

Do Rural Community Colleges Supply Unique Educational Benefits?

Elton Mykerezi, Genti Kostandini, and Bradford Mills

Community colleges likely draw to college individuals who would otherwise not attend due to their low costs and open admission requirements. This is labeled as the democratization effect. They may also divert individuals away from 4-year to terminal 2-year college degrees (the diversion effect). This study estimates democratization and diversion effects separately for nonmetropolitan and metropolitan youth using nationally representative data and models that account for endogenous institution selection. We find the democratization effect to exceed the diversion effect of community colleges for both metro and nonmetro youth. The democratization-diversion ratio is slightly higher for urban youth.

Key Words: rural, colleges, education, diversion

JEL Classifications: I21, R0

Two-year colleges expand postsecondary educational opportunities beyond those offered by public 4-year colleges by providing low-cost college credits and by maintaining open door policies. Thus, they likely increase higher education by drawing into college individuals that would otherwise not attend postsecondary institutions. This effect is defined as the democratization effect. Policy makers, however, worry that 2-year colleges may also divert some students from a 4-year degree to terminal 2-year degrees; this is appropriately referred to as the diversion effect (Rouse, 1995). The relative magnitudes of the democratization and diversion effects are perhaps the most important consideration for public investment decisions in 2-year colleges.

Two important studies have estimated the magnitudes of these effects with nationally representative data. Rouse (1995) uses High School and Beyond data for the high school class of 1980 to estimate the magnitudes of the democratization and diversion effects. Ordinary least squares (OLS) estimates that relate the type of institution first attended to years of education find the diversion effect to dominate. Instrumental variable (IV) estimates that account for possible endogenous institution selection, on the other hand, suggest that the democratization effect dominates, but the effect is not statistically significant. Rouse (1995) uses distance from the respondent's high school to the nearest 2-year or 4-year college and average state 2-year or 4-year college tuition as instruments in IV estimation. Another study by Leigh and Gill (2003) argues that controlling for desired levels of schooling is important in providing reliable estimates of these effects. The authors use data from the National Longitudinal Survey of Youth (NLSY) (1979) to provide estimates of the democratization and diversion effect. The initial 1979 interview of

Elton Mykerezi is assistant professor, Applied Economics, University of Minnesota, Twin Cities, St. Paul, MN. Genti Kostandini is assistant professor, Agricultural and Applied Economics, University of Georgia, Griffin, GA. Bradford Mills is professor, Agricultural and Applied Economics, Virginia Tech, Blacksburg, VA.

the NLSY asks respondents between the ages of 16 and 22 to report the number of years of schooling they desire to obtain in their life times. Leigh and Gill (2003) control for desired schooling, but only condition on observable characteristics. They acknowledge that accounting for endogenous institution selection (e.g., Heckman, 1979) is desirable, but claim to lack appropriate instruments. Leigh and Gill (2003) find that while the diversion effect is significant, the democratization effect is larger.

Rouse (1995) and Leigh and Gill (2003) make no distinction between youth living in urban and rural areas, and to date no study has estimated the democratization and diversion effects of 2-year college attendance for youth residing in rural areas. Rural areas are generally characterized by relatively low density settlements, lower incomes, and arguably generally low incentives to pursue college. In some rural areas the Community College is often the "only game in town" (Cavan, 1995). Thus, the responses of rural youth may be different from those of urban youth; yet the sensitivity of rural youth enrollment and total education to access to 2- versus 4-year colleges has not been quantitatively examined.

The current study augments the literature on the merits of investments in 2-year colleges in two important aspects. First, it provides separate estimates of the democratization and diversion effects for rural and urban youth. Second, in terms of data and methods, it utilizes the NLSY (1979) in order to control for desired levels of schooling as in Leigh and Gill (2003) and also control for the prestige of the profession that NLSY respondents aspire to occupy when they are 35 years of age. In addition the geo-coded version of the dataset, as well as data from the Department of Education's Integrated Post Secondary Education Participation System (IPEDS) on college locations, are employed to generate distance measures from the NLSY respondent's precollege residence to the nearest private 2-year college, public 2-year college, private 4-year college, and public 4-year college. These distance measures allow us to estimate the impact of public college proximity on institution selection and thus provide estimates of the democratization and diversion

effects with models that control for potential endogeneity in the choice of a 2- versus 4-year institution as the first college of attendance.

