DETERMINANTS OF COLLEGE STUDENT MIGRATION

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In a recent article, Professors Campbell and Siegel use aggregate enrollment data and price and income variables to explain movements in the demand for education over time [1]. Price and income variables can also be used to explain interstate migration. A simple economic model accounts for about 54% of the variation among states in the proportion of students leaving their home state to attend college. Adjusting the out-migration data to take into account the enrollment opportunities within the state, we find that the amount of variation explained increases to 64%. These results are interesting, especially given the paucity of explanatory models in this area.

I. CONCEPTUAL FRAMEWORK

Interstate migration of college attendees may be explained either by an investment or a consumption theory of demand. In the former case, students may migrate to increase the present value of the expected stream of benefits resulting from their education. These benefits might include lifetime earnings and/or nonmonetary returns such as appreciation of culture. The opportunity to increase these benefits is present if colleges in various states differ in drop-out rates, access to the labor market, or curriculum. Alternatively, state or other subsidies may make the costs of an equivalent education lower in some states than in others. Since college prices (costs) are not determined in a competitive market, price differences among states may persist through time [4, 41].

A student acting within a benefit-cost framework will presumably migrate when

his expected returns from migration exceed his costs. We would thus predict the following: other things equal, states with lower priced colleges should experience less out-migration than states with higher priced colleges. If out-migration results in higher benefits than costs, then a rise in family income should increase out-migration. The availability of a diversified set of college opportunities within a state should reduce the incentive to migrate.

Students may also attend college to obtain current consumption benefits. Climate, college environment, or location may yield positive satisfactions outweighing travel and housing costs. In support of this view, a recent study by this author suggests that some students attend a distant college even when a very similar college exists close to their home [4, 33–35]. Note too, that a decision to attend college to increase future income is not inconsistent with a decision to select a particular college for its high current consumption benefits.

The consumption approach raises the problem of how these benefits are valued. Campbell and Siegel suggest an approximation based upon the outlays made on a substitute set of activities outside of college [1, 484]. Nonetheless, it does not necessarily follow, as they suggest, that the *cost* of current consumption benefits varies directly with the prices of consumer goods. Consumption benefits supplied at zero costs are probably not reflected in the price charged by a college. A general rise in consumer prices will raise the cost of obtaining similar benefits outside the college environment. This will raise the returns from enrollment only if college price rises less than the general index of prices.

If the consumption benefits offered by

colleges are the same in all states students will find it profitable to migrate to states providing lower priced colleges. Alternatively, differences among colleges provide an incentive to migrate. Assuming that college consumption benefits are normal goods, an increase in family income should increase migration. The income effect will be greater in states having limited college facilities. For these states, the availability of income enables potential college attendees to take advantage of colleges in other states.

II. A MODEL OF COLLEGE STUDENT MIGRATION

A simple representation of the migration model is given by equation (1)

$$(1) \quad M' = f \ (Y, S, P, E)$$

where M' measures the proportion of students from a state attending college outside the state, Y denotes that state's per capita income, S stands for the average price charged by colleges within the state, P shows the number of public colleges in the state, and E reflects the average amount of student aid reported by within state colleges.

To estimate M' empirically we construct a ratio of students from a state attending 4 year colleges in the state to students from the state attending 4 year colleges anywhere. The ratio is computed from a 1963 U. S. Office of Education migration study for the U. S. [5]. Since this ratio indicates absorption within the state, we subtract it from 1 to get out-migration.

By restricting our analysis to the college attending group rather than to the total college age group we ignore the college demand inducing effects of a state's spatial distribution of colleges. This seems justifiable since the relationship between M' and the proportion of high school students going on to college is not statistically significant [4, 13].

State mean per capita income serves as a proxy for family income since we are dealing with an aggregative model. Use of per capita income may, to some extent, correct for the unequal income distribution among states and for differences in household size. Income is not adjusted for cost-of-living differences since this requires adjustment of college prices and an acceptable regional index could not be constructed with existing information.

To calculate the average price of attending college within a particular state, the total revenue received by both public and private colleges from student tuition and fees is divided by the total number of students registered at the colleges in the state. A similar technique is used to obtain a student aid figure. A student's opportunity costs are assumed to be the same no matter where he attends college although his travel costs will vary. Since actual travel costs are not available, the number of public colleges in the state is used as a proxy to capture the distance students must travel. Generally, states tend to locate state schools in large population areas thus reducing travel costs. This variable probably also estimates the attractiveness of state schools vis à vis other in-state college opportunities.

Out-migration may be due to two types of supply restrictions. Either the total openings available within the state may be limited, causing some students to look elsewhere, or the types of colleges available in the state may differ from those desired by students. A student living in Nevada, for example, will find it necessary to migrate in order to obtain an education at a top grade liberal arts school.

