Merit-Based Student Aid & Enrollment at In-State Institutions of Higher Education

Matthew Ennis
Senior Thesis
Spring 2004

I. Introduction:

Economic growth is a key policy goal of policy makers at all levels of government. Therefore, it is important for policy makers to know what the main causes of economic growth are. One such cause or factor of economic growth is education. By raising productivity growth, higher education translates into better economic performance (Gottlieb, 1999). Interaction between educated workers can multiply the benefit of education several times over. This is especially true in metropolitan areas. Fogarty contends, "education [also] interacts with technology, affecting the speed of its adoption and diffusion" (Fogarty, 1999). The education-productivity model not only shows higher productivity in better educated places, but also that growth in productivity will be higher as well. This faster productivity growth will translate into faster growth in per-capita income (Gottlieb, 1999).

Economists have long contended that education is a "public good," with benefits to a nation or region that exceed the benefits to the individual. This alone should be enough to justify public intervention in education markets. Using time-series data on the U.S., Robert Lucas calculated that an additional year of average education would increase total U.S. factor productivity by 3.2% (Lucas, 1988). Benhabib and Spiegel found at least three pathways linking education to productivity growth. They conclude that: Education increases the rate of domestic innovation, it increases the rate of technology adoption from abroad, and it helps attract physical capital to a nation. The fact that education helps to attract physical capital to a nation suggests that investment follows educated workers instead of workers following jobs. Rauch found additional evidence

that formal schooling is more important than work experience. Education was found to improve communication ability, the foundation of all knowledge spillovers.

American cities can no longer compete on a low-skill, low-cost basis. Global competition has forced them to compete on new ideas, new markets, and productivity growth. None of these competitive advantages are possible without more educated workers. Gottlieb's statistical analysis found that among the 75 largest metropolitan areas, the ten that had the most college graduates in 1980 enjoyed real per-capita income growth of 1.8% per year between 1980 and 1997. The ten metro areas that had the fewest college graduates in 1980 saw real per-capita income grow at an annual rate of only .8% over this period. This difference is statistically significant. In addition, metros that were better-educated in 1980 saw annual productivity growth rates that were five times as high as the metros that were least-educated in that year (Gottlieb 1999).

These findings are alarming to metro areas and states with low numbers of college graduates. These metropolitan areas must find ways to increase its number of highly educated people. Recent labor supply pressures of migration and retirement may compound the problem. This combination of migration of educated people and the retirement of experienced workers can lead to a phenomena know as "brain drain" (Gottlieb, 2004). 2000 census data shows that young (ages 25-34), educated (earned at least a bachelor's degree) workers are more likely to migrate than older, non-educated people. Young educated people have more opportunities and more potential return on their migration investment. They also usually have less family ties to a particular region. It seems that young educated workers are drawn to larger, culturally diverse cities with many amenities (Florida, 2002).

There is no quick fix for areas losing young and educated workers. Gottlieb states that long-term policies are most effective in increasing the number of young and educated workers and more importantly its stock of human capital (i.e., the quality of the human capital) (Gottlieb, 2004).

A person that has exceptional skills and knowledge is more valuable than an average college graduate. This is because a higher proportion of workers with large individual stocks of human capital have a higher probability of interaction with skilled colleagues. Gottlieb argues, "The goal of human capital programs is not necessarily to increase the number of educated bodies, but instead to increase the stock of knowledge" (Gottlieb 2004). This suggests that policy makers should choose a program aimed at a smaller group of high achievers rather than one aimed at all college graduates. This could make a case for competitive merit-based financial aid programs. A strong presence of technology related industry also seems to play a significant role. These factors influencing the migration patterns of the young and educated population should be taken into serious consideration by policy makers. Overall, the key is a demonstrated, long-term commitment to amenities and technology. Furthermore, institution building, particularly in the area of higher education is vital to accumulating large stocks of human capital (Gottlieb, 2004).

This paper seeks to test the effectiveness of state-level programs to enroll students at in-state institutions of higher education. It employs panel data techniques on data for U.S. States for the years 1988, 1994, and 1998.

II. Background:

State level efforts to keep and attract educated labor in their states have varied over the past decade. One way to do this is to begin efforts at the post-secondary education level. Aid in such programs may be either need-based or non-need-based (merit). Aid typically has two primary goals. One has been to promote greater access to higher education by targeting individuals who face credit constraints that would otherwise prevent them from attending college. The other has been to expand college choice by enlarging the number of affordable institutions.

