INSTITUTIONAL RESPONSES TO STATE MERIT AID PROGRAMS: THE CASE OF FLORIDA COMMUNITY COLLEGES

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Abstract

This study estimates the effects of a state merit aid program on community colleges by using the introduction of the Florida Bright Futures Scholarship program as a natural experiment. It examines the effects of the program in terms of institutional aid, tuition pricing, and as a re-sorting mechanism for high ability students. The results suggest that community colleges do not increase students' charges to capture additional revenues, nor do they substitute state aid for institutional aid. Contrary to what was expected, institutions apparently use the scholarship program as an "ability marker" to provide additional financial aid to high ability students. Although we find no statistical evidence that the community college system is losing high ability students, there is strong support for heterogeneity in the program effect across institutions that depends on measures of the level of competition within each college's educational marketplace.

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1. Introduction

Financial aid and the cost of college are among the most studied topics in the economics of higher education because of their policy relevance (Heller, 1997; Kane, 1999; Leslie & Brinkman, 1987). Economic theory suggests that financial aid can help reduce imperfections in the capital markets for financing of higher education and ease financial constraints for individuals wishing to go to college, therefore inducing individuals to invest in higher education at a more optimal level (Long, 2004a). For years, state financial aid policies have focused on need-based aid programs to reduce inequalities in access and completion in higher education. However, during the last 15 years and starting with the Georgia HOPE scholarship, many states have shifted their financial aid policies toward broad-based merit aid programs (Dynarski, 2004). Although merit-based financial aid programs have positive effects in terms of access (Cornwell, Mustard, & Sridhar, 2006; Dynarski, 2003, 2004; Kane, 2003), they also encourage grade inflation in high school (Henry & Rubenstein, 2002; Office of Program Policy and Government Accountability [OPPAGA], 2003) and provide incentives for college students to enroll in fewer and easier courses, to withdraw from classes, and to increase summer school credits (Cornwell, Kyung, & Mustard, 2005). Thus, although the new merit aid programs seem to increase the probability of enrolling in higher education, they also lead to student behavioral responses that partially undermine their objective of promoting academic achievement.

The implementation of new financial aid programs may also provide postsecondary institutions with incentives to alter the way they operate, particularly in increasingly difficult and competitive funding environments. Long (2004a) outlined three main possible responses to the introduction of financial aid policies by postsecondary institutions. First, most colleges and universities determine the amount of institutional aid they give by subtracting from the institutional cost of education all the aid that a student receives. Thus, the *crowding-out hypothesis* states that colleges are likely to reduce the amount of institutional aid they provide when a new source of financial aid becomes available, thereby capturing the rents from the new program (Kane, 2003). Second, institutions may increase students' charges, such as tuition, room and board, or fees, in order to capture the rents from the new program. This argument was first stated almost 20 years ago by former Secretary of Education William Bennett and is also known as the *Bennett hypothesis* (Bennett, 1987). These two hypotheses are fully explored below. A

third hypothesis, which was cited by Long but is not discussed in this study for reasons explained in the next section, is that institutions may reduce quality-enhancing investments, such as instructional expenditures, if the new financial aid program gives them a competitive advantage over out-of-state schools.

Although community colleges currently enroll almost half of all the students in higher education (National Center for Education Statistics, 2006), previous research has been limited to four-year colleges and universities. In this study, we test whether two-year public colleges respond to the introduction of a new state merit based financial aid program in the ways that Long (2004a) predicted they should respond. In 1997, the Florida Legislature created the Florida Bright Futures Scholarship (FBFS) program, funded by lottery funds. We use a unique administrative dataset obtained from the Florida Department of Education to evaluate community colleges' institutional behavior before and after this financial aid program was implemented.

The remainder of this study is organized as follows. In section 2, we describe the FBFS program and hypothesize its impact on community colleges and these institutions' potential responses to the economic incentives generated by the program. In section 3, we describe the dataset and the difference-in-difference empirical model used to estimate institutional responses to FBFS. We discuss our findings in section 4, and we present concluding remarks in section 5.

2. The Florida Bright Futures Scholarship and Its Effects on Community Colleges

In 1997, the Florida Legislature created the Florida Bright Futures Scholarship program. Funded by state lottery funds, it rewards traditional-age students for their academic achievements during high school by helping to finance their postsecondary education in the state of Florida. Traditional-age students are defined as those who matriculate at any Florida college in the fall term of the same year in which they graduated from high school. Students, who must also be Florida residents, apply for an FBFS by completing the Florida Financial Aid Application (FFAA) during their last year in high school (Office of Student Financial Assistance, 2004). This scholarship is awarded independent of a student's financial situation. The Bright Futures program therefore intends to encourage better student preparation and performance, make

college more affordable, and encourage more students to attend an in-state college (OPPAGA, 2003).

The FBFS program provides four types of awards: Florida Academic Top Scholars Award (FATS), the Florida Academic Scholarship (FAS), the Florida Medallion Scholarship (FMS), and the Florida Gold Seal Vocational Scholarship (FGSV). The first three can be used at any of the state's public and private degree granting institutions; the latter is reserved for students who pursue vocational/technical postsecondary education. In order to receive a FBFS, students must satisfy minimum high school GPA and ACT/SAT test scores. The minimum requirements vary according to the type of FBFS award received. For example, in order to receive an FAS, students must have a 3.5 high school GPA, score 1270 on the SAT or 28 on the ACT, and have at least 75 hours of community service while in high school. The minimum requirements are similar for the FATS, but less strict for the remaining two types of FBFS awards (Heller & Rasmussen, 2002). Once in college, recipients need to maintain a minimum GPA to renew their FBFS, which also varies according to the type of award, and they must enroll for a minimum of six non-remedial semester hours per term (Office of Student Financial Assistance, 2004).

Although one might expect that a merit aid program like FBFS affects mostly four-year college students, FBFS provides awards to a considerable number of community college students. Over 140,000 students received a scholarship for the 2005-2006 academic year for a total over $306 million; 18 percent of the recipients students used theirs at a community college or private two-year institution (Office of Student Financial Assistance, 2006).

