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Did the D.C. Tuition Assistance Grant Program Cause Out-of-State Tuition to Increase?

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Abstract

The District of Columbia Tuition Assistance Grant (DCTAG) program is a federally funded financial aid program that allows District residents to pay in-state tuition rates at public colleges and universities throughout the United States. One potential side effect of this program is that colleges and universities that enroll meaningful numbers of D.C. residents may have incentives to increase out-of-state tuition rates. We test this hypothesis empirically. Our preferred specification suggests that there is little evidence that colleges and universities that enroll a high percentage of out-of-state students from D.C. increased out-of-state tuition in response to the DCTAG program.

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1. Introduction

Concerned about the lack of affordable higher education options for residents of the District of Columbia, the United States Congress passed the District of Columbia College Access Act in November 1999. The Act created the District of Columbia Tuition Assistance Grant (DCTAG) program, which beginning in Fall 2000 allowed D.C. residents to pay in-state tuition at public colleges and universities throughout the U.S.[1] The federal government pays the difference between out-of-state and in-state tuition up to $10,000 annually and a student lifetime limit of $50,000.[2] The program also provides a $2500 tuition subsidy to District residents attending private colleges and universities in D.C. and to District residents attending private historically black institutions throughout the country. Abraham and Clark (2006) and Kane (2007) show that the DCTAG program has been highly successful at increasing the number of District residents enrolling in college and the effect has been largest at historically black four-year public institutions.

One potential concern with the DCTAG program is that it may provide incentives for some institutions to increase out-of-state tuition rates. The so-called Bennett (1987) hypothesis, named for former Secretary of Education William Bennett, suggests that colleges and universities might increase tuition to capture increases in financial aid. McPherson and Schapiro (1991) and Singell and Stone (2007) find that increased federal aid through the Pell Grant program has resulted in higher tuition rates, especially for out-of-state students and at private colleges. Similarly, Long (2004) finds that higher education institutions in Georgia increased tuition rates in response to the state's HOPE Scholarship program. Other studies that examine the various determinants of nonresident tuition include Greene (1994), Rizzo and Ehrenberg (2004), Dotterweich and Baryla (2005), Adkisson and Peach (2008), Calhoun and Kamerschen (2010), and Winters (2011).

DCTAG should have little or no effect on tuition at institutions that enroll very few D.C. residents, but it could plausibly affect tuition at institutions where D.C. residents are relatively important. By the law of demand, an increase in the price of enrollment will generally cause a decrease in the quantity demanded. The DCTAG program lowers the price at eligible institutions for District residents and makes them unresponsive to price changes at public institutions, as long as the difference between in-state and out-of-state tuition is less than $10,000. Therefore, the benefits of raising out-of-state tuition are greater for institutions with a high percentage of D.C. residents than for those with few D.C. residents.

This paper provides an empirical test of the Bennett Hypothesis for the DCTAG program. Specifically, we investigate whether DCTAG caused out-of-state tuition to disproportionately increase at four-year public institutions where a relatively high percentage of nonresidents are from D.C. While there is some evidence of a positive correlation, the effect disappears once institution-specific linear time trends are included. Our preferred specifications suggest that there is little evidence that colleges and universities increased tuition in response to DCTAG.

The paper proceeds as follows. The next section discusses the data and empirical methodology we use to test the Bennett Hypothesis for the DCTAG program. The third section presents the empirical results and a final section concludes.

[1] The program initially was restricted to public institutions in Maryland and Virginia, but was expanded to public institutions in all states in May 2000.

[2] This paper uses the terms "nonresident" and "out-of-state" interchangeably throughout.

2. Data and Methodology

This paper tests the Bennett Hypothesis for the DCTAG program using tuition data from the Integrated Postsecondary Education Data System (IPEDS) between years 1990-2008. The full sample includes all 570 public four-year institutions charging positive tuition except for the University of the District of Columbia. We begin by estimating variants of the following equation:

$$ln\ OST_{it} = \alpha_i + \gamma_t + \delta_i t + X_{it}\beta + \theta Post1999_t * PCTNRDC_{i,t-1} + \lambda PCTNRDC_{i,t-1} + \varepsilon_{it}, \quad (1)$$