Merit-based financial-aid programs have become very popular over the past decade. State and Federal governments alike are continuing the trend towards higher percentages of non-need based financial aid. Since 1993, thirteen states have enacted a merit-based financial aid program. Most states attempt to model their programs after popular and successful programs such as HOPE in Georgia (Selingo 2001). Until 1993, encouraged largely by federal matching dollars, most states had reserved their limited aid budgets for financially needy students. Today only five populous states have large commitments to need-based aid. One of the main reasons for the trend towards merit-based aid is that politicians have found that they resonate with the public. Another major reason is that legislators hope that the plans can accomplish what decades of need-based aid have not, namely, keeping smart students from defecting to other states for college and careers. States have articulated three primary motivations for the creation of these programs: i.) to promote college access and attainment. The Michigan law that established that state's award program, for example, stated as a goal that the program would "increase access to postsecondary education and reward Michigan high school graduates who have demonstrated academic achievement" (Michigan Merit Award

Scholarship Act, 1999). ii.) To stanch the "brain drain" of the best and brightest students and encourage them to attend college in the state. iii.) To encourage and/or reward students who work hard academically. The Florida statute creating its program states that it was created "to reward any Florida high school graduate who merits recognition of high academic achievement" (Florida Bright Futures Scholarship Program, 1999). (Heller, 2003)

As more states enact merit-based aid programs, many are encountering difficulties coming up with an economically feasible and publicly acceptable mix. This is because the costs of these programs have been much greater than the projections. Rising tuition costs and lenient eligibility requirements have created large deficits. The funding for the programs is also diminishing. Many rely on tobacco settlements and state lotteries. The tobacco settlements are starting to run out and with introduction of online gambling and out-of-state lotteries, lottery funding is falling. However the popularity of these programs with voters makes it impossible for politicians who have any hopes of re-election to make cuts or requirement restrictions to the programs.

Because most programs do not have an income cap, one criticism has been that it mainly benefits the middle-upper to upper class since academic achievement is highly correlated with income. Many of the awards are based on standardized tests and non-minority students tend to outperform minorities on such tests. In New Mexico, where 64% of the aid went to households with an annual income of $50,000 or more, the median household income is $32,000 (Selingo, 2001). One college board member stated, "when an orthopedic surgeon in Miami came up to me and said his twin daughters had full merit scholarships to the University of Florida, that's when I knew the program was

wrong" (Selingo, 2001). Also adding to the inequality these programs possibly create is the funding for the programs. In Georgia, HOPE is funded through the state lottery. Statistically, in Georgia, the lottery tickets are purchased in low-income areas of the state. People argue that low-income lottery players are funding the education of children from high income families.

But awarding aid based on grades rather than test scores is also problematic. Merit-based aid programs my cause inflation of grades. In Georgia, almost 60% of HOPE recipients lose their aid by the end of their freshman year in college. There is no universal high school grading scale in Georgia so in some cases; a 78% is needed for a "B" in one high school, where an 82% is needed for a "B" in others. Even if such measures were standardized, issues would remain as a 78 on a difficult test may indicate more achievement than an 82 on an easy one. And given that the requirement for the scholarship is a "B" average, this is a major flaw.

Evidence from Georgia:

This study seeks to determine what effects increases in merit-based aid have on in-state college enrollment rates. Cornwell et al. (2003) conducted an empirical study using time series data on enrollment rates in Georgia and enrollment rates of other states as a control. They estimated that the scholarship increased the overall freshmen enrollment rate by 6.9 percentage points, with the gains concentrated in 4-year schools. They also found that HOPE raised the enrollment rates of both blacks and whites in Georgia schools, with the state's historically-black institutions playing an important role. Finally, the results suggest that total HOPE-induced increase represents about 12 percent of high-school graduates who qualified for the scholarship and 21 percent of those who

took the award. However, because the overall HOPE effect involves enrollees at 2-year schools who are more likely recipients of the non-merit HOPE Grant, the total program enrollment response amounts to less than 10 percent of all freshmen program beneficiaries. The authors believe that these findings suggest that the HOPE program has operated largely as a transfer to students who would have enrolled in college anyway, although its relative price effects have influenced where students attend (Cornwell, 2003).

Heller (2003), using evidence from state legislation on merit-aid, argues that states have only been able to produce evidence of increased enrollment. The other two objectives of merit-aid programs, "stanch 'brain drain'" and "reward the states best high school graduates" have not been addressed. Heller argues, "While programs like Georgia's HOPE have proved to be effective in keeping high achieving students in state for college, there has yet to be any significant evidence that these students remain in state after graduation (Heller, 2003). Heller uses evidence from Michigan's merit-aid program to review its incentive effects. The results of the study show that in the program's first year to second year, there was an initial gain in student performance in scholarship qualification. However, there was no similar gain by the third cohort of students (Heller, 2003). Heller contends that one possible explanation is that the initial performance progress was caused by heavily publicizing the program. A majority of the students in the first cohort took the qualification MEAP exam before the program was finalized and had distributed program information to schools and the public.