How do we expect community colleges to respond to these additional funds available from FBFS? As discussed above, Long (2004a) outlined three main possible responses of colleges to new financial aid programs. Certainly, public two-year colleges could capture the rents from the new financial aid source by reducing the amount of institutional aid they provide as the crowding-out hypothesis predicts, and then redistribute the surplus among non-eligible students or reallocate it for other purposes. We test the crowding-out hypothesis below.

Public two year colleges could also capture the rents from FBFS by increasing tuition and fees. However, tuition at public colleges is generally determined after negotiation with the State Legislature, which limits their institutional freedom to modify tuition and fees in response to a new financial aid program (Long, 2002). This limited flexibility restricts the applicability of the

Bennett hypothesis at public colleges. Moreover, the democratic mission of community colleges might deter the colleges from increasing student charges even if they were able to do so. In Florida, each community college's board of trustees establishes tuition and fees, but they cannot be more than 15 percent above or 10 percent below the combined total of the fee schedule adopted by the State Legislature and the technology fee adopted by a board of trustees (2005 Florida Statutes, Title XLVIII, Chapter 1009, 1009.23). We therefore test whether community colleges in Florida responded to FBFS by exploiting this limited flexibility for increasing tuition as the Bennett hypothesis predicts.

Lastly, out-of-state competition is not a major threat for community colleges because they generally serve students who live within a reasonable commuting distance (Rouse, 1994, 1995). Only 5.8 percent of students in our dataset are out-of-state students, suggesting that Florida community colleges attract mostly in-state students. Moreover, only 4 out of Florida's 28 community colleges are located within 20 miles of state borders and in direct geographic competition with out-of-state colleges. Because of the limited applicability of the competitive advantage hypothesis to community colleges, we do not test it in this study.

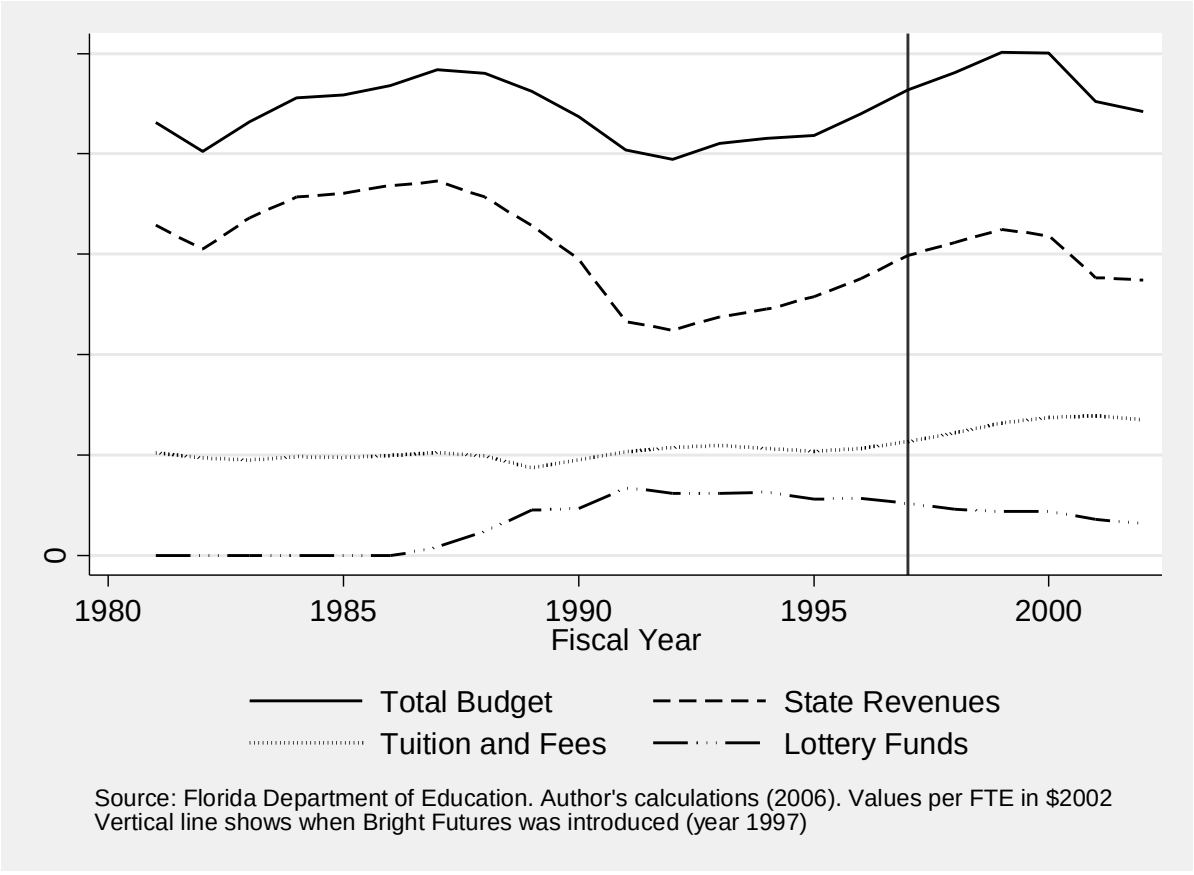
There are, however, additional ways in which a new merit aid program could impact community colleges. These alternative hypotheses have not been discussed in the literature because, in contrast to this study, previous research has not focused exclusively on two-year colleges. First, traditional-age students could modify their college choice decision and enroll in a four-year college instead of a two-year institution (Dynarski, 2004). Indeed, the most generous versions of the Bright Futures program, the FATS and the FAS, provide full tuition and fees coverage at any Florida public postsecondary institution—or 100 percent of tuition at a comparable public institution if the student enrolls at a private college. Less generous versions, like the FMS and the FGSV, cover 75 percent of tuition and fees.[1] Therefore, students eligible for these scholarships are likely to choose a four-year over a two-year college because FBFS decreases the cost of a four-year college relative to a two-year college. More importantly, given the merit component of the program, high ability students who otherwise would have attended a community college may instead consider enrollment at a four-year college. This *re-sorting hypothesis* or "moving up" effect preoccupies community college advocates because it may

[1] The 2006 Florida Legislature has since amended section 1009.535, Florida Statute; beginning in fall 2006, FMS students who choose to attend a Florida public community college may receive an award of 100 percent of their tuition and fees for college credit courses leading toward an associate degree.

decrease the average quality of students enrolled at community colleges, and may ultimately have a negative impact on the college's already low retention and graduation rates.

