Determinants of Graduation Rates of Historically Black Colleges and Universities

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ABSTRACT

Historically Black Colleges and Universities (HBCUs) play a crucial role in providing higher education for African Americans. It was reported that the 6-year graduation rate for 4-year HBCUs is lower than the national college graduation rate for African Americans. The role of HBCUs in providing higher education for African Americans has been challenged.

This paper examines the factors influencing HBCU graduation rates using data from College Results Online. We investigate the effects of college quality, college cost, student characteristics and local labor market on HBCU graduation rates. We set up a theoretical model of education production and estimate the model using Instrumental Variables method to account for the endogeneity of college cost.

We find that college quality and college cost are the important factors affecting the graduation rate of HBCUs. Specifically, college quality has a positive effect, college cost has a negative effect and financial aid has a positive effect on graduation rate of HBCUs. Improving the quality and reducing the net price of college education are among the effective measures to improve the graduation rate of HBCUs.

INTRODUCTION

The college wage premium increased substantially in the 1980s. Consequently, the college enrollment rate grew rapidly in the past 30 years for all racial groups (*Digest of Education Statistics* 2009, Table 201). The college enrollment rate of recent high school completers for African Americans rose from 42.7% in 1980 to 55.7% in 2008. Recent high school completers are defined as individuals who obtained a high school diploma or completed a GED in the past 12 months. It has been well documented that Historically Black Colleges and Universities (HBCUs) play a crucial role in providing higher education for African Americans. Among black students enrolled in 4-year institutions, 21.3% of them attend HBCUs. HBCUs produce 21.5% of the Bachelor's degrees conferred to African Americans (Provasnik & Shafer, 2004). However, it was reported that the 6-year graduation rate for 83 federal designated 4-year HBCUs is only 37%, 4% lower than the national college graduation rate for black students (Stripling 2010). The role of HBCUs in providing higher education for African Americans has been challenged. It is critical to know what factors determine the graduation rates of HBCUs.

This paper uses institutional data from College Results Online to test the effects of college quality, college cost and financial aid, student characteristics and local labor market on the completion rates of HBCUs. We find that college quality and college cost are the important

factors influencing graduation rate of HBCUs. College quality has a positive effect, college cost has a negative effect, and financial aid has a positive effect on HBCU graduation rate. Improving the quality and reducing the net price of college education are among the effective measures to improve the graduation rate of HBCUs.

LITERATURE REVIEW

Studies in college choice assume that agents are rational in the sense that they make decisions to maximize the expected life-time utility of wealth given their borrowing constraints. Most studies on college choice assume the college attendance decision to be a static process, in which people make a once-and-for-all choice on college attendance at a point of time after they complete high school. (Christensen, Melder & Weibrod, 1975) find students' ability and the socioeconomic variables (education of mother, education of father, occupation of father and family income) have positive effect on college attendance. With controls for selection bias, (Willis & Rosen, 1979) find expected gains of lifetime earnings from education affect college choices. (Gustman & Steinmeier, 1981) show that wage and youth unemployment rate affect college choices. (Fuller, Manski & Wise, 1982) and (Manski & Wise, 1983) find schooling cost, foregone earnings and individual academic ability relative to the academic standards of a college are the factors affecting college choices. By examining the college enrollment behavior of two age cohorts, (Corman, 1983) confirms that the cost of higher education (tuition and the density of postsecondary institutions), family income, and unemployment rate are important factors influencing college attendance. Altonji (1993) finds that academic ability, family background and high school curriculum influence the ex ante return to college. Besides emphasizing the importance of socioeconomic background, academic ability, the price of college education and unemployment rate in influencing the choice of two-year college vs. four-year college, (Rouse, 1994) adds return to college into the multinomial probit model of college attendance, and finds a positive effect of return to college on college attendance. (Card & Lemieux, 2000) study the slowdown of educational attainment in the 1970s. They find that tuition cost and local unemployment rate affect college enrollment decisions. They also find that cohort size has a negative effect on educational attainment and the return to college education positively affect college enrollment and college completion. (Card, 2001) formulates educational choice in a static framework and shows that optimal schooling level is achieved when the marginal benefit of schooling equals to the marginal cost of schooling.

(Cameron & Heckman, 1998 & 2001) and (Light & Strayer, 2000) is among the fewer studies that model schooling choice in a dynamic environment, in which the educational choice at stage t is based on all choices made at previous stages. (Cameron & Heckman, 2001) argue that credit constraint is not the key factor that affects college choice. It is long term factors such as parental characteristics and family environment that have significant effect on educational choice. (Light & Strayer, 2000) study the impact of the match between student ability and school quality on college completion. They find that student ability has a significant positive effect on college completion if student ability and college quality match well.