These estimates are developed in the rest of the paper as follows. Section two presents the empirical strategy. Section three describes the data and presents summary statistics. Section four presents empirical results and section five concludes and draws implications for policy and further inquiry.

Institution Selection and Empirical Strategy

Individuals have a choice between not attending an institution of higher education, attending a 2-year college and attending a 4-year college. We assume that individuals make a utility maximizing choice over the three alternatives and that the utility of the i_{th} individual over the j_{th} choice can be expressed as:

$$(1) \quad U_{ij} = \bar{U}(Z_{ij}) + \varepsilon_{ij}$$

where Z_{ij} is a vector of observed covariates that affect utility from institution choice and ε_{ij} is a random disturbance. Individual i makes choice j if $U_{ij} > U_{i-j}$ where $-j$ denotes all choices but j . We further assume that Z is linearly related to utility and thus the probability that individual i makes choice j is given by

$$(2) \quad P_{ij} = P((\alpha Z_{ij} + \varepsilon_{ij}) > (\alpha Z_{i-j} + \varepsilon_{i-j}))$$

where α is a vector of parameters. Assuming that ε_{ij} approximates a logistic distribution yields the familiar multinomial logit specification:

$$(3) \quad P_{ij} = \frac{e^{\alpha Z_{ij}}}{\sum_j e^{\alpha Z_{ij}}}$$

The number of years of education for each individual i and each choice j are given by:

$$(4) \quad E_{ij} = X\beta_{ij} + \lambda_j\Psi_j + \omega_{ij}$$

where X is a vector of observable covariates that affect educational attainment, Ψ_j is the correction term proposed in Lee (1982, 1983), β_j and λ_j are parameter vectors, and ω_j is an error term. Equation (4) is estimated for both, 2-year college and 4-year college attendees.

Treatment effects of the choice to attend a 2-year college and a 4-year college are then estimated by comparing the average predicted education for each choice to 12 (the number of years of education of high school graduates who did not attend a postsecondary institution). The treatment effect of the choice to attend a 2-year college is equal to the democratization effect. The difference between the treatment effect of a 2-year college and a 4-year college is the diversion effect.

Data and Descriptive Statistics

The primary data source for the current study is the National Longitudinal Survey of Youth 1979, a nationally representative sample of 12,686 respondents who were between the ages of 14 and 22 when first interviewed in 1979. The respondents were then interviewed annually until 1994 and biannually thereafter until 2006. Family, individual, and community characteristics, as well as measures of cognitive ability are available for most youth. Additionally, the geo-coded version reports the county code for each respondent in each survey year. This study uses only data on individuals who graduated high school, who were less than 18 years old as of August 1979 (so the baseline characteristics measured as of 1979 correspond to a precollege age), and who have information on important study variables. The final sample contains a total of 4,843 individuals, 3,605 of whom resided in urban areas prior to the age of 18 and 1,238 of whom resided in rural areas. In this study we designate urban youth as those who resided in a county with a 1983 Economic Research Service urban-rural continuum code of 0-3 and rural youth as those who resided in counties with rural-urban codes of 4 or greater (USDA, 2008).

Four sets of covariates are included in both the institution selection and the education equation. Demographic characteristics include indicators of race, ethnicity, and gender. (1) Individual skills and aspirations are accounted for by the Armed Forces Qualifying Test Score (AFQT) years of desired education, the Socio Economic Prestige Index (SEI) associated with the aspired profession, an index measuring their knowledge on the world of work, and the Rotter

scale of the locus of control (an index that measures how much control individuals believe they have over the direction of their lives). (2) Schooling related influences are accounted for by indicators of attending a general school, an indicator of attending a school that has a college preparatory track, and the desired years of education of their best friend. (3) Characteristics of the household include parents' education, the socio-economic prestige index of the father's occupation, an indicator of a missing male figure in the household during the teenage years, and an indicator of whether an adult in the household held a library card. (4) Attributes associated with the county of residence prior to college include the shares of county population comprised of Blacks and Hispanics, the share of adults with a college degree, the rate of unemployment, and the median per capita income.

In addition, distances from the precollege county of residence to the nearest private and public 2-year and 4-year colleges are included in the institution selection equation, but are excluded from the education equation. Institutions of higher education in close proximity to one's residence have been found to increase college attendance (Card, 1995; Mykerezi and Mills, 2004). Closer proximity likely reduces travel costs, and possibly allows youth to pursue a college education while maintaining familial, social, and employment ties.