A second alternative hypothesis is that state-level effects as previously estimated in the literature (e.g., Long 2002, 2004a) mask fundamental variation in responses across institutions. For example, public two-year colleges receive the bulk of their funding from state appropriations and local tax revenues, but they have been exposed to an increasingly difficult funding environment where other demands on state resources, such as health care and corrections facilities, have squeezed community college funding in many states (Kane, Orszag & Gunter, 2003). Certainly, as shown in Figure 1, this national trend was clearly evident in Florida in the late 1980s, although state revenues rebounded during the 1990s. Similarly, institutional responses might be a function of educational marketplace where each community college is located. We also contribute to the literature by explaining how different institutional factors have an effect on the response of each community college to this new merit aid program.

Figure 1:
Florida Community College System: State Revenues 1981-2002



Source: Florida Department of Education. Author's calculations (2006). Values per FTE in $2002
Vertical line shows when Bright Futures was introduced (year 1997)

In sum, our study investigates the impact of FBFS on community colleges and their responses to the new economic incentives created by it. In particular, we test the applicability of the crowding-out, Bennett, and re-sorting hypotheses for community colleges after teasing out potentially confounding factors such as the trend in state appropriations and the behavior of four-year institutions.[2] Moreover, our detailed micro dataset allows us to test the assumption of homogeneous program effect and to show that previous state-level program effect estimates mask fundamental variation in responses across institutions.

[2] Community colleges may be affected by changes occurring in the public four-year sector. For example, increases in the slots available in the Florida State University System (FSUS) could decrease the demand for two-year colleges, especially among traditional-age students, an effect that might be confounded with the behavioral response of community colleges to the introduction of FBFS program.

3. Data and Empirical Strategy

3.1 Dataset and Variables

For this study, we rely on a unique administrative dataset obtained from the Florida Department of Education. It includes transcript records of all Florida resident[3] first-time, degree-seeking community college students who enrolled in a college-credit course at any of Florida's 28 community colleges in the fall of years 1995 to 2000,[4] which covers the period before and after the implementation of the FBFS program.

The dataset includes the amount, type, and source of financial aid received by each student in the first semester of college, and each student's college placement test scores.[5] The dataset also contains information on the demographic characteristics of all students in each cohort, including gender, race/ethnicity, citizenship, and English language proficiency. In addition, we obtained Integrated Postsecondary Education Data System (IPEDS) codes for the 28 Florida community colleges, and thus our dataset has been merged with the IPEDS dataset. IPEDS is a set of annual surveys collected by the National Center for Education Statistics (NCES), designed to be an annual census of all primary providers of postsecondary education in the United States. From IPEDS, we extracted tuition information for two- and four-year colleges located in Florida, enrollment rates at Florida four-year institutions, and ZIP codes to compute distances between institutions. The dataset is supplemented with information on high school graduates, community colleges' revenues, and enrollment at four-year colleges obtained directly from the Florida Department of Education, Division of Community Colleges.

3.2 Empirical Strategy

We used the introduction of the FBFS program as a source for a natural experiment and a difference-in-difference regression to estimate its causal effect on different measures of community colleges' institutional behavior (Campbell & Stanley, 1990; Meyer, 1995). In order to identify the FBFS program effect, we took advantage of the fact that FBFS is open only to

[3] Since FBFS is not available to non-residents and fee policies for non-resident students are quite different from those for in-state students, out-of-state students are excluded from the dataset (5.8 percent of total sample).
[4] Currently, 7 of these 28 colleges have been granted permission to offer bachelor's degrees. The colleges were all considered community colleges during the time frame covered by this study.
[5] We do not have all necessary information to determine which type of FBFS award each student received. Therefore, we cannot estimate the effects of the four FBFS awards separately.

traditional students—those who matriculate at any Florida community college in the fall term of the same year in which they graduated from high school. Since this type of aid was not available to traditional students before the implementation of FBFS, we identified the FBFS effect by analyzing traditional students before and after the introduction of the program.

We defined traditional-age students as those students who were younger than age 19 by the time they entered college, or were the same age at college entrance as at high school graduation. Florida resident students who delayed enrollment form a natural within-state control group because they were exposed to similar trends and economic shocks as the treatment group. To create a valid comparison group, we restricted our control group to those Florida resident students who were younger than age 25—but older than age 19—when they entered college.[6] However, the fact that they delayed college entry suggests they were somewhat different from our treatment group, and therefore our baseline models control for a detailed set of observable pre-treatment differences. Hence, we estimated linear regressions of the form:

$$y_{ijt} = \beta \text{AFTER}_i \cdot \text{Trad}_i + \alpha_1 \text{AFTER}_i + \alpha_2 \text{Trad}_i + D_j'\delta_j + X_i'\gamma + Z'\varphi + \varepsilon_{ijt} \qquad (1)$$

where y_{ijt} is the outcome of interest, such as the amount of institutional financial aid, in-state tuition, or the student's test scores, for student *i* in academic year *t* (t = 95, 96, … , 2001) enrolled in community college *j* (j = 1, 2 , … , 28); AFTER_i is an indicator that is set to 1 for students who matriculated after 1997; Trad_i is a dummy for traditional student and equals 1 for those who started college right after their high school graduation; D_j is a set of dummy variables indicating whether a student is enrolled in community college *j*; X_i contains student's characteristics and a continuous variable measuring the time trend; Z is a set of variables measuring state-level trends in revenues for community colleges, average institutional test scores, and enrollment and tuition at four-year colleges; and ε_{ijt} is the error term.[7]

The program effect is captured by the coefficient on $\text{AFTER}_i \cdot \text{Trad}_i$, the interaction between enrollment after the introduction of the Bright Futures program (AFTER_i) and the traditional-age student (Trad_i) dummies. This coefficient measures the state-level weighted

[6] Strictly speaking, the higher education literature considers "non-traditional" students as those older than 25 years, generally attending part time and working full time while enrolled, married, caring for children, and/or financially independent. For the purposes of this paper, however, we consider non-traditional students as those who delayed enrollment, and we exclude "older students" (25 years or older) to create a more homogeneous control group in terms of enrollment trends and pathways (Calcagno, Crosta, Bailey, & Jenkins, in press; Turner, 2004).