Students in the second cohort had much more information on the program by the time they took the MEAP exam. This alone would give them more incentive to work

hard at scoring the required level on the exam. By the time the third cohort took the exam, it is likely that program information was close to perfect and heavily saturated among high school students. This could have made it difficult to measure further gains in performance. Furthermore, the increases of performance by the second cohort may have been a result of academically stronger students being induced to take the MEAP exam, because the potential inducement of winning the scholarship. So, the higher qualification rate in the second cohort may have been due at least in part to the changing mix of test-takers, rather than induced academic performance (Heller, 2002).

In addition, the award in Michigan is a one-time $2500 grant. This may not be a substantial incentive for the state's highest achieving students. While there has been evidence of increased enrollment effects, there are still many unanswered questions. Some other questions that need to be addressed are how large does the incentive have to be, what is the lag time required between when the incentive is put in place and when students can be expected to change behavior, and are there ways to target the incentive at students who have more marginal academic performance, and would thus benefit from improving their performance in preparing for college, rather than simply awarding it to all students (Heller, 2003).

It is apparent that a high population of young educated workers is a determinant of economic growth. The steps policy makers should take towards obtaining and keeping these workers is not so apparent. A statistical analysis of what variables are significant in a students' decision-making process on college choice could be helpful in policy making decisions. With the large trend towards state merit-aid programs, close attention should be paid to the merit-based aid expenditure variable.

III. Formulation of the General Model

One would infer that the more colleges within a state, the higher the likeliness that one of those colleges will appeal to an in-state student. Also, the presence of a Tier 1 research university would supply for the demand of a prestigious university. So, there should be a direct relationship between the number of colleges and presence of a Tier 1 research university and in-state enrollment. The availability and amount of student aid (merit and non-merit) and enrollment in-state institutions should be directly related, because aid in effect lowers tuition and makes in-state schools relatively cheaper to attend. Also, greater increases in Gross State Product, and indicator of an improving job market, should encourage students to attend college in their home state. However, this brings up the question of whether students follow the jobs or if firms follow where the students (educated labor) are. Gottlieb (1999) contends that it is the latter (Gottlieb, 1999). Rising per capita income could have one of two effects on students. It could cause more people overall to be able to afford college or it could cause people to be able to afford out-of-state tuition. Lastly, as tuition and fees rise, students will have more incentive to explore other alternatives such as the job market.

The hypothesis of this study is that in-state enrollment in public four-year colleges is dependent upon the number of colleges and personal income per capita of a state, average tuition and fees of at state's public institutions, the amount of need-based financial aid per student in each state, the total amount of merit based financial aid in each state, the change in real Gross State Product and the existence of a "Tier 1" research university as determined by *US News & World Report* in a state. The number of colleges

in a state affects the number of choices a student has when deciding where to attend. The greater the selection the higher the likeliness of a student finding a college that suits his/her wants and interests. It is assumed that education outside of one's state is a normal good. As income increases, the more likely a person is to consider an out-of-state alternative. Also, it is assumed that tuition and fees and availability of grant and/or scholarships affect choice in that people will opt for a cheaper alternative. Furthermore, the prestige and comparatively low price of a "Tier 1" research university in a state may entice students to remain in their home state to acquire a degree from this institution.

This study uses panel-data and a fixed-effects model to analyze the migration of college bound high school seniors across the United States for the years 1988, 1994 and 1998. A fixed-effects model assumes that differences across states are captured by differences in the constant term. The primary benefit of a FEM model is that the fixed-effects estimator is robust to the omission of any relevant time invariant regressors. An F-test rejects the null of no fixed effects (F-test results are reported in table 2). Also, a Hausman test rejects the null of random effects. Thus, the fixed effects method is superior to the ordinary least squares and random effects model in this case.

IV. Data Sources and Description

The data for this analysis is for 49 states of the US (Hawaii not included) for the years 1988, 1994, and 1998. The 1988, 1994, and 1998 figures for percentage of students who remain in their home state to enroll in college and the real dollar amount of need-based financial aid and grants per student award by a state are used directly. However, since it is assumed that students base there enrollment decisions, in part, on college ranking, income, tuition and economic growth, the 1987, 1993 and 1997 figures are used

as this would have been the information available to the students at the time they chose a school. The 1997 tuition figures were not available for Hawaii and consequently all Hawaii data was removed from the analysis. The 1987-88, 1993-94 and 1997 statistics for the number of colleges located within each state were used because these were the most appropriate numbers that were available.

