Ann Reg Sci (2003) 37:603–612
DOI: 10.1007/s00168-003-0130-4

The Annals of
Regional Science

Interstate migration of college freshmen

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Received: January 2002 /Accepted: November 2002

Abstract. We examine the economic determinants of interstate migration of college-bound freshmen, using state-level data. Our analysis provides a robust explanation of the striking differences among the U.S. states in out-migration of college-bound freshmen. States that provide more educational choices and higher quality education services, charge lower tuition, have broad-based merit scholarship programs and have lower income levels tend to retain a higher percentage of their college-bound freshmen at home.

JEL classification: R23, J61

Interstate migration of college students is important: to students for the opportunities they seek, to institutions for diversity in their student body and the revenue they add, and to communities and states for economic benefits they gain or lose from students who come to a state to enroll or leave a state to enroll elsewhere.

Postsecondary Education OPPORTUNITY
August, 1996

1. Introduction

During the past decades there has been a steady rise in the number of freshmen leaving their home states to enroll in colleges and universities in other states.[1] Currently, about 1 in 5 college freshmen who graduated from high school in the previous 12 months enroll in a college or university in

We thank Andrew Mason, Sang-Hyop Lee and Rhonda Sharpe and two anonymous referees for helpful comments and suggestions.

[1] Between 1986 and 1998, the number of freshman college-bound students leaving their own states grew from 195,000 in 1986 to 320,000 in 1998 (“Interstate Migration of College Freshmen,” *Postsecondary Education OPPORTUNITY*, January 2001; the original source of this data is the U.S. Department of Education, National Center for Education Statistics, *Digest of Education Statistics, 2000*, Chapter 3a, Table 205 and is accessible on line at: http://nces.ed.gov/pubs2001/digest/list_tables.html). However, the percentage of students leaving their own states showed no clear trend.

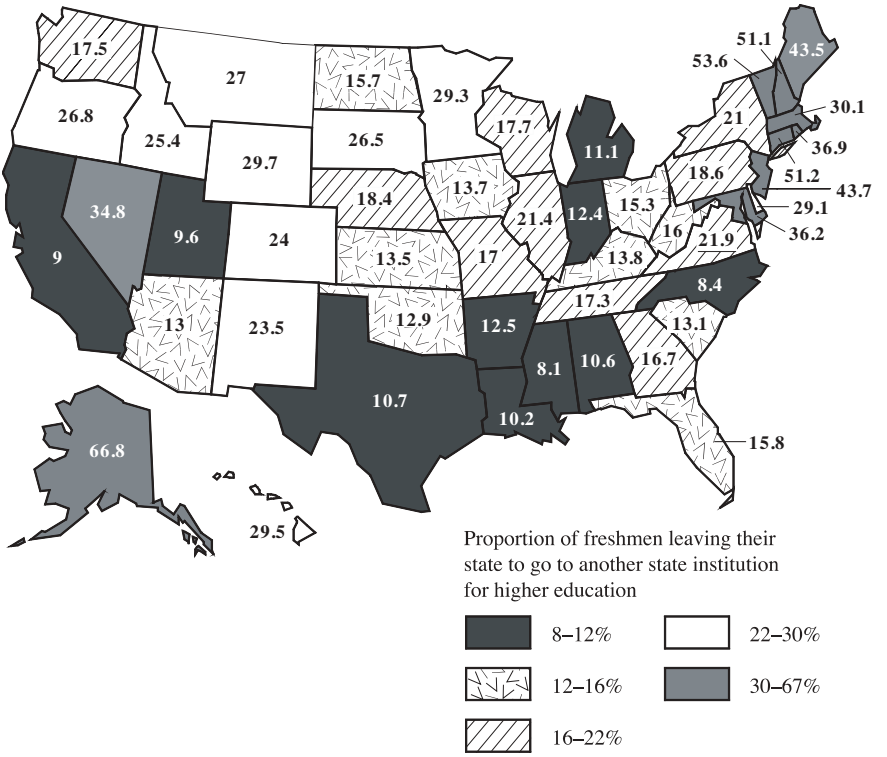

Fig. 1. Percent of freshmen attending college out of their home state, 1998

another state. However, there are striking differences among the states in the out-migration rates of these college-bound freshmen (see Fig. 1). For instance, in 1998, 66.8% of college-bound freshmen in Alaska left home to attend colleges and universities in other states; by contrast, the out-migration rate in Mississippi was 8.1%.[2] The median out-migration rate among the 50 states was 18%.