[7] All difference-in-difference regressions are adjusted using clustering methods (Bertrand, Duflo, & Mullainathan, 2004).

average of institutional responses to the introduction of FBFS. The identifying assumption is that any relative shift in the outcomes of interest is attributable to the introduction of FBFS. The coefficient α_1 removes any effect that is common to both traditional and non-traditional students after the implementation of FBFS, while α_2 removes any effect of being a traditional-age student before and after the introduction of the FBFS program.

Microdata allowed us to test heterogeneity in the program effect across institutions, or the behavioral responses of each community college to the introduction of a new state merit aid program. We followed a two-step multilevel model (Gelman & Hill, 2006). First, we captured the average program effect at each institution by adding a triple-interaction between the community college dummies (D_j), the enrollment after the Bright Futures indicator ($AFTER_i$), and the traditional student indicator ($Trad_i$) as follows:

$$y_{ijt} = \beta_j \, AFTER_i \cdot Trad_i \cdot D_j^{'} + \alpha_1 AFTER_i + \alpha_2 Trad_i + D_j^{'}\delta_j + X_i^{'}\gamma + Z'\varphi + \varepsilon_{ijt} \quad (2)$$

where β_j are 28 institution-specific program effects (one set equal to 0). In the second step, we performed a linear regression at the institutional level using these estimated coefficients as dependent variables and different institutional-level factors as predictors. Since this second step has only 28 data points, we tested the impact of institutional factors on program effects as a set of separate bivariate regressions.

4. Results

4.1 Descriptive Statistics

Table 1 summarizes the variables we used in the analysis. Regardless of the merit aid policy, traditional-age students received more institutional financial aid than those who delayed enrollment. As expected, the average amount of institutional aid in 2002 dollars decreased for traditional-age students after the implementation of the FBFS, although only slightly. However, the average amount of institutional aid also decreased for non-traditional students, suggesting a statewide decreasing trend in institutional financial aid. Traditional-age students had higher test scores, especially in the math section of the SAT, and were also more likely than non-traditional students to be female and White, to hold U.S. citizenship, and to be fluent in English both before and after the implementation of FBFS. We used a detailed set of observable characteristics in the

regressions to control for pre-college differences between traditional-age and non-traditional students.

Table 1:
Sample Means Before and After Bright Futures for Traditional and Non-Traditional Community College Students

Variable	Before BF: 1995-1996		After BF: 1997-2000	
	Traditional	Non-traditional	Traditional	Non-traditional
Institutional aid	195.62	126.84	189.44	112.41
	(453.99)	(378.44)	(447.68)	(340.53)
In-state tuition	1,332.36	1,336.32	1,333.74	1,334.17
	(103.72)	(102.54)	(160.98)	(155.70)
SAT converted math	417.85	364.99	425.04	373.76
	(93.32)	(94.13)	(90.35)	(93.43)
SAT converted verbal	441.52	420.00	457.01	438.15
	(91.22)	(99.67)	(88.86)	(98.98)
Age	17.80	20.08	17.86	20.07
	(0.44)	(1.53)	(0.39)	(1.50)
Female	0.55	0.47	0.55	0.47
Asian	0.02	0.03	0.03	0.03
Black	0.15	0.21	0.15	0.19
Hispanic	0.21	0.24	0.19	0.19
American Indian	0.00	0.01	0.00	0.01
US citizen	0.90	0.83	0.93	0.87
Limited English proficiency	0.07	0.09	0.03	0.06
State revenues per FTE	2,670.14	2,668.90	3,112.91	3,112.21
	(337.78)	(311.69)	(465.24)	(441.43)
FTE enrollments FSUS	130,008.80		143,472.90	
	(1,012.98)		(6,144.11)	
Tuition FSUS	2,076.75		2,328.65	
	(22.88)		(143.53)	
Observations	26,220	12,083	69,698	34,687

Source: Authors' calculations using data from the Florida Department of Education and IPEDS.
Notes: standard deviation for continuous variables in parentheses. Monetary values are expressed in 2002 dollars.

As expected, state-level trends were different before and after the introduction of the FBFS. Table 1 confirms the pattern shown in Figure 1: State appropriations for community colleges decreased during the 1980s, but they experienced a rebound in the 1990s. In addition,

the total number of slots in the Florida State University System (FSUS) and FSUS's average tuition increased after the introduction of the FBFS, pointing to the importance of controlling for these trends at the four-year level.

Table 2 shows descriptive statistics on institutional level characteristics and measures of the level of competition within the educational marketplace. The average distance to the closest four-year public college was 31 miles, although the average number of four-year institutions within a 50-mile radius was seven. Moreover, an average community college in Florida faced competition from 11 postsecondary education institutions within a radius of 50 miles. This appears to suggest that, on average, the educational marketplace of Florida community colleges is quite competitive. The average institution enrolled 8,500 full-time equivalent (FTE) students and managed an annual budget of $5,000 per FTE student over the years 1995 to 2000, with $3,281 of these funds coming from the state as appropriations.

Table 2:
Sample Means for Institutional Characteristics

Variable	Mean
Distance to closest 4-year public college	31.76
	(24.96)
Number of public 4-year institutions in 50-mile radius	1.25
	(0.88)
Number of 4-year institutions in 50-mile radius	6.9
	(6.43)
Number of postsecondary institutions in 50-mile radius	10.96
	(9.13)
Total FTE students (per 1,000)	8.53
	(8.02)
Mean state revenues per FTE (1995-2000, CPI adjusted)	3281.40
	(737.22)
Mean budget per FTE (1995-2000, CPI adjusted)	4929.77
	(743.37)
Observations	28

Source: Authors' calculations using data from the Florida Department of Education and IPEDS.
Notes: Standard deviation for continuous variables in parentheses. Monetary values are expressed in 2002 dollars.