where $ln\ OST_{it}$ is log out-of-state tuition for institution i in year t, α_i is an institution fixed effect, γ_t is a year dummy, δ_i is an institution-specific coefficient on a linear time trend, X_{it} is a set of explanatory variables with parameter vector β, $Post1999_t$ is an indicator equal to one for years 2000-2008 and zero for years 1990-1998[3], $PCTNRDC_{i,t-1}$ is the share of nonresident freshmen at institution i from D.C. in the previous year and comes from IPEDS, and ε_{it} is an error term. We measure $PCTNRDC$ with a one year lag to reduce concerns about reverse causality and because institutions typically set tuition rates for the upcoming academic year before students officially enroll and start taking classes.

Our main parameter of interest is θ, which measures the effect on out-of-state tuition from the interaction between the share of nonresidents from D.C. (lagged one year) and the treatment period. Basically, θ measures whether public institutions with a high percentage of D.C. residents experienced greater out-of-state tuition increases *after DCTAG was implemented* than institutions with very few D.C. residents. The Bennett Hypothesis claims that institutions respond to federal financial aid programs by increasing tuition rates and suggests that θ will be positive.

The other explanatory variables in X_{it} thought to affect out-of-state tuition include log in-state tuition, log enrollment lagged one year, log population of 18-19 year olds in the state, the state unemployment rate, log median household income, log state appropriations for higher education, the return to a bachelor's degree, and an indicator for a state merit aid program. In-state tuition and enrollment data also come from IPEDS, population and household income come from the Bureau of the Census, unemployment rates come from the Bureau of Labor Statistics, state appropriations come from the Grapevine annual reports, the return to a bachelor's degree is computed from the March Current Population Survey, and the merit program indicator variable is based on programs reported in Heller (2004) and Orsuwan and Heck (2009). All dollar amounts are converted to year 2008 dollars using the BLS Consumer Price Index.

One limitation with estimating equation (1) is that data on student residences are only available for the years 1992, 1994, 1996 and 1998 prior to 2000, and the missing data cause some pre-DCTAG years to be excluded from the analysis. Additionally, there could be concerns that the share of nonresidents from D.C. is endogenous even using a one year lag. To address these limitations we employ a second approach of estimating variants of:

$$ln\ OST_{it} = \alpha_i + \gamma_t + \delta_i t + X_{it}\beta + \theta Post1999_t * PCTNRDC_{i,9298} + \varepsilon_{it}, \quad (2)$$

[3] The year 1999 is excluded to alleviate concerns that some institutions may have anticipated DCTAG's adoption and altered their tuition policies before the program was enacted.

where $PCTNRDC_{i,9298}$ is the average share of nonresident freshmen at institution i from D.C. prior to creation of DCTAG, computed as the average share during the years 1992, 1994, 1996 and 1998. $PCTNRDC_{i,9298}$ is fixed over time and allows us to include all years between 1990 and 2008 (except again 1999). The separate effects for $Post1999_t$ and $PCTNRDC_{i,9298}$ are respectively captured by time dummies and institution fixed effects. Our main parameter of interest is again θ, which now measures the effect on out-of-state tuition from the interaction between the *average* percentage of nonresidents from D.C. prior to DCTAG and the treatment period. Therefore, θ measures whether public institutions that enrolled a high percentage of D.C. residents prior to the program experienced greater out-of-state tuition increases after the program was implemented than institutions that enrolled very few D.C. residents. The Bennett Hypothesis again suggests that θ will be positive.

In addition to estimating equations (1) and (2) for the full sample, we also estimate the equations separately for the 49 public institutions that enroll a non-trivial percentage of nonresidents from D.C., defined as being greater than one percent of nonresidents during the years 1992-1998; i.e., the smaller sample includes the 49 public institutions with $PCTNRDC_{i,9298} > 0.01$.