Ideally, we should like to isolate voluntary out-migration to determine its relationship to the income available to the student and to college price. In fact, it is difficult to separate the two causes of out-migration. To explore the possibility that insufficient space within a state's colleges may cause students to migrate, we calculate the ratio of total students enrolled in a state to the total students going to college from that

state. We also assume that the colleges in the state are operating at capacity. If the number of within-state and out-of-state students enrolled in a state's colleges (public and private) exceeds the number of that state's students attending college (whether or not attending in the state), the state is treated as if it had room for its out-migrating students. That portion of out-migrating students for which the state has room is considered to be out-migrating voluntarily. If the state has no spaces available which can be filled by its out-migrants, we treat its out-migration as non-voluntary.

Table I presents the data for the 50 states and the District of Columbia: for those states with insufficient space to house their applicants, the following adjustment is made in the out-migration variable used in equation (1).

$$(2) \quad M'' = M' - A \quad A > 0$$

where A measures involuntary out-migration, that is the proportion of students from a state attending college outside the state for whom no space was available in their home state. Note that M'' estimates the *voluntary* out-migration rate while M' gives the *gross* out-migration rate.

The adjustment for involuntary out-migration must be interpreted cautiously. A college may have more openings available in a year than students within the state who are eligible to fill them. The adjustment

TABLE I

GROSS AND VOLUNTARY OUT-MIGRATION RATES FOR THE 50 STATES AND THE DISTRICT OF COLUMBIA
(1963 DATA)

State	Gross Out-Migration	Involuntary Out-Migration	Voluntary Out-Migration	State	Gross Out-Migration	Involuntary Out-Migration	Voluntary Out-Migration
Alabama	20.2	1.6	18.6	Montana	22.9	8.5	14.4
Alaska	53.9	46.0	7.9	Nebraska	18.0		18.0
Arizona	11.8		11.8	Nevada	31.1	21.8	9.3
Arkansas	17.3	3.7	13.6	New Hampshire	43.5		43.5
California	5.9		5.9	New Jersey	43.1	34.3	8.8
Colorado	19.6		19.6	New Mexico	23.2		23.2
Connecticut	38.3	17.8	20.5	New York	20.8	8.2	12.6
Delaware	50.0	17.6	32.4	North Carolina	13.3		13.3
D. C.	35.5		35.5	North Dakota	22.3	6.2	16.1
Florida	20.2	7.9	12.3	Ohio	17.0		17.0
Georgia	12.2		12.2	Oklahoma	11.4		11.4
Hawaii	34.6	17.5	17.1	Oregon	18.1		18.1
Idaho	32.9	15.7	17.2	Pennsylvania	22.8		22.8
Illinois	22.3	8.1	14.2	Rhode Island	33.8		33.8
Indiana	16.7		16.7	South Carolina	24.5		24.5
Iowa	25.8		25.8	South Dakota	23.1		23.1
Kansas	17.7		17.7	Tennessee	17.8		17.8
Kentucky	18.4		18.4	Texas	7.5		7.5
Louisiana	9.3		9.3	Utah	8.1		8.1
Maine	35.2		35.2	Vermont	39.9		39.9
Maryland	31.3	13.1	18.2	Virginia	36.5	14.1	22.4
Massachusetts	21.5		21.5	Washington	13.6		13.6
Michigan	10.6		10.6	West Virginia	17.2		17.2
Minnesota	16.4		16.4	Wisconsin	16.7		16.7
Mississippi	12.8		12.8	Wyoming	33.1	10.3	22.8
Missouri	21.0		21.0				

Source: U. S. Office of Education, *Digest of Educational Statistics*, Washington, 1964. Computation procedures are described in the appendix.

may best be viewed as a measure of the *potential* space available to state residents.

III. RESULTS AND CONCLUSIONS

If a regression equation is estimated using *gross* out-migration as the dependent variable and a simple linear form, we get the following results

$$(3) \quad M' = 0.584 + 0.009Y - 0.357$$
$$\qquad\qquad (3.8)^* \qquad (4.8)^*$$
$$\qquad\quad + \; 0.016S - 0.007E$$
$$\qquad\qquad (2.7)^* \qquad (.3)$$

$R^2 = .547$

S.E. $= 7.847$

where the numbers in parentheses are the results of a T-test of the parameters and an asterisk indicates the parameter is significant at a 1% probability level. As predicted, a rise in income (Y) increases out-migration while an increase in the number of public colleges (P), serving as a proxy for travel costs and for the attractiveness of state schools, reduces out-migration. The average price of a state's colleges (S) is positively correlated with its out-migration. As the average price charged at colleges within the state increases, the proportion of students migrating out-of-state rises. Student aid (E) appears to be unimportant in determining out-migration. The simple model explains a respectable proportion of the variance in interstate out-migration with a limited number of variables.