4.2 Regression Results

Table 3 shows the evidence for the crowding-out hypothesis in Florida community colleges using the amount of institutional financial aid as the dependent variable. We began with a model that includes the direct effects, the treatment interaction, institutional fixed effects, demographic controls, and a time trend (column 1). Then covariates were sequentially introduced into the model to test for confounding factors (columns 2-5). In contrast to the crowding-out hypothesis, community colleges in Florida seem to have increased institutional financial aid after the implementation of the FBFS program. As mentioned earlier, the most generous versions of the state merit aid program cover 100 percent of tuition, whereas the less generous versions cover only 75 percent of tuition. Awarding students who received 75 percent of their costs in scholarship funds the remaining 25 percent gives community colleges an advantage in recruiting good students. Not only do FBFS awards serve as an "ability marker" to institutions—indicating which are the higher ability students—but they also give colleges an important tool for competing: it makes them more attractive financially to high ability students. While traditional-age students had initially received higher amounts of institutional aid than non-traditional students (coefficient on traditional-age students), the FBFS program further increased the amount of institutional aid that traditional students received. The pattern held after controlling for several potentially confounding factors (columns 2-5).[8] Moreover, we found a negative effect that is common to both traditional and non-traditional students after the implementation of FBFS that confirms the statewide decreasing trend in institutional aid found in Table 1, although this result becomes statistically significant only after controlling for the trend in enrollments at FSUS.

[8] All regression results are also robust to changes in transition or participation rates (measured by the changes in the number of high school graduates who enroll in college) and to changes in the number of students taking AP exams. Results are not shown here but are available from the authors upon request.

Table 3:
Difference-in-Difference Results Using Institutional Aid as Dependent Variable

Variable	(1)	(2)	(3)	(4)	(5)
After BF * Traditional	11.843**	11.827**	12.030**	11.531**	11.533**
	(5.028)	(5.028)	(5.009)	(5.001)	(5.003)
Traditional 18yrs	35.312***	35.167***	34.648***	35.064***	35.062***
	(4.377)	(4.376)	(4.351)	(4.345)	(4.345)
After Bright Futures	7.542	0.321	-2.788	-12.758**	-12.735**
	(5.026)	(5.218)	(5.222)	(5.740)	(5.748)
Institutional dummies	YES	YES	YES	YES	YES
Demographic controls and time trend	YES	YES	YES	YES	YES
State revenues per FTE		YES	YES	YES	YES
Institutional mean for test scores			YES	YES	YES
FTE enrollments FSUS				YES	YES
Tuition FSUS					YES
R-squared	0.185	0.185	0.186	0.186	0.186
Observations	142,680	142,680	142,680	142,680	142,680

Notes: * significant at 10%; ** significant at 5%; *** significant at 1%. Robust standard errors in parentheses. Monetary values are expressed in 2002 dollars. Demographic controls include gender, race/ethnicity, citizenship, limited English proficiency, verbal and math test scores.

Several robustness checks were conducted to test the assumptions of our difference-in-difference model. First, although we controlled for observable differences between the treatment and control groups, non-traditional students might be affected differently by "environmental factors" that are unobservable to the econometrician. These unobserved environmental factors could ultimately affect non-traditional students' enrollment decisions differently over time (Bean & Metzner, 1985).[9] Thus, as shown in Table 4, we tested the sensitivity of the estimates to our decision to include students who were younger than 25 years old when they entered college. The

[9] In the Florida dataset, the trend in enrollment rates for non-traditional (traditional) students remained pretty flat, ranging from 32 (68) percent in 1995 to 34 (66) percent in 2000. The trend also remained stable if we included in our "non-traditional" group those students who were older than 25 years old.

results are quite stable after restricting the control group to only those students younger than age 24, 23, and 22 years old, respectively. Second, Table 4 indicates that there are no significant changes in the treatment estimators when we focused on years closer to the implementation of the policy (1996 and 1997, 1995 to 1998), although estimates slightly increase in size. Third, we estimated the same model but using a related outcome that is not supposed to have been affected by FBFS (amount of federal financial aid) and an outcome that should have been directly affected by the policy (amount of state financial aid). As expected, FBFS had no statistical effect on the amount of federal aid (Table 4, column 2), while the effect of the policy in column 3 further confirms the robustness of the results.

Table 4:
Sensitivity of Results to Choice of Control Group and Years

Selected subsamples	Dependent variable		
	Institutional aid	Federal aid	State aid
	(1)	(2)	(3)
Baseline: control group is < 25 years old; All years (1995 to 2000)	**11.843****	-2.239	20.713***
	(5.028)	(10.297)	(3.364)
Control group: < 24 years old	9.843**	-2.050	19.706***
	(4.95)	(10.391)	(3.403)
Control group < 23 years old	10.485**	1.891	19.965***
	(5.078)	(10.531)	(3.480)
Control group < 22 years old	9.972*	5.046	20.124***
	(5.251)	(10.634)	(3.569)
Years 1996 and 1997	18.962**	7.581	15.036***
	(7.786)	(15.414)	(5.379)
Years 1995 to 1998	15.941***	8.849	16.669***
	(5.624)	(11.509)	(3.757)

Notes: * significant at 10%; ** significant at 5%; *** significant at 1%. Robust standard errors in parentheses. Monetary values are expressed in 2002 dollars. Baseline results for column 1 come from table 3, column 1.