Interstate migration of college students has been the subject of several studies since the late 1960's. In one of the first and most comprehensive, Gossman et al. (1968) proposed a gravity model to analyze interstate student migration data from 1938 to 1968. Subsequent studies fall into several categories, among them, government policy reports, demand analyses, migration patterns, and future projections.[3] In this paper, we employ a general economic model to explain differences among the states in the out-migration rate of college-bound freshmen in 1996 and 1998, the most recent years for which out-migration data are available. Our model is a

[2] The out-migration rates in this paper refer to those college-bound freshmen who graduated from high school within the previous twelve months.

[3] Johns and Viehland (1989) present a brief review of some of these studies.

variant of one developed by Tuckman (1970).[4] We do not attempt to explain why individual students choose to go away to school; the reasons underlying individual students college choices are more diverse and include personal, academic and institutional factors.[5] Our model is an aggregative model.

2. Model

The decision either to attend a home state institution or go away to college is determined by both economic and non-economic (i.e., general educational development) reasons. Going away means being on your own and learning first hand about other peoples and places, but it also means incurring additional financial and psychic costs of being away from home, family and friends. For some students, going away to college may reflect more importantly a labor migration (i.e., human capital investment) decision.[6] Some students seek better job opportunities elsewhere, and going to school in another state is part of that relocation process (McCann and Sheppard 2001; Morgan 1983, p. 188). Spatial analysis of student college choices indicates that non-pecuniary factors such as "going away from home," "becoming more cultured person," "gain general education," and "learn more about things" are relatively more important than financial considerations such as "couldn't find a job," "to get a better job," or "to make more money" in choosing to enroll in a distant college (*Postsecondary Education OPPORTUNITY*, August 1996, pp. 3–4).

We model freshman migration with the following equation:

$$\%OUT_i = \alpha_0 + \alpha_1 NUMEDU_i + \alpha_2 2YEAR_i + \alpha_3 HIED\$_i + \alpha_4 TUTION_i + \alpha_5 MERIT_i + \alpha_6 Y_i + \alpha_7 UNEMP_i + \alpha_8 ALASKA_i + \alpha_8 HAWAII_i + \varepsilon_i$$

where:

$\%OUT_i$ = percent of college-bound high school graduates (within the past twelve months) from state i enrolling in college in another state,

$NUMEDU_i$ = number of degree-granting institutions of higher education, state i,

$2YEAR_i$ = ratio of number of two-year institutions to total number of institutions of higher education, state i,

[4] Tuckman used his model to analyze differences in the proportion of students in all classes attending 4-year colleges in other states in 1963; by contrast, our study focuses on the out-migration of college freshmen only. For many purposes, the first-time freshman class is the population of greatest interest.

[5] See, for example, Chapman (1981); and Galotti and Mark (1994).

[6] In the typical labor migration model, a potential migrant chooses to migrate if the difference in the present value of future life-time earnings between moving and staying minus moving costs is greater than zero. See for example Borjas (2000, pp. 304–05), and Borjas (1999, especially pp. 1710–1711.) These models typically assume that the migration decision is irreversible.

$HIED\$_i$ = per capita state and local government expenditure on higher education in state i, adjusted for inflation[7],
$TUTION_i$ = ratio of resident tuition and fees at "the University of ..." state i to the average nonresident tuition and fees in the other 49 states,
$MERIT_i$ = 1 if state i has a broad-based merit scholarship program, 0 otherwise,
Y_i = per capita personal income, state i, adjusted for inflation,
$UNEMP_i$ = unemployment rate, state i,
$ALASKA_i$ = 1 if state i is Alaska, 0 otherwise,
$HAWAII_i$ = 1 if state i is Hawaii, 0 otherwise,
ε_i = error term.