Whether schooling choice is formulated statically or dynamically, it is agreed that the direct cost of education, the forgone earnings, the expected gains of life-time earnings from education, the individual academic ability, family background (parental education and family income) and economic conditions (local wage level and unemployment rate) are among the most important factors influencing college entry decisions. Some studies find that men and women may respond differently to the same factors when they make educational choices.

THEORETICAL MODEL AND ESTIMATION STRATEGY

Suppose the education production function is defined as:

$$G_i = f(Q_i, C_i, X_i, I_i, L)$$

Where G_i is the graduation rate of institution i, Q_i denotes the quality of institutional i, C_i denotes the cost of institution i, X_i denotes student characteristics of institution i, I_i denotes institutional characteristics and L denotes the local labor market conditions. We use the first year retention rate, student-related expenditures per full-time equivalent undergraduate, the rejection rate among applicants for admission, and the median ACT score to measure the college quality. The in-state tuition and fees, average federal financial aid, average state financial aid and average institutional financial aid are used to measure college cost. Student characteristics include percent of undergraduates receiving Pell grant, percent of women, percent of part-time undergraduates and percent of undergraduates above 25 years old. College characteristics include the location of the institution, enrollment of the institution, Carnegie classification of the institution, and the sector of the institution (private vs. public). We use state unemployment rate to measure the local labor market conditions and the average weekly earnings of production employees in manufacturing industry to measure the opportunity cost of attending college.

Suppose the graduation rate is a linear function of the educational inputs Q_i, C_i, X_i, I_i and L, then the education production function can be written as

$$G_i = \alpha Q_i + \beta C_i + \gamma X_i + \delta I_i + \theta L + \varepsilon_i$$

Where ε_i is the error term. Then,

$\alpha = \frac{\partial G_i}{\partial Q_i}$, which represents the effect of college quality on graduation rate.

$\beta = \frac{\partial G_i}{\partial C_i}$, which represents the effect of college cost and financial aid on graduation rate.

$\gamma = \frac{\partial G_i}{\partial X_i}$, which represents the effect of student characteristics on graduation rate.

$\delta = \frac{\partial G_i}{\partial I_i}$, which represents the effect of institutional characteristics on graduation rate.

$\theta = \frac{\partial G_i}{\partial L}$, which represents the effect of local labor market on graduation rate.

$\alpha, \beta, \gamma, \delta,$ and θ are the parameters of interest in this study.

DATA AND EMPIRICAL RESULTS

The data in this study is retrieved from the websites' of College Results Online (http://www.collegeresults.org/) and Bureau of Labor Statistics (http://www.bls.gov/). College Results Online provides detailed information on graduation rates, retention rates, degrees, college characteristics, student characteristics, admissions, cost and financial aid, college expenditures and faculty characteristics from 1997 to 2012. This study explores the graduation rates of four-year HBCUs in 2009. The data provided by College Results Online come from Department of Education's Integrated Postsecondary Education Data System (IPEDS). The state unemployment rate and the average weekly earnings of production employees in manufacturing industry are retrieved from Bureau of Labor Statistics' website. The state unemployment rate is retrieved from http://www.bls.gov/news.release/archives/srgune_03032010.pdf . The average earnings of production employees in manufacturing industry by state are retrieved from http://www.bls.gov/sae/eetables/sae_annavg310.pdf.

Table 1 presents the sample characteristics of the data set. Variable definitions are available at http://www.collegeresults.org/aboutthedata.aspx#question-2. There are 81 HBCUs in the sample. The mean graduation rate is 31.2%, varying between 3.4% and 82.8%. The average first-year retention rate is 61.6%, with the lowest retention rate being 20% and the highest retention rate being 86%. The mean rejection rate is 34.8%, ranging from 0% to 89%. The estimated median ACT scores for these 81 institutions are from 12 points to 27 points. The expenditure per student varies between $4,901 and $25,521. The in-state tuition and fees are between $2,922 and $20,531. As far as student financial aid is concerned, the federal grant aid per receiving student ranges from $1,190 to $6,686; the state grant aid per student ranges from $113 to $1,916; and the institutional grant aid per student ranges from $200 to $17,822.

The average undergraduate enrollment is 2,633. Undergraduate enrollment varies between 416 and 8,934. Among the 81 HBCUs, 48% of them are public institutions, 64% of them are located in a city and 93% of them are located in the south. According to Carnegie Classification, 58% of them are Baccalaureate Colleges, 42% of them are Master's Colleges and Universities and 10% of them are Doctoral Colleges and Universities. Among students enrolling in these HBCUs, 63% of them receive Pell Grants, 59% of them are females, 11% of them are part-time students, and 19% of them are 25 years old or older. With regards to local labor market conditions, the average state unemployment rate in 2009 is as high as 9.2% due to the recession of 2007 to 2009. The state unemployment rates vary between 6.4% and 11.7% in 2009. The average weekly earnings of production employees by state range from $564.21 to $835.99.