Table I reports the average share of nonresidents from D.C. for both the 1992-1998 and 2000-2007 time periods and the percentage change in nonresident tuition between 1998 and 2008 for public institutions with a D.C. share of nonresidents for 2000-2007 greater than 0.02. Bowie State, a historically black university in Maryland tops the list with 42 and 36 percent of nonresidents coming from D.C. during the 1992-1998 and 2000-2007 periods, respectively. A number of other institutions have meaningful shares of nonresidents from D.C. including several other historically black colleges and universities (HBCUs). Table I also shows that the share of nonresidents from D.C. increased for many institutions after DCTAG was implemented, consistent with suggestions by Abraham and Clark (2006) and Kane (2007) that the DCTAG program increased college enrollment among District residents. Table I also shows a wide range of values for the percentage change in real nonresident tuition rates during the period 1998-2008, but nearly all of the institutions had sizable increases.[4]

3. Empirical Results

Table II provides regression results for several variants of equation (1). For results shown, all equations are estimated modeling the disturbance term as an AR(1) process to account for serial correlation in the error term and report the Bhargava et al. (1982) Durbin-Watson Statistic. In results not shown, we also explore the effects of instead clustering standard errors by institution and by state and find qualitatively similar results and significance levels. Results in the first three columns are for the full sample and results in the last three columns include only the 49 institutions with $PCTNRDC_{i,9298} > 0.01$. The first and fourth columns include only institution fixed effects, year dummies, the share of nonresidents from D.C., and the primary variable of interest, the interaction between post-1999 and the share of nonresidents from D.C. The second and fifth columns add the additional regressors but not the institution-specific time

[4] The lone exception is SUNY College at Buffalo (which is not the same as SUNY University at Buffalo), which in 2007 adopted a policy of charging equal tuition rates for residents and nonresidents, resulting in a considerable decrease in nonresident tuition rates.

trends. The third and sixth columns are for the full specifications that include the institution-specific time trends.

Table I: Share of Recent FTF Nonresidents from D.C. for Select Public Institutions

Institution	State	HBCU	D.C. Share 2000-2007	D.C. Share 1992-1998	%Δ in NRT 1998-2008
Bowie State University	MD	Yes	0.362	0.420	95.7
University of Maryland-University College	MD	No	0.200	0.176	125.2
Fayetteville State University	NC	Yes	0.176	0.081	50.8
Cheyney University of Pennsylvania	PA	Yes	0.167	0.091	62.3
University of Maryland Eastern Shore	MD	Yes	0.157	0.134	55.9
Virginia State University	VA	Yes	0.153	0.062	69.2
Coppin State University	MD	Yes	0.134	0.120	70.2
Pennsylvania State University-Greater Allegheny	PA	No	0.133	0.012	94.9
North Carolina Central University	NC	Yes	0.131	0.070	48.7
Virginia Commonwealth University	VA	No	0.121	0.027	55.7
North Carolina A & T State University	NC	Yes	0.114	0.051	45.5
Norfolk State University	VA	Yes	0.114	0.060	122.9
St Mary's College of Maryland	MD	No	0.108	0.014	110.8
Winston-Salem State University	NC	Yes	0.107	0.049	50.8
Delaware State University	DE	Yes	0.083	0.074	69.6
Frostburg State University	MD	No	0.079	0.043	109.2
Pennsylvania State University-Mont Alto	PA	No	0.072	0.016	94.9
Texas Southern University	TX	Yes	0.066	0.007	90.9
Elizabeth City State University	NC	Yes	0.066	0.043	49.4
George Mason University	VA	No	0.055	0.033	79.8
Glenville State College	WV	No	0.054	0.106	124.3
Morgan State University	MD	Yes	0.053	0.055	69.4
University of Michigan-Flint	MI	No	0.050	0.000	34.8
Lincoln University of Pennsylvania	PA	Yes	0.046	0.072	74.6
West Virginia State University	WV	Yes	0.036	0.047	89.6
Rutgers University-Camden	NJ	No	0.034	0.020	106.7
Old Dominion University	VA	No	0.034	0.007	67.5
University of Pittsburgh-Bradford	PA	No	0.034	N/A	59.2
SUNY College at Buffalo	NY	No	0.029	0.000	-38.2
Temple University	PA	No	0.027	0.023	79.4
Pennsylvania State University-Harrisburg	PA	No	0.027	N/A	53.0
Pennsylvania State University-Beaver	PA	No	0.026	0.010	94.7
University of Pittsburgh-Greensburg	PA	No	0.025	N/A	59.5
Pennsylvania State University-Altoona	PA	No	0.024	0.008	99.5
Central State University	OH	Yes	0.024	0.016	56.8
Florida Agricultural & Mechanical University	FL	Yes	0.023	0.027	76.6
University of Maryland-Baltimore County	MD	No	0.022	0.030	89.2
The University of Virginia's College at Wise	VA	No	0.022	0.000	109.3
Millersville University of Pennsylvania	PA	No	0.020	0.004	53.3
Boise State University	ID	No	0.020	0.000	58.1