NUMEDU – the number of degree granting institutions of post-secondary education in the home state – is a proxy for higher education options. We surmise that states with more degree granting institutions provide more educational choices at home to potential students and thus are more likely to keep a higher percentage of their students at home. Moreover, the variable *2YEAR* will indicate whether an extensive complement of two-year colleges (relative to the total number of institutions of higher learning) will affect out-migration of first-time freshmen.

We used *HIED*\$ – per capita state and local government expenditures on higher education in the home state – as a crude proxy for the (perceived) quality of the home state institutions. It is assumed that states that spend more public money (per capita) on higher education have higher quality institutions and thus are likely to keep a higher percentage of their college-bound students at home.[8] We acknowledge that public expenditures do not capture the quality of private colleges and universities. While there are quality rankings of individual institutions (for example, the U.S. News and World Report annual issue on America's best colleges and universities) we are unaware of any composite higher education quality index for each state. Such an index would be difficult to construct and perhaps even more difficult to defend.[9] We note, however, that public institutions enroll most (nearly 80% of all) undergraduate students.[10] Since private institutions must compete for students against public schools, one expects a close correlation between quality indexes for public and private institutions in each state (Cartter 1967, p. 12; Miron 2001, p. 84).

TUITION measures the relative price of going to college in the home state versus going to college in another state. It is defined as the ratio of resident tuition and fees at "The University of [state *i*]" (the flagship university in state

[7] Adjusted to 1996 price levels using the Bureau of Labor Statistics' Consumer Price Index CPI-U, available at ftp://ftp.bls.gov/pub/special.requests/cpi/cpiai.txt

[8] Higher per capita public financial support for higher education can also mean lower average tuition thus encouraging more students to stay home. However, the simple correlation between average resident tuition at in-state public supported universities and per capita state and local government spending on higher education is only −0.11 for 1996 and −0.19 for 1998.

[9] An earlier attempt to construct a quality index for *public* colleges and universities in each state was reported by Cartter (1967, pp. 10–11).

[10] Based on fall 1997 enrollment data and 1998–99 data on degree granting post-secondary institutions (U.S. Department of Education, Chapt. 3a).

i) to average non-resident tuition and fees at the flagship universities of the other 49 states.[11] The higher the ratio of resident tuition and fees at home to nonresident tuition and fees in other states, the more likely students will out-migrate from their own states.

In addition to financial support of public colleges and universities, state policies also directly affect the demand for higher education through student aid programs. A growing number of states (13 currently) have implemented broad-based merit (as opposed to need-based) scholarships that provide free or reduced tuition at in-state institutions to their high school graduates who have achieved grades above some minimum threshold (Selingo 2001). These programs are designed to increase higher education access in response to sharply rising (real) tuition and fees since the 1980s (Heller *op. cit.*, and *Postsecondary Education OPPORTUNITY*, April 2001) and to keep more of the brighter students at home by reducing the relative price of going to college in the home states. The *Chronicle of Higher Education* notes that "states have produced little hard evidence of those successes – except for Georgia" (Selingo *op. cit.*) In 1993, Georgia pioneered the movement by offering to pay the college tuition at any institution in the state for any Georgia high school graduate who had attained a grade of B or above. By fall 2000, over 75,000 Georgia college students were recipients of the state's HOPE scholarships; at the University of Georgia, ninety-six percent of the in-state freshmen are on HOPE scholarships. Three-fourths of the state's high school graduates who scored higher than 1500 on the SAT now attend a Georgia institution compared to 23% before HOPE was implemented.[12] By 1996, two other states, Arkansas and Mississippi, had implemented broad-based merit scholarship programs. Two years later, five additional states – Florida, Louisiana, Missouri, New Mexico and South Carolina – had introduced similar programs.[13] The popularity of merit scholarship programs is quickly spreading to other states. In this paper, the variable *MERIT* takes the value 1 if the home state has a broad-based merit scholarship program, 0 otherwise. We also tried an alternative model specification to capture the retention effect of merit scholarships by replacing the binary variable *MERIT* with *YRSMERIT*, the number of years since each program was first implemented.