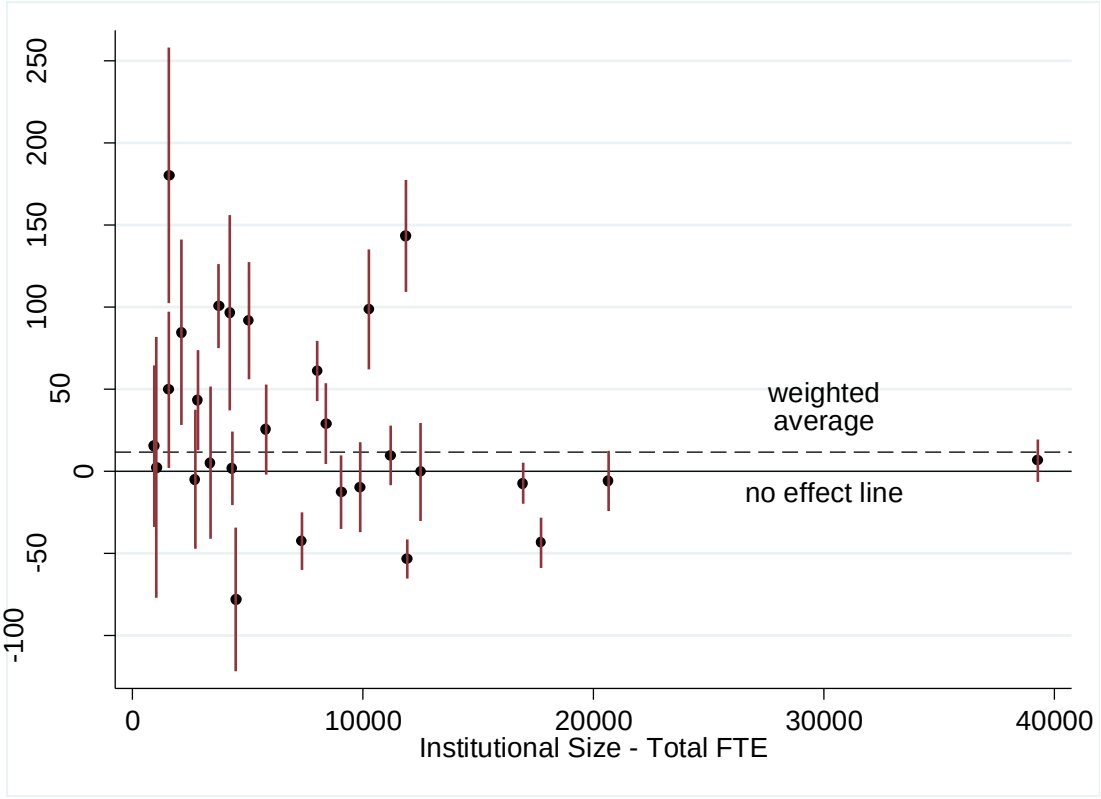
However, these state weighted average estimates mask the institution-specific responses to the FBFS program. To estimate institutional-specific responses, we interacted the treatment effect with each institutional indicator as explained in equation 2. Figure 2 shows the institutional treatment effect, the ± 1 standard error bounds, the weighted average (11.533, as

shown on column 5 of Table 3), and the no effect line set to equal 0. Confidence intervals that touch the no effect line at 0 are not statistically significant at a five percent level. Institutional treatment effects were plotted against institutional size as measured by the total number of FTE students.[10] As expected, the graph shows heterogeneous responses across institutions. Some institutions increased their first semester level of institutional aid by amounts as high as $250, while others decreased it by amounts as low as $100. Interestingly, the largest responses appear to have come from the smallest institutions—although these estimates have larger standard errors and are therefore more volatile.[11]

[10] Note that institutional size here is measured as the total number of FTE students from IPEDS. This information is more broadly defined than any other measure of institutional size that we can obtain from a more limited dataset of first-time, degree seeking, resident students in our sample.

[11] This result, however, could be related to the volatility inherent to small institutions, where the impact of an individual student is considerably larger than that at a large institution (Gelman & Hill, 2006; Kane & Staiger, 2002).

Figure 2:
Institutional Treatment Effects Using Institutional Financial Aid as Dependent Variable



Note: Dependent variable is institutional financial aid. No effect line is set at 0. The weighted average comes from table 2, column 5. Institutional treatment effects are estimated according to equation 2. Confidence intervals that touch the no effect line at 0 are not statistically significant at a 5 percent level (± 1 standard error).

We then tested the applicability of the Bennett hypothesis in Florida community colleges. Table 5 shows the regression results using in-state tuition as the dependent variable following the same sequential models previously described. The effect of the FBFS program on in-state tuition is identified by between-institution variation, because tuition is an institutional level variable with a small within-institution variation over time (in 2002 dollars). Although public postsecondary institutions in Florida do not have much institutional freedom to modify their tuition, we found a statistically significant effect of around a $5 increase in tuition. Nonetheless, this result is economically minor given a pre-policy average tuition of $1,300, and its detection is an artifact of large sample size power. Moreover, the statistical difference vanished after controlling for the trend in tuition at the FSUS, suggesting an increasing trend at all Florida

public postsecondary institutions. This result in Florida community colleges confirms previous evidence found for two-year colleges in Georgia (Long, 2002).

Table 5:
Difference-in-Difference Results Using In-State Tuition as Dependent Variable

Variable	(1)	(2)	(3)	(4)	(5)
After BF * Traditional	4.876***	4.890***	5.139***	4.562***	1.587
	(1.316)	(1.315)	(1.293)	(1.271)	(1.146)
Traditional 18yrs	-3.460***	-3.482***	-4.601***	-4.164***	-1.821**
	(1.022)	(1.021)	(1.002)	(0.970)	(0.912)
After Bright Futures	163.924***	161.115***	164.085***	154.246***	130.148***
	(1.383)	(1.404)	(1.371)	(1.413)	(1.330)
Demographic controls and time trend	YES	YES	YES	YES	YES
State revenues per FTE		YES	YES	YES	YES
Institutional mean for test scores			YES	YES	YES
FTE enrollments FSUS				YES	YES
Tuition FSUS					YES
R-squared	0.139	0.140	0.162	0.163	0.376
Observations	142,680	142,680	142,680	142,680	142,680

Notes: * significant at 10%; ** significant at 5%; *** significant at 1%. Robust standard errors in parentheses. Monetary values are expressed in 2002 dollars. Demographic controls include gender, race/ethnicity, citizenship, limited English proficiency, verbal and math test scores.

Finally, as shown in Table 6, we tested the re-sorting hypothesis using math and verbal test scores as dependent variables. As already stated, the most generous state merit aid programs award 100 percent of tuition and therefore could serve as incentives to students to change their postsecondary education choice. High ability traditional-age students under financial pressure may have decided to attend the less expensive two-year institutions before the creation of FBFS, but the program decreased the cost of a four-year college relative to a two-year college within the state. Hence, if high-test-scores students re-sort toward four-year colleges, we would expect to

observe a decrease in the average cognitive ability of students at community colleges after the establishment of the FBFS. Results on the treatment interaction for traditional students in math and English test scores did not confirm this hypothesis, however. The effects for traditional students after the implementation of the FBFS program across models were not statistically significant.