Table 1 presents descriptive statistics on urban and rural youth separately. Youth in rural areas reside in counties that have lower shares of college graduates, higher unemployment rates, and lower median per capita incomes. They are also located substantially further away from all types of institutions of higher education. A substantially lower share of rural youth attends institutions of higher education. Rural youth also have slightly lower average years of education relative to their urban counterparts.

Results

Institution Selection

We start by discussing the determinants of institution selection. Marginal effects associated

Table 1. Summary Statistics

Variable	Rural		Urban	
	Mean	Std. Dev.	Mean	Std. Dev.
Hispanic	0.099	0.298	0.185	0.389
Black	0.261	0.439	0.289	0.453
Female	0.500	0.500	0.508	0.500
Library card	0.552	0.498	0.752	0.432
AFQT	37.831	26.463	40.055	27.428
Knowledge of professions	5.099	2.038	5.307	2.032
Rotter score	8.625	2.158	8.356	2.178
Parent's SEI	26.173	21.516	33.255	24.618
Missing parent's SEI	0.090	0.286	0.095	0.293
SEI desired profession	45.704	28.138	51.955	27.744
Missing SEI desired profession	0.106	0.308	0.093	0.291
General school	0.522	0.500	0.471	0.499
College preparatory track	0.223	0.416	0.319	0.466
Desired schooling	13.968	2.248	14.658	2.211
Friend's desired schooling	13.370	2.605	13.922	2.647
Pcnt black (county)	12.635	16.420	13.708	13.148
Pcnt Hispanic (county)	4.244	13.276	6.935	121.329
Pcnt college educated (county)	6.6723	2.685	10.914	3.974
Unemployment rate (county)	5.085	2.3578	4.387	1.482
Median income (county)	7082.718	1456.177	9962.924	1747.206
Distance private 2-year	1.351	3.054	0.798	0.997
Distance private 4-year	0.692	0.642	0.341	0.637
Distance public 2-year	0.500	0.356	0.233	0.345
Distance public 4-year	0.569	0.369	0.257	0.310
Education (years)	13.344	1.903	13.542	1.867
Started at a 2-year college	0.235	0.424	0.290	0.454
Started at a 4-year college	0.279	0.449	0.318	0.466
N	1238		3605	

with attending a 2 and attending a 4-year college relative to not attending a postsecondary institution are presented in Table 2 for rural and urban youth separately. As access decays with distance from the nearest 2-year college the probability that youth attend a 2-year college declines. Marginal effects indicate that a 10 mile increase in distance from the nearest public 2-year college reduces the probability of 2-year college attendance by 1.4 percentage points for rural youth and 2.2 percentage points for urban youth. Being 10 miles further away from a public 4-year college, on the other hand, increases the probability of attending a 2-year college by 3.6 percentage points for rural youth and by 2.2 percentage points for urban youth. College proximity shows the expected associations with the probability of attending a 4-year

college. For both samples being further away from a public 4-year college reduces the probability that one will be selected as the first institution attended after high school, and being further away from a public 2-year college increases the probability of 4-year college attendance, *ceteris paribus*. Proximity to private institutions does not appear to affect attendance decisions in a statistically significant way.

Education Attainment

Selectivity corrected estimates of years of educational attainment for 2-year and 4-year college entrants are presented in Table 3. Parameter estimates indicate that education increases with higher test scores, and higher educational aspirations for all samples. Higher socio economic prestige