Since going away to college is usually more costly than staying at home, we expect states with higher per capita incomes *Y* to have higher out-migration

[11] Our data source (described below) provides three measures of tuition and fees, none of which is comprehensive. The variable we use here is tuition and fees at the state's flagship public university. Also available are tuition and fees at a selected list of other public colleges and universities in the state; and at a selected list of community colleges. Flagship university tuition tends to be highly correlated with those of comprehensive universities in each state (see Heller 1999).

[12] On the other hand, nearly 60% of the recipients fail to maintain a B average in college to keep their scholarships (see Selingo *op. cit.*; also, http://www.hope.gsfc.org/ and the editorial in *Postsecondary Education OPPORTUNITY*, February 1997).

[13] Not all merit programs have the same reach and generosity. For instance, the 75,000 recipients of Georgia's HOPE scholarship comprised nearly 30% of all undergraduate students in Georgia's degree granting post-secondary institutions (based on fall 1998 enrollment data); by contrast, merit scholarship recipients comprised only about 2%, or less, of undergraduate enrollment in Alaska, Washington, and Mississippi. The average value of a scholarship in Georgia was about $3,000 in 2000, but less than $1,000 in Kentucky and Nevada.

rates of college-bound freshmen. To capture the labor migration aspect of college location choice, we used the variable *UNEMP*, the state's unemployment rate, to capture potential differences in financial returns from going to school in states with different prospects of finding future employment. The relevant unemployment rates are the expected future unemployment rates in the home and destination states when the student finally enters the job market at the completion of schooling, say two to five years from initial entry into college.

Finally, we included separate dummy variables for Alaska and Hawaii to capture the effects of distance and isolation experienced by residents of the two non-contiguous states. While distance may deter students from leaving their home states, students in Hawaii and Alaska may feel a stronger urge to "experience" the rest of the country. The dummy variables may also capture any cultural effects on student mobility.

In sum, we posit the coefficients of *NUMEDU, HIED$* and *MERIT* (or *YRSMERIT*) to be negative; those of *TUITION*, *Y* and *UNEMP* to be positive; and we have no prior expectations on the signs of *2YEAR*, *ALASKA* and *HAWAII*.

3. Data

Out-migration rates of college-bound freshmen in 1996 and 1998 were published by the U.S. Department of Education, National Center for Education Statistics, *Digest of Education Statistics*. Data on the number of degree granting institutions in each state came from the same source. State per capita personal income and per capita state and local higher education expenditures were obtained from the U.S. Department of Commerce's Bureau of Economic Analysis and from the U.S. Census Bureau. Unemployment rates were obtained from the *Statistical Abstract of the United States* (various years). Resident and non-resident tuition and fees data were kindly provided by the Washington State Higher Education Coordinating Board.[14] Information on the states with broad based merit scholarships and their initial dates of implementation were obtained from the January 19, 2001 issue of the *Chronicle of Higher Education*.

4. Empirical results

We estimated two variants of the migration equation for out-of-state college enrollment by recent high school graduates for 1996 and 1998 using the method of ordinary least squares.[15] One variant employed the binary

[14] Each year, the Board publishes a state by state comparison of tuition and fees at public colleges and universities in the U.S. We appreciate the assistance of Kathy Raudenbush of the Board in obtaining these data. The numbers are available at http://www.hecb.wa.gov/paying/index.html.

[15] All OLS predicted out-migration rates lie within the expected limits of 0–100% except for California, which was slightly negative in the 1998 and pooled results. To eliminate that problem we also estimated the migration equations using TOBIT procedures. Since the results are quite similar, we chose to report the OLS estimates because the coefficients are more easily (i.e. directly) interpreted. The Tobit results are available from the authors by request.