Table II: Results Using 1 Year Lagged Percentage of Nonresidents from DC

	1	2	3	4	5	6
After 1999*Share of Nonresidents from DC, 1 Year Lag	0.170	0.188*	0.094	0.147	0.046	0.095
	(0.122)	(0.107)	(0.121)	(0.140)	(0.142)	(0.151)
Share of Nonresidents from DC, 1 Year Lag	-0.002	-0.028	-0.021	-0.001	0.000	0.024
	(0.068)	(0.061)	(0.068)	(0.084)	(0.088)	(0.095)
Log In-State Tuition		0.668***	0.698***		0.370***	0.393***
		(0.015)	(0.014)		(0.062)	(0.078)
Log Enrollment, 1 Year Lag		0.059***	0.058***		0.007	-0.012
		(0.014)	(0.012)		(0.035)	(0.042)
Log Population Age 18-19		0.030	0.169***		0.065	0.307**
		(0.026)	(0.030)		(0.101)	(0.139)
Unemployment Rate		-0.005*	0.002		-0.019*	-0.001
		(0.003)	(0.003)		(0.011)	(0.013)
Log Median Household Income		-0.030	0.100***		0.349***	0.041
		(0.026)	(0.020)		(0.073)	(0.101)
Log State Appropriations		-0.029	-0.034		0.123	-0.069
		(0.021)	(0.024)		(0.087)	(0.101)
Return to Bachelor's Degree		-0.007	-0.005		0.004	-0.002
		(0.006)	(0.006)		(0.023)	(0.023)
Merit		0.017**	0.004		0.017	0.006
		(0.008)	(0.009)		(0.030)	(0.030)
Number of Institutions	570	570	570	49	49	49
Number of Observations	7707	7707	7707	660	660	660
Institution Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Institution-Specific Time Trends	No	No	Yes	No	No	Yes
Time Trends F-test P-value			<0.001			<0.001
Bhargava et al. Durbin-Watson Statistic	0.578	0.678	1.205	0.880	1.069	1.710

Notes: Standard errors in parentheses modeled as AR(1) process.

*Significant at 10%; **Significant at 5%; ***Significant at 1%.

The main variable of interest, the interaction between the post-1999 indicator and the share of nonresidents from D.C., has a coefficient (θ) of 0.170 in column 1 that is not quite statistically significant at the ten percent level of significance (p-value=0.162). Including the additional regressors in column 2, however, increases the θ coefficient slightly to 0.182 and it is now statistically significant at the 10 percent level, suggesting that DCTAG may have caused some institutions to increase nonresident tuition. However, when we include the institution-specific time trends in column 3, the coefficient on the interaction term falls to 0.092 and is not statistically significant. The coefficient is also fairly small in magnitude. The interaction

coefficient suggests that a 0.10 difference in the share of nonresidents from D.C. (a relatively sizable difference as seen in Table I) would increase nonresident tuition by less than one percent following the implementation of the program. We also conduct a specification test of whether the institution-specific time trends are jointly significant and can reject the null that they are jointly insignificant at the 0.001 level of significance. Our preferred specification is, therefore, the full model in column 3 that includes the institution-specific time trends. According to this specification, there is minimal evidence that DCTAG caused institutions enrolling a high percentage of nonresidents from D.C. to increase nonresident tuition in response to the program.

Some of the other variables, however, do significantly affect out-of-state tuition rates. As one might expect, out-of-state tuition is positively affected by increases in in-state tuition in both columns 2 and 3. Similarly, higher enrollment in the previous year causes institutions to raise nonresident tuition. Column 3 also suggests that the number of 18-19 year old individuals in the state causes nonresident tuition to increase. Median household income in the state also has a positive effect on nonresident tuition in column 3. The rest of the variables are statistically insignificant for the full specification in column 3.