In the regression using a *voluntary* out-migration dependent variable (M'') the amount of variance explained increases by about 18%.

$$(4) \quad M'' = 12.826 - 0.002Y - 0.158P$$
$$\qquad\qquad\quad (1.3) \qquad (3.2)^*$$
$$\qquad\quad + \; 0.028S + 0.003E$$
$$\qquad\qquad (7.0)^* \qquad (.1)$$

$R^2 = .642$

S.E. $= 5.206$

Substitution of the voluntary out-migration variable increases the T-value and the size of the coefficient of the average price parameter. The *partial* correlation coefficient for this parameter rises from .37 in equation (3) to .72 in equation (4). Further, the coefficient for the number of public colleges in the state is reduced (from $-.581$ to $-.431$), possibly suggesting that this parameter was previously picking up some of the out-migration due to lack of space. In addition, our income parameter becomes insignificant implying a more complex association between income and unadjusted out-migration than the one presented here. High income states may attract more in-migrants, for example, because of a more cosmopolitan environment.

As in the previous equation, the student aid variable adds little to the estimate. This result may, however, be due to our inability to separate vested aid (i.e., aid available to the student no matter where he goes to college) from aid which is only available at the college.

Clearly, the decision by students to attend college in other states is influenced by the prices of both the in-state and out-of-state colleges. A system of state subsidized schools apparently succeeds in reducing the amount of out-migration.

Modifications of the simple economic model formulated here may have a number of potential uses. More sophisticated models might forecast migration for manpower and educational planners, shed some light on optimal resident-non-resident tuition levels, and clarify the demand-inducing role of tuition.

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APPENDIX: SOURCES USED TO DERIVE THE VARIABLES

Ratio of Students from a State Attending 4 Year Colleges in that State to Students from that State Attending 4 Years Colleges Anywhere

A study of the residence and migration of college students in the fall of 1963, reprinted in the U. S. Office of Education, Digest of Educational Statistics [5, 77] provides data to construct this variable. Students remaining in their home state are divided by students with residence in the state and studying either in or out of state. Enrollment information is for students taking either bachelor's or higher degrees.

State Per-Capita Income

Personal income for 1963 comes from the U. S. Department of Commerce, Survey of Business Economics as reprinted in [5, 67].

Average Price, Average Student Aid, and Number of Colleges in the State

Student tuition and fees are taken from the 1967 issue of the Digest [6, 89]. Student aid figures can be obtained from p. 95. The per student figure used as a divisor includes students remaining in the state and

APPENDIX TABLE I

STATE PER CAPITA INCOME AND DISTRIBUTION OF PUBLIC AND PRIVATE COLLEGES (1963 DATA)

State	Per Capita Income	Number of Public Colleges	Private Colleges	State	Per Capita Income	Number of Public Colleges	Private Colleges
Alabama	$1656	9	18	Montana	$2239	8	3
Alaska	2819	1	2	Nebraska	2293	10	13
Arizona	2115	5	2	Nevada	3372	1	—
Arkansas	1598	8	11	New Hampshire	2303	5	8
California	2930	88	86	New Jersey	2900	9	29
Colorado	2386	14	8	New Mexico	1887	7	2
Connecticut	3162	8	25	New York	3000	52	135
Delaware	3250	2	2	North Carolina	1813	17	43
D. C.	3398	3	22	North Dakota	2030	11	3
Florida	2111	32	16	Ohio	2483	10	61
Georgia	1865	20	27	Oklahoma	1953	24	11
Hawaii	2476	1	3	Oregon	2515	11	18
Idaho	1934	4	4	Pennsylvania	2444	16	114
Illinois	2945	25	89	Rhode Island	2398	2	10
Indiana	2475	5	36	South Carolina	1584	6	24
Iowa	2274	19	32	South Dakota	1932	7	9
Kansas	2231	21	24	Tennessee	1776	7	40
Kentucky	1789	8	29	Texas	2046	53	45
Louisiana	1768	10	12	Utah	2129	4	4
Maine	2008	7	15	Vermont	2092	5	11
Maryland	2778	20	25	Virginia	2066	11	35
Massachusetts	2850	24	76	Washington	2505	17	12
Michigan	2528	25	42	West Virginia	1872	11	10
Minnesota	2332	16	29	Wisconsin	2380	33	29
Mississippi	1379	25	20	Wyoming	2427	6	—
Missouri	2508	15	49				

Source: U. S. Office of Education, Digest of Educational Statistics, Washington, 1964. Computations described above.

in-migrants [6, 83]. Unfortunately, this variable includes both in-state and out-of-state tuition. A more ideal measure—not available from current data sources—would include only in-state tuition. The number of public institutions comes from [5, 91]. Our model was also formulated and tested using both an additional parameter for the number of private colleges and a single parameter for the combined number of colleges. The presence of the latter hid the significance of public college availability while the parameter of the former was insignificant. The distribution of public and private colleges may be seen in Appendix Table I.

Proportion of Students from a State Attending College outside the State for Whom No Space was Available in Their Home State

Students enrolled in the state (those remaining plus in-migrants) are divided by students with residence in the state and studying either in or out-of-state. If the numerator exceeds the denominator we assume that the state has a larger college capacity than it requires to educate its own students. If the numerator is less than the denominator a state cannot educate its own students. The proportion it cannot educate is subtracted from the proportion out-migrating to get voluntary out-migration.