Table 6:
Difference-in-Difference Results Using Test Scores as Dependent Variables

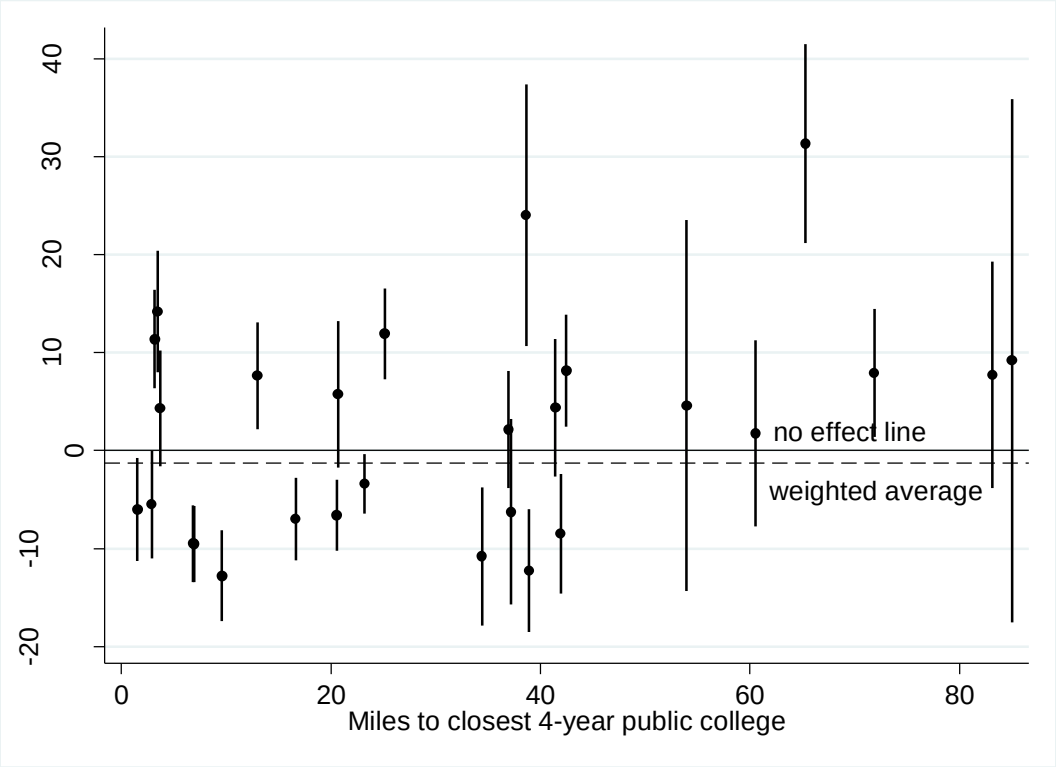
Variable	Math	Verbal	Math	Verbal
	(1)	(2)	(3)	(4)
After BF * Traditional	-1.512	-0.997	-1.251	0.032
	(1.176)	(1.186)	(1.149)	(1.127)
Traditional 18yrs	51.142***	17.742***	51.951***	13.135***
	(1.013)	(1.021)	(0.991)	(0.972)
After Bright Futures	6.844***	12.952***	2.519**	3.283***
	(0.987)	(1.016)	(1.182)	(1.173)
Institutional dummies	YES	YES	YES	YES
Demographic controls and time trend	NO	NO	YES	YES
R-squared	0.952	0.960	0.955	0.964
Observations	146,305	148,810	146,297	148,802

Notes: * significant at 10%; ** significant at 5%; *** significant at 1%. Robust standard errors in parentheses. Monetary values are expressed in 2002 dollars. Demographic controls include gender, race/ethnicity, citizenship, limited English proficiency.

We then interacted the treatment indicator with the institutional dummies following equation 2, and again found that the state weighted average masks fundamental variation in behavioral responses across institutions. Figures 3 and 4 show the 28 institutional treatment effects, the ± 1 standard error bounds, a no effect line at 0, and the state-level weighted average when each test score is used as a dependent variable (Table 6, columns 3 and 4). The effect of the introduction of the FBFS on the math test scores of community college students was not statistically significant for nine institutions, but for the remaining nineteen it was clearly defined

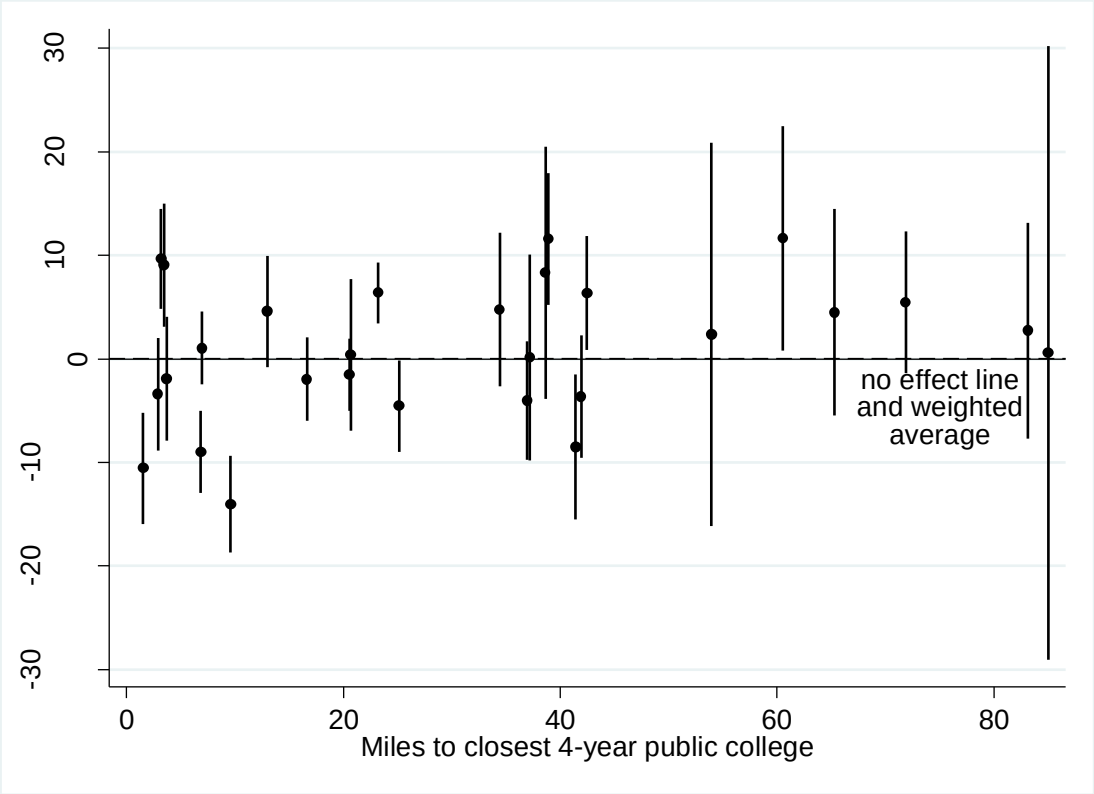
as either positive or negative, and it ranged from gains of 30 points to losses of 20 points (SAT math scores units). Statistical differences for English test scores from Figure 4 were less evident.