Table 2. Estimated Marginal Effects of Institution Selection

	Rural				Urban			
	2-year		4-year		2-year		4-year	
	Param	SE	Param	SE	Param	SE	Param	SE
Hispanic	0.070	0.075	-0.010	0.069	-0.038	0.029	0.082	0.034**
Black	0.035	0.052	0.143	0.059**	0.006	0.026	0.156	0.028**
Female	0.052	0.030*	0.000	0.028	0.062	0.018**	0.021	0.017
Library card	0.020	0.031	0.085	0.030**	0.008	0.021	0.020	0.022
AFQT	0.003	0.001**	0.006	0.001**	0.001	0.001**	0.007	0.000**
Knowledge of professions	-0.007	0.009	-0.003	0.009	0.005	0.005	-0.011	0.005**
Rotter score	-0.004	0.007	0.004	0.007	0.003	0.004	-0.003	0.004
Parent's SEI	-0.001	0.001	0.002	0.001**	0.000	0.000	0.002	0.000**
Missing parent's SEI	0.036	0.059	0.084	0.068	-0.028	0.034	0.096	0.040**
SEI desired profession	0.001	0.001	0.002	0.001**	0.001	0.000**	0.001	0.000
Missing SEI desired profession	-0.013	0.061	0.211	0.080**	0.036	0.042	0.051	0.044
General school	0.098	0.037**	0.012	0.037	-0.007	0.024	-0.012	0.025
College preparatory track	0.118	0.054**	0.139	0.052**	0.027	0.028	0.089	0.028**
Desired schooling	0.009	0.009	0.042	0.008**	0.011	0.005**	0.038	0.005**
Friend's desired schooling	0.008	0.006	0.005	0.006	-0.005	0.003	0.013	0.004**
Pcnt black (county)	0.000	0.000	0.000	0.000	0.000	0.000**	0.000	0.000**
Pcnt Hispanic (county)	0.000	0.000	0.000	0.000	0.000	0.000**	0.000	0.000**
Pcnt college educated (county)	0.000	0.001	0.001	0.001	0.000	0.000	0.001	0.000**
Unemployment rate (county)	0.000	0.001	0.002	0.001**	0.001	0.001	-0.001	0.001
Median Income (county)	0.000	0.000	0.000	0.000	0.000	0.000*	0.000	0.000
Distance private 2-year (10 mi)	-0.002	0.001*	-0.001	0.001	-0.002	0.002	0.001	0.002
Distance private 4-year (10 mi)	-0.004	0.004	0.005	0.003	-0.003	0.003	0.004	0.003
Distance public 2-year (10 mi)	-0.014	0.005**	0.009	0.005**	-0.022	0.004**	0.012	0.003**
Distance public 4-year (10 mi)	0.036	0.005**	-0.023	0.005**	0.022	0.004**	-0.016	0.004**
Pseudo R2	0.25				0.20			
N	1238				3605			
Log L	-968.2				-3149.6			

** and * indicate statistical significance at the 0.05 and 0.1 levels of significance respectively.

Table 3. Selectivity Corrected Estimates of Educational Attainment

	Rural				Urban			
	2-year		4-year		2-year		4-year	
	Param	SE	Param	SE	Param	SE	Param	SE
Hispanic	0.490	0.408	-0.174	0.466	-0.108	0.171	-0.091	0.199
Black	0.259	0.329	1.447	0.400**	0.301	0.152**	0.316	0.189*
Female	0.025	0.204	0.275	0.196	0.264	0.112**	0.082	0.107
Library card	-0.152	0.218	0.210	0.247	-0.001	0.126	0.073	0.148
AFQT	0.021	0.006**	0.042	0.008**	0.021	0.003**	0.029	0.005**
Knowledge of professions	-0.065	0.059	-0.073	0.060	-0.021	0.031	-0.024	0.034
Rotter score	-0.056	0.047	0.019	0.048	-0.004	0.023	-0.055	0.027**
Parent's SEI	0.002	0.005	0.017	0.005**	0.008	0.003**	0.010	0.003**
Missing parent's SEI	-0.394	0.371	0.132	0.447	0.464	0.208**	0.116	0.238
SEI desired profession	0.005	0.005	0.011	0.006*	0.004	0.003	0.012	0.003**
Missing SEI desired profession	0.291	0.426	1.272	0.498**	0.415	0.240*	0.886	0.273**
General school	-0.372	0.284	-0.482	0.295	-0.022	0.142	0.156	0.173
College preparatory track	-0.410	0.338	0.083	0.323	0.107	0.157	0.322	0.186*
Desired schooling	0.168	0.061**	0.290	0.068**	0.133	0.031**	0.120	0.045**
Friend's desired schooling	0.042	0.039	0.105	0.045	0.008	0.019	0.050	0.025**
Pcnt black (county)	0.000	0.001	-0.002	0.001	0.000	0.001	0.000	0.001
Pcnt Hispanic (county)	-0.002	0.001	0.001	0.001	0.001	0.001**	-0.001	0.001
Pcnt college educated (county)	0.001	0.005	0.015	0.005**	-0.001	0.002	0.004	0.002**
Unemployment rate (county)	0.003	0.004	0.003	0.004	0.008	0.004**	-0.003	0.005
Median income (county)	0.000	0.000	0.000	0.000*	0.000	0.000	0.000	0.000
λ	0.057	0.357	-1.572	0.507**	-0.338	0.298	0.065	0.380
Intercept	9.709	1.577**	4.217	2.223*	9.218	0.864**	10.325	1.403**
R2	0.1064		0.2421		0.1452		0.3272	
N	291		346		1047		1145	

