household head, rural residence, blue collar occupation, high school graduate, household size of three, and household income in the lowest category. The high SES household has a 48 year-old, Caucasian and married household head, suburban residence, professional occupation for the male household head, female head stays at home, both household heads are college graduates, household size of four, and household income in the highest category.

Using these different profiles for the three households, we find that the sample average household has a 32% probability of a child receiving the 100% scholarship, which also means they have a 68% probability of receiving the 75% scholarship. The high SES household has a 42% probability of receiving the 100% scholarship. In contrast, the low SES household has only a 10% probability of receiving the 100% scholarship. We use these predicted probabilities to estimate the expected value of the benefits received from the scholarship for each of our three households.

These benefits are calculated by first finding the average annual amount of money awarded to each type of scholarship recipient during the 1999-2000 academic year.[40] These amounts were $2834 for the 100% scholarship recipients, and $1676 for the 75% scholarship recipients.[41] We then calculate a weighted average of the benefits received by each type of household based upon the probability that their child will receive the 100% versus the 75% scholarship. The benefit estimate for the sample average household is: 0.32 ($2834) + 0.68 ($1676) = $2046.56. The estimates for the low and high SES households are calculated in a similar fashion using their estimated probabilities of receiving the 100% versus the 75% scholarship. Table 5 shows the estimated benefits for each type of household, assuming the scholarship is renewed for each year of the recipient's four years of eligibility.[42]

TABLE 6
Net Benefits Received from 1 Year of the Florida Bright Futures Scholarship

Type of Household	Expected Benefits Received from 1 Year Scholarship (From Table 5) (1)	Lifetime Lottery Taxes Paid (From Table 4) (2)	Net Benefits Received from a 1Year Scholarship (1) - (2)
Sample Average	$2046.56	$1000.62	$1045.94
Lower SES	$1791.80	$2012.79	-$220.99
Higher SES	$2162.36	$775.45	$1386.91

Table 7
Net Benefits Received from Multiple Years of the Florida Bright Futures Scholarship

Type of Household	2 Year Scholarship	3 year Scholarship	4 year Scholarship
Sample Average	$3092.50	$5139.06	$7185.62
Lower SES	$1570.81	$3362.61	$5154.41
Higher SES	$3549.27	$5711.63	$7873.99

Comparing the Benefits from the FBF Scholarship to Lottery Tax Receipts

In order to determine whether the households whose children receive the Bright Futures scholarships are paying their own way or are receiving income transfers from other lottery players, we have calculated the net benefits of the Bright Futures scholarships for our three households. These amounts are shown in Table 6. The table shows very clearly that the average households in the sample and the higher socioeconomic status households get a much greater dollar amount of benefit from a one year Bright Futures scholarship than they will pay in lifetime lottery taxes.

Only the lower socioeconomic households will pay more in lottery taxes than they receive from a one year Bright Futures Scholarship. We compare the benefits received from only one year's worth of the Bright Futures Scholarship with lifetime lottery taxes paid because we wanted to be conservative. We know that each of the households in our sample had at least one child receive a FBF scholarship for at least one year; however, we do not know if the child's scholarship was renewed. About 30% of the recipients of BF scholarships lose them after the first year because they have not accumulated at least 6 hours of college credit or have not maintained a 3.0 GPA for the 100% scholarship and a 2.75 GPA for the 75% scholarship.[43]

However, if the scholarship is renewed for a second year or if the household has more than one child who receives a Bright Futures scholarship, then all of the households, even the lower SES households, will receive an amount of benefit that far outweighs the amount they will pay in lifetime lottery taxes. Table 7 shows the net benefits received by the three types of households when the scholarship is maintained for 2, 3, or 4 years. The amount of monetary benefit these households will receive over and above the amount of lottery taxes they will pay in a lifetime are quite substantial -- $7873.99 for a high SES household whose child receives the scholarship for four years or $15,747.98 if they have two children who receive it for four years. This amount of net benefit given to families who have household incomes that exceed $80,000 per year is disturbing, especially given the fact that it is an income transfer from lottery players, who tend to be from poorer, less-educated and minority households. It truly represents a reverse Robin Hood effect!

Conclusions and Policy Recommendations

The results of this research are not surprising, given the preponderance of research that shows that lottery taxes are paid disproportionately by lower-income households and that merit-based scholarships go disproportionately to the children of higher income households. As evidence of this, 81% of the households in our sample of Bright Futures Scholarship recipients have annual incomes greater than $40,000, which is above the median income in Florida, and 32.4% of the households in the sample have annual incomes greater than $80,000. Conversely, 36.7% of the respondents have not played Lotto and 70.9% have not played other lottery games within the last year.