The data was collected from: the Statistical *Abstract of the United States* (per capita personal income and number of colleges 1997); various editions of the *Digest of Education Statistics* (student migration, number of colleges, tuition and fees, scholarship and grants); the United States Department of Commerce Bureau of Economic Analysis website (change in Gross State Product); and the October 26, 1987, October 4, 1993 and September 1, 1997 issues of *US News & World Reports* (Tier 1). Data on merit-based aid was obtained through reports from the National Association of State Student Grant and Aid Programs (NASSGAP). The three annual reports used were the 21st, 25th, and 29th.

IV. Results

The mean value, standard deviation, sum, minimum and maximum values of each variable are presented in Table 1. The percentage of students who remain in their home states for college varies greatly from 9.00% in Arkansas (1988) to 92.00% in Michigan (1988). The question here is what is causing such great differences and what, if anything, a state can do to improve its retention of college-bound graduating high school students. Lower tuition and large grants are programs that would theoretically entice a student to attend college in his or her home state. Large differences among states can also be seen in these variables. For example the states with the lowest tuition in 1998 are Oklahoma

($5,076), Arkansas ($5,402) and New Mexico ($5,428), while the states with the highest tuition in that year were Vermont ($11,360), Rhode Island ($9,648) and New Jersey ($9,661). The amount of need-based grants per student given in each state in 1998 varies from $0 in South Dakota to $9,907.42 in New York. The amount of merit-based aid given per student for each state in 1998 varies from $0 in 18 different states to $3,508.45 in Georgia.

Table 2 shows the results of fixed-effects regressions on the percentage of students who remain in their home states to attend college. In table 2, equation (1) includes all variables. This equation shows that only real average undergraduate tuition and fees of full-time students at public colleges and change in real Gross State Product impact the percentage of students who remain in their home states to attend college. Equation (2) combines the merit-aid and non-merit-aid variables by adding them together. The new combined variable is insignificant at all three levels. Tuition and change in GSP remain significant at .1 and .01 respectively. In equation (3), non-merit grants are omitted. The variables and model are unaffected. Equation (4) excludes merit-based grants. This again has no effect on any variables or the model. In all four equations, the income variable was insignificant. The merit variable was close behind in all four equations with Pr > t ranging from .8998 to .9336.

The statistically significant impact of real average tuition and fees at public institutions was expected because it makes state colleges a less expensive alternative. The estimates suggest that a $1000 cut in tuition at state colleges raises the percentage of students who attend college in-state by about 1.5. It is surprising that real need based financial aid and grants per student did not have a significant impact on the percentage of

students remaining in their home states to attend college. One explanation could be that many need-based grants may be used out of state. However, it is unlikely that one who qualifies for need based aid would pay the additional out-of-state costs. Allowance for use of merit aid for an out-of-state institution is extremely limited. Based on state merit-aid program websites, in most cases only a fraction of a percent is allowed to be used at an out of state institution and they usually require extenuating circumstances. Another possible explanation could be that information about possible need-based grants is not widely known by the public. Students may not be aware of the amount and what types of grants available. Perhaps greater publicity of financial aid available would increase this variables significance in the future.

V. Conclusion

The introduction of the merit-aid variable had no effect on the significance or insignificance of the variable in the original model. The merit-aid variable itself was insignificant. Based on state merit-aid program websites, in most cases only a fraction of a percent is allowed to be used at an out of state institution and they usually require extenuating circumstances. This suggests that across the United States for this time period, merit-based financial aid was not a factor when students made decisions on whether to attend college out of state. This is potentially alarming considering that fourteen states currently have merit-based aid programs and more states are expected to follow. It also suggests that many merit aid programs are failing to accomplish one of their main goals outlined in legislation; "stanch brain drain." It is conceivable that a state could structure a merit aid program that was effective, but what that structure is would be

difficult to learn. One cause of the ineffectiveness of merit aid could be the types of students who typically receive them. Since academic achievement is highly correlated with income, middle to higher income families typically qualify for the awards. It is possible that these students need greater inducement to stay in state. It is unlikely that a small merit award would create enough incentive for a student from a financially privileged family to choose to stay in state.

References

Benhabib, Jess; Spiegel, M. "The Role of Human Capital in Economic Development: Evidence from Aggregate Cross-Country Data," *Journal of Monetary Economics* 34 (1994), pp. 143-173.

Cornwell, Christopher; Mustard, David B. and Sridhar, Deepa J. "The Enrollment Effects of Merit-Based Financial Aid: Evidence from Georgia's HOPE Scholarship." January 26, 2003.