Table 1 Sample Characteristics					
Variables	**Observations**	**Mean**	**Std. Dev.**	**Minimum**	**Maximum**
Graduation Rate	81	31.17	13.53	3.4	82.8
College Quality					
Retention Rate	81	61.59	12.63	20	86
Student and Related Expenditures / FTE	81	9693.28	3623.44	4901	25521
Percent Rejected	81	34.84	26.13	0	89
Estimated Median ACT	54	17.73	2.58	12	27
College Cost and Financial Aid					
In-State Tuition and Fees	81	8560.68	4468.65	2922	20531
Average Federal Grant Aid per Receiving Student	81	4303.67	813.32	1190	6686
Total State Grant Aid $ / FTE (Statewide)	81	843.47	540.59	113	1916
Average Institutional Grant Aid / Full-Time First-Time Student	80	4746.99	2901.73	200	17822
Student Characteristics					
Percent of Undergraduates Receiving Pell Grants	81	63.26	15.98	13	96
Percent Women	81	58.96	12.03	0	100
Percent Part-Time	81	10.53	8.55	0.9	48.8
Percent 25 and Over	81	18.80	11.87	2.7	49.6
Institution Characteristics					
Full-Time Equivalent Undergraduates	81	2632.94	1948.13	416	8934
Public Institution	81	0.48	0.50	0	1
Private Institution	81	0.52	0.50	0	1
Baccalaureate Colleges	81	0.58	0.50	0	1
Master's Colleges and Universities	81	0.32	0.47	0	1
Doctoral Colleges and Universities	81	0.10	0.30	0	1
Located in a City	81	0.64	0.48	0	1
Located in the Midwest	81	0.05	0.22	0	1
Located in the Northeast	81	0.02	0.16	0	1
Located in the South	81	0.93	0.26	0	1
State Labor Market					
State Unemployment Rate	81	9.18	1.61	6.4	11.7
Average Weekly Earnings of Production Employees	79	659.82	81.56	564.21	835.99

Table 2 presents the effect of college quality on graduation rates. It shows that college quality alone can explain 65% of the variation in graduation rates among the 81 HBCUs. All four measures of college quality have positive effects on graduation rate. The effect of first-year retention rate is significantly positive at 1% level and the effect of the median ACT score is significantly positive at 5% level.

Table 2 THE EFFECT OF COLLEGE QUALITY		
Independent Variables	Coefficient.	P-Value
Retention Rate	0.8101636	0.00
Percent Rejected	0.0772484	0.17
Expenditures / FTE	0.274451	0.39
Median ACT	1.073047	0.05
Number of Observations	54	
Adjusted R-Square	0.65	

Table 3.1 presents the effects of college cost and financial aids on college graduation rates. College cost and financial aids can explain 27% of the variation in graduation rates. It shows that tuition and fees have a significantly positive effect on graduation rate. One explanation for the significantly positive effect of tuition is that tuition is endogenously determined. Tuition is positively correlated with unobserved characteristics of the institution that promote college graduation rate. The OLS estimate of the effect of tuition on graduation rate may be upward biased due to the omitted variable bias.

Table 3.1 THE EFFECT OF COLLEGE COST AND FINANCIAL AID WITHOUT ACCOUNTING FOR THE ENDOGENEITY OF TUITION AND FEES		
Independent Variables	Coefficient	P-Value
In-State Tuition and Fees	0.8057597	0.02
Average Federal Grant Aid	1.326412	0.42
Average State Grant Aid	4.329687	0.08
Average Institutional Grant Aid	1.237815	0.02
Number of Observations	80	
Adjusted R-Square	0.27	

To account for the endogeneity of tuition, I use the location, sector (public vs. private) and Carnegie classification of colleges as instruments for in state tuition. Table 3.2 presents the instrumental variables regression results. It also shows the result of first stage estimation and Hausman test for endogeneity of tuition and fees. Hausman test rejects the hypothesis that tuition is exogenous at 1% significance level. Table 3.2 shows that college cost and financial aid can explain 18% of the variation in graduation rate. We can see that tuition has a negative effect on graduation rate and all three measures of financial aid have a positive effect on graduation rate. However, the effects of tuition and average federal grant aid are insignificant. The effects of average state aid and average institutional aid are significant at 5% level and 1% level respectively.

Table 3.2 INSTRUMENTAL VARIABLES REGRESSION ON THE EFFECT OF COLLEGE COST AND FINANCIAL AID		
Independent Variables	Coefficient	P-Value
In-State Tuition and Fees	-0.2281496	0.60
Average Federal Grant Aid	2.071226	0.24
Average State Grant Aid	5.778937	0.03
Average Institutional Grant Aid	1.994614	0.00
Number of Observations	80	
Adjusted R-Square	0.18	
R-Square from First Stage Regression	0.79	
P-value from Hausman Test	0.00	

Table 4 presents the effect of student characteristics on graduation rate. It shows that student characteristics can explain 48% of the variation in graduation rate. We can see that percent of undergraduates receiving Pell grant and percent of part-time undergraduates have a significantly negative effect on graduation rate. Percent of undergraduates 25 years old or older also has a negative effect on graduation rate, but the effect is not significant. Percent of women has a significantly positive effect on graduation rate.