It is important to remember that all of the households included in our sample have at least one child who received a Florida Bright Futures Scholarship. All of these households, except those in the low SES category, will receive more monetary benefit from receiving the Bright Futures Scholarship for just one year than they will pay in lottery taxes over the expected remaining lifetime of the household head. If the scholarship is renewed for a second year, then all of the households, including the low SES households, will receive scholarship benefits that far outweigh the amount of lifetime lottery taxes the households will pay. If the household has two children who receive an FBF scholarship then the household's net benefit doubles. How can almost all of the households with children who receive the Bright Futures Scholarship receive more monetary benefit from the scholarship program than they pay in lifetime lottery taxes? The answer is obvious: the difference is made up by the lottery taxes paid by other households who will never receive an FBF scholarship. Those other households contain the bulk of lottery players who tend to be less-educated, lower income and non-white. Essentially, the Florida Bright Futures Scholarship Program and other lottery-funded merit scholarship programs like it, are tantamount to an income redistribution program from non-white, low-income, uneducated households to white, rich, well-educated households.

What can states and local governments do to alleviate some of the inequities inherent in lottery-funded merit scholarships? The obvious answer is to eliminate them. Although this is the preferred answer from the economist's point of view, the reality of the situation is that these programs are far too politically popular to eliminate. As a second best solution, we suggest the following policies.

At the State Level:

1) Promote Lotto and other big jackpot games over the instant and daily numbers games. Our research clearly shows that Lotto is much less regressive than the smaller jackpot games. The best way to

promote Lotto over the other games is to aim lottery advertising at higher income households. This can be accomplished by emphasizing the benefits of scholarships in lottery ads rather than the "get rich quick" attributes of the lottery.

2) Expand lottery-funded scholarships to include need-based scholarships as well as merit-based scholarships. States can use a portion of their lottery revenues to support scholarships that are purely need-based and have no high school GPA or standardized test score minimums required of the students. These scholarships should be supplements to, rather than replacements for, Pell grants and other federal financial aid programs. Currently, students who receive Bright Futures Scholarships and also qualify for federal financial aid find that their Bright Futures scholarship awards are reduced by the full amount of any federal financial aid that they receive. Lottery-funded scholarships should be used to help students avoid the debt that federal financial aid often imposes on low-income students. Students from low-income families often find that one of the greatest financial obstacles preventing them from attending college is the heavy debt burden that they must undertake. These need-based scholarships can prevent them from acquiring large amounts of debt in order to attend college.

3) Use lottery revenues to provide grants for college preparation programs to high schools with low rates of college attendance. Lottery revenues should be used to help students from disadvantaged backgrounds prepare for successful college attendance. These programs can help students qualify for lottery-funded merit scholarships.

At the Local Level:

1) Use local tax revenues for public schools K-12 to fund college preparation courses for disadvantaged students. These programs can run the gamut from summer camp programs that acquaint middle-school students with college life to free SAT prep courses for high school students. The goal is to prepare disadvantaged students from as early as their kindergarten years for college attendance.

2) Local government officials can use their bully pulpits to educate citizens about the distributional effects of lottery-funded merit scholarships. Most citizens are not aware that lottery funded merit scholarships redistribute substantial amounts of income to households with incomes greater than $80,000. Once they realize the magnitude of the problem, many citizens' groups and church leaders may encourage their members to lobby state government to change this situation.

Although this list is far from exhaustive, we hope it will serve as a first step for policy makers who care about equity in education policy and in government finance. In recent years, the anti-poverty focus of education policy has all but disappeared. Need based programs have been wholly or greatly reduced during the 1990's. Student loans are the primary source of financial aid even for the lowest income groups. At the same time, we have seen a rapid increase in the growth of state lotteries as a means of raising revenues so that 38 states and the District of Columbia now have lotteries. The conjoining of these two trends has resulted in politically popular but horrendously inequitable lottery-funded merit scholarships. Those of us who understand the consequences of these two trends must work to counteract them.

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[32]. We estimate a probit model of the household's decision to play the lottery or not, and then we estimate a truncated Tobit model of the amount of lottery expenditures that the households that play the lottery will spend. The results of these estimated models can be obtained from the authors by e-mail (mborg@unf.edu or hstranah@unf.edu).

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[35]. The average age of the household head in our sample is 48.9 years. The majority of these heads are males, although some are female. We therefore, have chosen to use the remaining life expectancy for both sexes

at the age of 48-49, which is 31.5 years (Life Tables, 1997).

[36]. The 6.16% rate is the average yield on long-term government bonds from 1947-1998, a period of time equivalent to the discounting period (31.5 years).

[37]. We estimate a probit model of the probability that a household will have a child who receives the 100% scholarship versus the 75% scholarship. The results of the estimated model can be obtained from the authors by e-mail (mborg@unf.edu or hstranah@unf.edu).

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[41]. In addition to the full amount of tuition and fees for all of the courses in which the 100% scholarship recipients enroll, they also receive a $600 educational allowance that the 75% scholarship recipients do not receive. This accounts for the greater than 25% difference between the level of benefits for the two types of scholarships.

[42]. This is not a trivial assumption. The Postsecondary Education Planning Commission of Florida reported that of the 23,700 students receiving Bright Futures Scholarship funding for the first time in the 1997-98 academic year, 30% did not meet the renewal requirements necessary to continue receiving funding in 1998-1999.

[43]. If a student loses the scholarship due to a GPA below the minimum, they can re-apply for the scholarship the following year if their GPA has risen above the minimum. Also a student who has received the 100% scholarship and whose GPA falls below 3.0 but is still above 2.75 is eligible to receive the 75% scholarship.