Table 1. Freshman outmigration (Dependent variable: %OUT)

Variable name	1996		1998		1996 & 1998 (pooled)	
	Coefficients variant 1	Coefficients variant 2	Coefficients variant 1	Coefficients variant 2	Coefficients variant 1	Coefficients variant 2
NUMEDU	−0.110482*	−0.11429*	−0.10189*	−0.10252*	−0.10784*	−0.10813*
	(0.01625)	(0.01625)	(0.01310)	(0.01377)	(0.01041)	(0.01072)
2YEAR	8.0846	7.8348	6.1237	5.4497	7.6404	7.3126
	(7.655)	(7.703)	(8.6039)	(7.1150)	(5.0937)	(5.2891)
HIED$	−0.0271*	−0.02659*	−0.02099	−0.02000*	−0.02581*	−0.02567*
	(0.01249)	(0.01271)	(0.01334)	(0.01180)	(0.00897)	(0.00851)
TUITION	44.891*	44.615*	45.094*	45.610*	45.644*	46.228*
	(14.520)	(14.620)	(14.221)	(14.125)	(9.8105)	(9.7387)
MERIT	−5.6377*	–	−4.3714	–	−5.0381*	–
	(2.777)		(2.7674)		(2.1214)	
YRSMERIT	–	−0.95335*	–	−0.97069*	–	−1.0493*
		(0.4604)		(0.43585)		(0.33822)
Y	0.00125*	0.00130*	0.00122*	0.00125*	0.00115*	0.00116*
	(1.00041)	(0.00041)	(0.00033)	(0.00032)	(0.00023)	(0.00023)
UNEMP	1.1085	1.0469	2.2690*	2.1943*	1.6077*	1.5409*
	(0.9029)	(0.9149)	(0.94799)	(0.91374)	(0.68170)	(0.66856)
ALASKA	37.941*	37.947*	33.430*	33.688*	36.424*	36.755*
	(4.229)	(4.1397)	(8.7505)	(4.4121)	(3.1627)	(3.0543)
HAWAII	2.7286	2.7681	−0.83969	−0.49007	1.5802	1.8922
	(2.539)	(2.567)	(2.6535)	(2.6069)	(2.2085)	(2.1857)
INTERCEPT	−11.654	−12.774	−20.4680	−21.497	−13.444	−13.770
$\bar{R}^2$	0.680	0.674	0.769	0.765	0.746	0.743

Standard errors appear in parentheses below each coefficient. An * indicates a coefficient with a p-value of 0.05 or less

variable, *MERIT*, in the specification; the other used *YRSMERIT*. A battery of diagnostics indicated some evidence of heteroskedasticity, so the reported standard errors use White's heteroskedastic-consistent covariance matrix, even though our sample is somewhat small to invoke the asymptotic property of this correction (see e.g., Greene 2000, p. 463.) Chow tests showed no structural difference between the two years, so we ran a third set of equations pooling the 1996 and 1998 data. The results are displayed in Table 1.[16]

Our results are quite robust, especially for a study using cross-section data. The estimated equations for the two years explain between 68% and 77% of the variation in out-migration rates of college-bound freshmen among the 50 states. As predicted, states with more (fewer) degree-granting higher education institutions tend to have lower (higher) rates of college-bound freshmen enrolling in schools in other states. The ratio of two-year to total institutions of higher education makes no difference in out-migration rates, suggesting that it is the total number of institutions that matters in the migration decision, not the composition (i.e., two-year or four-year schools) of the institutions. In both years, the average level of resident tuition and fees at "the State" university was about 35% of out-of-state tuition and fees in

[16] We use one-tailed tests on coefficients of all the variables with prior sign expectations, and two-tailed tests for *2YEAR, HAWAII* and *ALASKA*.

other states. The states with the lowest relative tuition (around 20%) included Idaho, Nevada, Arizona and Florida, and the state with the highest relative tuition (over 75%) was Vermont. Not surprisingly, states with low in-state tuition and fees tend to retain a higher percentage of their own students.