Table 4 EFFECT OF STUDENT CHARACTERISTICS		
Independent Variables	Coefficient	P-Value
Percent Pell Grants	-0.4368487	0.00
Percent Women	0.2857683	0.00
Percent Part-Time	-0.6998728	0.00
Percent 25 and Over	-0.1689516	0.25
Number of Observations	81	
Adjusted R-Square	0.48	

Table 5 shows the effect of local labor market on graduation rate. The local labor market conditions can only explain 3% of the variation in graduation rate. It shows that state unemployment rate has a significantly positive effect on graduation rate, which is consistent with findings in schooling literature. Average weekly earnings of production employees in manufacturing sector have a positive effect on graduation rate, but the effect is not significant.

Table 5 EFFECT OF LOCAL LABOR MARKET		
Independent Variables	Coefficient	P-Value
State Unemployment Rate	1.950511	0.05
Average Weekly Earnings	0.0085105	0.66
Number of Observations	79	
Adjusted R-Square	0.03	

Table 6 presents the instrumental variables regression on determinants of college completion. Overall, college quality, college cost and financial aid, student characteristics and local labor market conditions can explain 73% of the variation in graduation rates among HBCUs. College quality has a positive effect on college completion. Among the four measures of college quality, retention rate and median ACT scores have a significantly positive effect on graduation rate. Tuition and fees have a negative effect on graduation rate, though the effect is insignificant. Financial aid has a positive effect on graduation rate. Among the three measures of financial aid, the average institutional aid has a significantly positive effect on graduation rate. As far as local labor market conditions are concerned, state unemployment rate has a significantly positive effect on graduation rate and average weekly earnings of production employees has a insignificantly positive effect on graduation. As far as the effect of student characteristics are concerned, we can see that percent of undergraduates receiving Pell grant and percent of part-time undergraduates have a significantly negative effect on college completion. Percent of women and percent of undergraduates above 25 years old have a significantly positive effect on graduation rate. Undergraduate enrollment has a negative effect on graduation rate, though the effect is not significant.

Table 6
DETERMINANTS OF GRADUATION RATE

Independent Variables	Coefficient	P-Value
College Quality		
Retention Rate	0.6509453	0.00
Percent Rejected	0.0454512	0.37
Expenditures / FTE	0.1885821	0.58
Median ACT	0.9328552	0.09
College Cost and Financial Aid		
Tuition and Fees / 1000	-0.1442201	0.75
Average Federal Grant Aid / 1000	2.263139	0.24
Average State Grant Aid / 1000	1.676375	0.46
Average Institutional Grant Aid / 1000	0.7812455	0.09
Student Characteristics		
Percent Pell Grants	-0.3214633	0.01
Percent Women	0.163682	0.07
Percent Part-Time	-0.7802127	0.02
Percent 25 and Over	0.3466393	0.04
State Labor Market		
State Unemployment Rate	1.750947	0.04
Average Weekly Earnings	0.0020796	0.90
Enrollment	-0.6288831	0.44
Number of Observations	53	
Adjusted R-Square	0.73	

In conclusion, college quality and college cost are important factors influencing graduation rate. College quality has a positive effect and college cost has a negative effect on graduation rate. As far as college quality is concerned, if first year retention rate increase by 1%, the graduation rate will increase by 0.7%. If average student-related expenditures increase by $1000, the graduation rate will increase by 0.2%. If the median ACT score increases by 1 point, the graduation rate will increase by 0.9%. As far as college cost is concerned, if in-state tuition decreases by $1000, the graduation rate will increase by 0.14%. If average federal aid increases by $1000, the graduation rate will increase by 2.3%. If average state aid increases by $1000, the graduation rate will increase by 1.7%; and if average institutional aid increases by $1000, the graduation rate will increase by 0.8%.

CONCLUSIONS AND POLICY IMPLICATIONS

HBCUs have been well recognized for promoting higher education for African Americans. The observation that the graduation rate of HBCUs is lower than the national graduation rate for African American students challenges the role of HBCUs in providing higher education for African Americans. It is crucial to know the determinants of graduation rates of HBCUs. Using data from College Results Online, this study finds that college quality and college cost are the important factors affecting the graduation rate of HBCUs. Specifically, college quality has a positive effect; college cost has a negative effect; and financial aid has a positive effect on HBCU graduation rate. If we are intended to promote the graduation rate of HBCUs, we need to improve the college quality or reduce the net price of college.

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