Restricting the sample to the 49 public institutions with $PCTNRDC_{i,9298} > 0.01$ in columns 4-6 of Table II tells a similar story. The interaction term coefficient (θ) is again fairly small in all three specifications and it is now statistically insignificant in all three specifications. The reduced number of institutions also changes the results for several variables in Table II, so that only in-state tuition and the 18-19 year old population are significant in the full specification in the sixth column. The institution-specific time trends, however, continue to be jointly significant.

Table III presents results for several variants of equation (2). The θ coefficient for the interaction between the post-1999 indicator and the share of nonresidents from D.C. follows a similar pattern to that in Table II. The coefficient is 0.374 and marginally insignificant (p-value=0.102) in column 1. Adding the additional regressors in column 2 increases the coefficient to 0.421 and it is now significant at the five percent level. However, when we include the institution-specific time trends in column 3, the coefficient decreases to 0.153 and is not statistically significant at the ten percent level. An F-test again confirms that the institution-specific time trends are jointly significant, so the full specification in the third column is again our preferred specification. For the other variables in column 3, in-state tuition and the population of 18-19 year olds again have statistically significant positive effects on nonresident tuition and state appropriations has a significantly negative effect.

Restricting the sample to the 49 public institutions with $PCTNRDC_{i,9298} > 0.01$ yields similar results in columns 4-6. The θ coefficient for the interaction term in column 6 is actually negative at -0.146 but is not statistically significant. An F-test again supports the full specification that includes the institution-specific time trends. The results in Table III, therefore, suggest that DCTAG did not cause out-of-state tuition to increase at public institutions with a high percentage of nonresidents from D.C. In results not shown, we also use a similar approach to separately examine the effect of the DCTAG program on tuition at eligible private institutions with a high percentage of students from D.C. The effect of DCTAG on tuition at private institutions was small and not statistically significant.

Table III: Results Using Average Percentage of Nonresidents from DC, 1992-1998

	1	2	3	4	5	6
After 1999*Average Share of Nonresidents from DC, 1992-1998	0.374	0.423**	0.153	0.278	0.367*	-0.146
	(0.228)	(0.191)	(0.246)	(0.225)	(0.207)	(0.259)
Log In-State Tuition		0.711***	0.725***		0.496***	0.607***
		(0.012)	(0.013)		(0.059)	(0.058)
Log Enrollment, 1 Year Lag		0.017	0.026**		-0.069	-0.025
		(0.012)	(0.011)		(0.043)	(0.039)
Log Population Age 18-19		0.019	0.220***		0.068	0.166
		(0.030)	(0.028)		(0.113)	(0.115)
Unemployment Rate		-0.003	-0.001		-0.012	-0.013
		(0.002)	(0.002)		(0.009)	(0.010)
Log Median Household Income		-0.031	0.007		0.047	0.039
		(0.023)	(0.024)		(0.090)	(0.088)
Log State Appropriations		-0.011	-0.063***		-0.012	-0.031
		(0.018)	(0.019)		(0.075)	(0.081)
Return to Bachelor's Degree		-0.008	-0.006		0.008	-0.002
		(0.005)	(0.006)		(0.019)	(0.020)
Merit		0.013*	0.009		0.019	0.000
		(0.008)	(0.008)		(0.027)	(0.026)
Number of Institutions	570	570	570	49	49	49
Number of Observations	9543	9543	9543	831	831	831
Institution Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Institution-Specific Time Trends	No	No	Yes	No	No	Yes
Time Trends F-test P-value			<0.001			<0.001
Bhargava et al. Durbin-Watson Statistic	0.558	0.593	1.078	0.751	0.866	1.502

Notes: Standard errors in parentheses modeled as AR(1) process.
*Significant at 10%; **Significant at 5%; ***Significant at 1%.

4. Conclusion

Financial aid programs are intended to lower the cost of higher education and increase access to college for students who might otherwise be unable to afford it. An important concern with publicly funded financial aid programs is that they may encourage colleges and universities to increase tuition rates for students. This paper considers whether the DCTAG program led to increased out-of-state tuition rates at public institutions with a high percentage of nonresidents from D.C. While there is some evidence of a positive correlation, this effect is small and statistically insignificant once institution-specific time trends are included. Our preferred specifications, therefore, suggest that there is little evidence that the DCTAG program caused colleges and universities to increase out-of-state tuition rates.

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