** and * indicates statistical significance at the 0.05 and 0.1 levels of significance respectively.

Table 4. Democratization and Diversion Effects

	Urban	Rural
4-year-prediction	14.44786**	14.46445**
2-year-prediction	13.84322**	13.70196**
4-year treatment	2.44786**	2.46445**
2-year treatment	1.84322**	1.70196**
Diversion	0.60464**	0.76249**

** and * indicates statistical significance at the 0.05 and 0.1 levels of significance respectively.

of parent is also positively associated with years of education and the parameter estimate is significant for all but the rural 2-year college attendees. Other parameter estimates have the expected signs and magnitudes.

Associated predictions of democratization and diversion effects are presented in Table 4. Turning to the main results, we estimate a democratization effect of 1.70 for rural youth and 1.84 for urban youth. The treatment effect of attending 4-year colleges is however higher than the democratization effect at 2.46 and 2.45 for urban and rural youth respectively. The diversion effect is therefore -0.76 years for rural youth and -0.60 for urban youth. Furthermore, results suggest that the democratization effect is smaller and diversion effect is slightly larger for rural youth. By comparison, our estimates of democratization effects are larger in magnitude than the 1.49 years estimated by Leigh and Gill (2003) and the diversion effect is smaller than their estimate of -1.22 .

Conclusions

We find that the democratization effect associated with two year college attendance is slightly larger for urban than for rural youth and that the diversion effect is somewhat larger for rural youth. Overall our estimates indicate that the democratization effect far outweighs diversion. Our estimated of the democratization to diversion ratio is slightly more favorable than that estimated by Leigh and Gill (2003). Overall we conclude that the use of models that account for endogenous institution choice confirm that two year colleges have a significant positive net impact on postsecondary education. Further, we demonstrate that the positive

impact of two-year colleges is present in both rural and urban areas.

We also recommend that this line of research be pursued with more recent and larger data on rural youth. Rural areas are uniquely different from one another, and we are perhaps missing some important detail in focusing on all nonmetro youth. However the sample size of youth from remote areas is too small in the NLSY (1979). Focus on more remote rural areas may be an interesting area for future research.

References

- Bureau of Labor Statistics, U.S. "Department of Labor. National Longitudinal Survey of Youth 1979 cohort, 1979–2006" [computer file]. Columbus, OH: Center for Human Resource Research, The Ohio State University, 2006.
- Card, D. "Using Geographic Variation in College Proximity to Estimate the Return to Schooling." *Aspects of Labour Market Behaviour: Essays in Honour of John Vanderkamp*. L.N. Christofides, E.K. Grant, and R. Swidinsky, eds. Toronto: University of Toronto Press, 1995.
- Cavan, J. "The Comprehensive Mission of Rural Community Colleges." *New Directions for Community Colleges* 90(1995):9–16.
- Heckman, J.J. "Sample Selection Bias as a Specification Error." *Econometrica* 47(1979):153–61.
- Lee, L. "Some Approaches to the Correction of Selectivity Bias." *The Review of Economic Studies* 49(1982):355–72.
- . "Notes and Comments, Generalized Econometric Models with Selectivity." *Econometrica* 51(1983):507–12.
- Leigh, D.E., and A.M. Gill. "Do Community Colleges Really Divert Students from Earning Bachelor's Degrees?" *Economics of Education Review* 22(2003):23–30.
- Mykerezi, E., and B.F. Mills. "Economic Growth in Racially Diverse Rural Counties: The Contribution of Historically Black Colleges and Universities." *The Review of Regional Studies* 34(2004):303–19.
- Rouse, C.E. "Democratization or Diversion? The Effect of Community Colleges on Educational Attainment." *Journal of Business & Economic Statistics* 13(1995):217–24.
- US Department of Agriculture, Economic Research Service. Internet site: <http://www.ers.usda.gov/Data/RuralUrbanContinuumCodes/> (Accessed November 24, 2008).