Figure 3:
Institutional Treatment Effects Using Math Test Scores as Dependent Variable



Note: Dependent variable is math test score. No effect line is set at 0. The weighted average comes from table 5, column 3. Institutional treatment effects are estimated according to equation 2. Confidence intervals that touch the no effect line at 0 are not statistically significant at a 5 percent level (± 1 standard error).

Figure 4:
Institutional Treatment Effects Using Verbal Test Scores as Dependent Variable



Note: Dependent variable is English test score. No effect line is set at 0. The weighted average comes from table 5, column 4. Institutional treatment effects are estimated according to equation 2. Confidence intervals that touch the no effect line at 0 are not statistically significant at a 5 percent level (± 1 standard error).

The institutional treatment effects in Figures 3 and 4 are drawn against the distance to the closest four-year public university as a measure of the competition within the community college's educational marketplace.[12] This relation between college choice and college location is more formally explored in a multilevel setting in Table 7. We extracted all 28 institutional treatment effects from equation 2 and used them as dependent variables in a regression on institutional level predictors (Gelman & Hill, 2006). First, we estimated the effect of measures of competition within the educational marketplace, such as the distance to the closest four-year public college and the number of institutions in a 50-mile radius; then we used group-level

[12] The distance is computed using the ZIP codes of Florida community colleges and of Florida four-year colleges and universities. It is measured in straight miles and does not take into account driving distance.

predictors like the total number of FTE students, the mean state revenues per FTE, and the mean budget per FTE (1995-2000, CPI adjusted). Only the distance to the closest four-year public college had a statistically significant impact on institutional treatment effects, although for the rest of the variables the direction of the effect was as expected. Hence, we conclude that distance to the closest four-year public competitor is the main determinant of losing or gaining high-test-score students. This result confirms the hypothesis that distance is an important predictor for college choice and enrollment (Long, 2004b; Rouse, 1995). Due to incentives generated by the merit aid program, high ability students were more likely to switch to a public university if a four-year college was within a reasonable commuting distance.

Table 7:
Results for Institutional Treatment Effect Coefficients as Dependent Variables

Independent variable	Dependent variable	
	Math test score coefficients	Verbal test score coefficients
Distance to closest 4-year public college	0.157**	0.083*
	(0.072)	(0.047)
Number of public 4-year institutions in 50-mile radius	-3.460	-1.607
	(2.496)	(1.606)
Number of 4-year institutions in 50-mile radius	-0.218	-0.056
	(0.279)	(0.186)
Number of postsecondary institutions in 50-mile radius	-0.095	-0.004
	(0.213)	(0.135)
Total FTE students (per 1,000)	-0.480*	-0.146*
	(0.000)	(0.000)
Mean state revenues per FTE (1995-2000, CPI adjusted)	0.003	0.001
	(0.002)	(0.001)
Mean budget per FTE (1995-2000, CPI adjusted)	0.002	0.001
	(0.002)	(0.001)

Notes: * significant at 10%; ** significant at 5%; *** significant at 1%. Robust standard errors in parentheses. Monetary values are expressed in 2002 dollars. Each row is a separate regression with 28 institutions/observations.

5. Summary and Conclusions

In this paper, we have examined the institutional behavioral responses of public-two year institutions to the introduction of a merit aid scholarship program in the state of Florida. We find no support among Florida community colleges for the *Bennett hypothesis*, which holds that institutions will increase tuition and other fees in order to capture the rents from a new aid program, and we note that public institutions have generally limited flexibility to modify their tuition and fees. Moreover, in contrast with the crowding-out hypothesis, which asserts that colleges are likely to reduce the amount of institutional aid they provide when a new source of financial aid becomes available, community colleges in Florida increased institutional financial aid for eligible students after the implementation of the Florida Bright Futures Scholarship. One plausible explanation for this finding is that institutions use the Bright Futures program as an "ability marker" and were willing to provide institutional aid to make up any amount of tuition not covered by the merit scholarship program. However, the state-level weighted average estimates mask fundamental variations across institutions. We find positive and negative institutional level effects, ranging from an increase in $250 in institutional aid per student to a $100 reduction in institutional financial aid.

Finally, we find no statistical evidence for the re-sorting hypothesis which posits that the state community college system loses high ability students as a result of the implementation of the Bright Futures program. However, our results also confirm the inappropriateness of a state-weighted average treatment effect for the change in average test scores at community colleges. The analysis of institutional treatment effects suggests that some community colleges gained higher ability students after FBFS was introduced—with a maximum gain of 30 points in average math test scores—while other two-year colleges lost higher ability students—with a college losing as much as 20 points in the average math test scores. The shift of Florida students away from community colleges as a result of the FBFS program seems to be statistically associated with measures of the level of competition within each community college's educational marketplace, such as the distance to the closest public four-year college.

In conclusion, this study finds that community colleges respond to the economic incentives created by the introduction of a merit aid program by modifying their institutional financial aid policies, on average, in unexpected ways. Our study also suggests that students

modify their college choice decisions after a new source of financial aid becomes available, but that the new program appears to affect the behavior of only those students residing in competitive higher education markets. Whether or not this re-sorting mechanism is a desirable consequence is a question that should be evaluated in terms of social returns. Nonetheless, policymakers should be aware of the heterogeneity of responses among institutions and students when evaluating the impact of programs like the Florida Bright Futures Scholarship program.

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