Florida, Richard. "The Rise of the Creative Class." *Washington Monthly.* May, 2002.

Gottlieb, Paul D. and Fogarty, Michael. "Educational attainment and metropolitan growth. An REI policy brief." *The Center for Regional Economic Issues.* July 1999.

Gottlieb, Paul D. "Labor Supply Pressures and the "Brain Drain": Signs from Census 2000." *Center for Urban and Metropolitan Policy.* January, 2004.

Heller, Donald E. "Merit Scholarships and Incentives for Academic Performance." November, 2003.

Heller, Donald E. Figure 8. and Figure 9. in appendix A. "Based on Annual survey of National Association of State Student Grant and Aid Programs." *The College Board.* 2002.

Levens, Megan. "An Analysis of State-Level Efforts to Enroll Students at In-state Institutions of Higher Education." 2002.

Lucas, Robert. "On the Mechanics of Economic Development." *Journal of Monetary Economics,* Vol. 22, July 1988.

Rauch, James E. "Productivity Gains from Geographic Concentrations of Human Capital: Evidence from the Citites." *Journal of Urban Economics, Vol. 34, p 381.*

Selingo, Jeffrey. "State Spending on Aid for Needy Students Increases by 6%, Survey." *Chronicle for Higher Education,* Vol. 45 Issue 35, May 7, 1999.

Selingo, Jeffrey. "Questioning the Merit of Merit Scholarships." *Chronicle of Higher Education,* Vol. 47 Issue 19, January 19, 2001.

Selingo, Jeffrey. "Hope Wanes for Georgia's Merit Based Scholarships." *The Chronicle of Higher Education,* Vol. 50 Issue 13, November 21, 2003.

Table 1. Means and Standard Deviations

Variable	Mean	Standard Deviation	Minimum	Maximum
% Students that Remain In-state(b)	69.1156	14.4410	9	92
Number of Colleges©	75.8367	72.5117	8	396
Personal Income Per Capita(d)	21613.8	4518.75	13266.31	41010.57
Tuition(e)	6317.00	1570.81	2405.26	11142.72
Non-merit grants(f)	2294.19	2585.73	0	12397.53
Tier 1 (g)	0.08844	0.2849	0	1
Change GSP(h)	3.7711	2.7824	-4.0807	14.7362
Merit-Based Grants(i)	137.4398	387.8623	0	3508.45

Table 2. Fixed effects regression results for percentage of students remaining in their home states to attend college.

Variable	(1)	(2)	(3)	(4)
Number of Colleges (a)	.0297 (.42)	0.0339 (.49)	0.0180 (.26)	0.0314 (.47)
Personal Income Per Cap (b)	0.000013 (.05)	-0.000015 (.06)	.000023 (.09)	.000013 (.05)
Tuition (c)	-.00146 * (-1.86)	-.00145* (-1.86)	-.00148* (-1.90)	-0.00146* (-1.87)
Grants (d)	-.00058 (-.65)			-0.00059 (-.66)
Merit Grants (e)	.00022 (.08)		.000332 (.13)	
Tier 1 (f)	-3.46293 (-.81)	-0.47581 (-.10)	-2.9218 (-.70)	-3.4778 (-.82)
Change GSP (g)	-1.23211*** (-4.54)	-1.2315*** (-4.56)	-1.2286*** (-4.54)	-1.2321*** (-4.57)
Merit/non-merit combined (h)		-.00051 (-.59)		
	n = 147 R^2 = .8699 CS = 49 F = 6.68 Pr > F = .0001	n = 147 R^2 =.8697 CS = 49 F = 6.80 Pr > F = .0001	n = 147 R^2 = .8693 CS = 49 F = 6.76 Pr > F = .0001	n = 147 R^2 = .8699 CS = 49 F = 6.82 Pr > F = .0001

Dependent Variable (Y): % of students who stay in their home state to attend college.
t-stats in parentheses. *** = significant at .01, ** = significant at .05, * = significant at .10
a Number of colleges in each of the 50 states (sq. miles) for 1996.
b Real median personal income per capita for each of the 50 states (1996 $)
c Real undergraduate tuition and fees of full-time students at public colleges for each of the 50 states ('96$)
d Real need-based financial aid and grants per student awarded by each of the 50 states ('96 $)
e Real merit-based financial aid and grants per student awarded by each of the 50 states (’96 $)
f Presence of a Tier 1 research university in the state.
g Change in real Gross State Product in each of the 50 states (in millions of 1996 $)
h Merit added to non-merit based aid per student by each of 50 states. (96$)
All cross section estimates have been suppressed