As well, states with broad-based merit scholarship programs also tend to retain a significantly higher percentage of their high school graduates. The three states with merit scholarships in 1996 had out-migration rates that averaged 5.6 percentage points less than states without similar scholarship programs; for 1998, the average was 4.4 percentage points less, though this latter coefficient is not significantly different from zero. The equations with the *YRSMERIT* variable (variant 2 in Table 1) indicate that the retention effect of broad-based merit scholarships is significantly greater the longer the scholarship programs have been in effect. On average, each additional year the merit-based scholarship is in effect results in about one percentage point lower out-migration rate of college-bound freshmen. States with higher per capita state and local government expenditures on higher education also tend to retain a higher percentage of their students. As anticipated, our results confirm that higher income states tend to have higher student out-migration rates.

We lack information on how students form expectations about future employment prospects. Rational expectations would suggest that experience or knowledge of past unemployment rates plays a central role. Hence we examined two alternative measures of past unemployment. For one, we used the 1995 and 1997 statewide unemployment rates for high school graduates applying for college admission in 1996 and 1998 respectively. In the other, we tried an average of unemployment rates for the five years prior to enrollment. The former yields a significant coefficient from the 1998 and pooled samples, but not with the 1996 data. The five-year average unemployment rate was never significant.[17] This weak result may not be surprising. Schwartz (1967) argues that migration is not necessarily a response to general measures of economic differences but a response to personal opportunities. He notes that, for any two regions in the U.S., migration is observed in both directions, and that the net flow is small even in the presence of large regional differences.

Finally, all else being equal, Alaska, but not Hawaii, residents have significantly higher propensity to leave their home state for higher education.

5. Conclusion

In this brief paper, we examined the economic determinants of interstate migration of college-bound freshmen in 1996 and 1998. We focused on only one aspect of freshmen migration: the differences in out-migration rates of college-bound freshmen among the states. We did not examine the differences in the in-migration of college-bound freshmen. Our analysis provides a robust explanation of why there are such large differences among the states in the percentage of college-bound freshmen leaving their home states to enroll in

[17] Results are not shown in Table 1. On the possibility that the appropriate variable is prospective economic growth, rather than unemployment, we tried the five-year average growth rate of real gross state product for each state. This too failed significance tests.

schools in other states. We find that states that provide more educational choices to potential college freshmen (whether in the form of two- or four-year institutions) tend to retain their students. Likewise, states that provide generous financial support to their public institutions tend to provide higher quality, and perhaps also relatively lower priced, higher education services and thus are more likely to keep their college-bound students at home. Lower in-state tuition and fees and broad-based merit scholarships are shown to have significant positive impacts on student retention. We find that the effect of merit scholarships on student retention is greater the longer a scholarship program has been in existence. By contrast, high income states tend to see a higher percentage of their students leave their states to go to school elsewhere. We find mixed empirical evidence to indicate that differences in unemployment rates among the states offer a good explanation of differences in the out-migration rates of college-bound freshmen.

On the policy front, the study sheds insights into what states can do to induce a higher percentage of their college-bound students to stay home. There is a good reason why economists and policy makers interested in regional growth issues should be concerned with where college students decide to acquire their higher education, given evidence (see, for example, McCann and Sheppard) linking college location choice to where students eventually choose to live and work. Encouraging more of the state's college bound students to study at home may encourage local human capital accumulation and local economic growth. This study, however, cannot answer the more important questions of what are the benefits and costs of keeping a higher percentage of college-bound students at home, and what are the most efficient and equitable ways of achieving higher student retention. For instance, in spite of their growing political popularity, broad-based merit scholarships have come under increasing criticism by analysts as bad public policy because they are economically inefficient and inequitable.

Of course, individual prospective students will consider more factors in choosing an institution of higher education than those we have used in our model. Some are specific to the individual (for example, family background, marital status, high school quality, regional preferences); some to the institutions (financial aid, academic and other reputations, recruiting effort and acceptance rates, extra-curricular offerings); and some to the state or locality in which the school is located (living costs, weather, opportunities for employment during and after completion of the degree) (see for example Galotti and Mark 1994). Although further study of these factors would require a detailed survey of individual students, such information would enlighten college and university administrators in formulating recruitment and retention policies as well as inform policy makers on matters relating to higher education funding.

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