AN ECONOMIC ANALYSIS OF COLLEGE STUDENT MIGRATION

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TABLE OF CONTENTS

LIST OF TABLES

CHAPTER I

INTRODUCTION

Human migration is an important issue both nationally and internationally, due to its consequences-economically, socially, and politically- for the sending and the receiving areas. Student migration is similar to general human migration in many respects; however, it is different in other respects. Therefore, to understand student migration it is necessary to subdivide migrants into students and non-students (Long,1977,159).

Interstate student migration is an important phenomenon in the United States. It deserves a comprehensive study for three reasons. First, freshmen students who migrate to another state constitute an important portion of the total number of the freshmen students enrolled in U.S. educational institutions; in the Fall of 1984, for example, 13% of all freshmen students crossed state lines to attend college (U.S. Department of Education, 1984, 1). Moreover, some states experienced a much higher percentage of student migration. The District of Columbia (where 47% of freshmen students out-migrate), New Hampshire (39%), New Jersey and Alaska (37% each), are four examples of states in which student out-migration is an important problem due to its

consequences in terms of human capital loss, especially if those students consider their move as a permanent relocation as some studies suggest (Long 1977,162). Would tuition policies or the provision of high quality institutions keep these students in their home state? Second, the receiving states as providers of the educational opportunities for the migrant students will incur a cost to educate them. What policies could those states follow to minimize this cost in the face of constraints on appropriations to higher education institutions? How could receiving states benefit most from their investment in migrant students? Third, investigating interstate student migration will help to understand the motivations of the student migrants rather than drawing potentially misleadindg conclusions from the studies of general human migration. This is essential in the light of the fact that some variables which affect student migration are irrelevant to human migration in general or they work in different directions. By the same token this study should help us find similarities between student migrants and other migrant groups.

The Purpose Of The Study

The purpose of this research is to examine the factors which make students cross state lines to attend college in another state. Is the student more concerned about the distance he has to travel to join the college, or the tuition charges by the school, or the climate of that state?

Would institutional variables be more important than economic conditions in his decision? Answers to these question would be helpful in developing approaches to some of the relevant policy concerns such as tuition policies, the quality of education provided, and state finance of higher education.

Methodology

The method used is a cross sectional analysis of state-level data, as no time series data are available for student migration. The year of 1984 was chosen because it is the latest year for which student migration and other necessary data are available. The student migration data classify the students by state of destination and state of origin for over 3000 institutions. There are 50 states included as well as the District of Columbia; thus, 50 possible destinations are available for the potential migrants. The gross migration rate is preferred to the level of gross migration (Yap ,1977,224); therefore, the gross migration rate is used as the dependent variable in this study. Gross migration rate functions are estimated by using the Ordinary Least Squares (OLS) estimation technique.

Organization Of The Study

This study contains five additional chapters, as follows:

II. Literature Review

III. An Economic Model of College Student Migration

IV. Data Sources and Regression Results

V. Interpetation of the Results

VI. Conclusions and Policy Implications

CHAPTER II

LITERATURE REVIEW

The human migration literature is vast. Therefore, we will be selective by concentrating on the special subjects in human migration related to our topic. The college student migration literature is quite limited, however (McHugh and Morgan,1984,269), and it will be thoroughly reviewed.

General Migration

Migration studies have been based on two types of models; the first uses gross migration as the dependent variable, the second uses net migration. Gross migration is a single flow from the origin, I, to destination, J (GMIJ). Net migration is the difference between two gross flows, from I to J and from J to I (NMIJ). The use of net migration has been criticized by many researchers. For example, Schuessler stated that: "the implicit assumption in net migration studies is that the random or non-economic element in gross migration flows GMIJ and GMJI tend to cancel out, leaving NMIJ as an indicator of the predominant directional flow, reflecting influences of the economic variables" (Schuessler, 1972, 4). The following simple migration model illustrates the point:

$$GMIJ = B_0 + B_1DIJ + B_2XJ$$

$$GMJI = B_0' + B_1'DIJ + B_2'XJ$$

Where GMIJ:Gross migration from area i to area j.

GMIJ:Gross migration from area j to area i.

DIJ :Distance between the two areas.

XJ :A vector of independent variables such as income and employment.

From the above two gross migration equations a net migration equation can be constructed as follows:

$$NMIJ = (B_0-B_0') + (B_1-B_1')\ D_{IJ} + (B_2-B_2')X_J$$

It is inevitable that (B_1-B_1') will drop out, i.e., the distance variable will be canceled. This explains why net migration models contain fewer explanatory variables than gross migration models. Furthermore, Vanderkamp argued that even the remaining variables in the net migration models might be difficult to interpret. For example, if XJ is income, and $(B_2-B_2') > 0$, then we do not know whether $B_2 > 0$ and $B_2'=0$, or $B_2=0$ with $B_2' < 0$ (Vanderkamp,1972, 460-465).

The "Gravity-Law" is the usual starting point for estimates of gross migration. Economists have modified this law to incorporate other variables which influence the migration decision (Greenwood, 1975, 398). Carey (1858) defined the "Gravity-Law" of spatial interaction as follows:"the degree of attraction varies directly with the mass or concentration of population and inversely with distance" (Niedercorn and Bechdolt, 1969, 274).

The utility maximization framework has been used by economists to provide an economic base for the "Gravity-Law". In this framework, it is assumed that the economic agent will move to another destination so as to maximize his utility from spatial interaction, subject to money and time constraints (Niedercorn and Bechdolt, 1969, 275). Empirical studies by economists have generally confirmed Carey's hypothesis about the nature of spatial interaction.

More generally, the migration decision is influenced by both economic and non-economic factors, and migration studies have incorporated many variables in their attempt to explain migration flows. Those independent variables that have been used most frequently will be featured in the following literature review. Generally speaking, people look for higher income, and some of them consider migration to achieve that goal. Thus, income differentials among regions is one cause of migration. However, migrants will choose the destination which gives them the highest expected net returns.

Sjaastad (1962, 83-85) identified the private costs and returns associated with human migration in some detail. According to him private cost could be divided into money cost, such as the cost of transportation, and non-money cost, such as psychic cost, and foregone income. Private returns consist primarily of money returns due to earning differentials between the origin and the destination areas, and non-money returns which result from locational

preferences and the desire to travel.

Does geographic mobility raise the migrants income? Is the migrant better off in terms of income as a result of his migration? Lansing and Morgan (1967, 460) argue that "the annual earnings of those who have been geographicaly mobil on the average are no higher than those of people who have not been geographicaly mobil. However, certain groups of migrants have raised their post-migration income, like those who migrated from rural to urban areas, or who left the deep south".

Other economists have reported that geographic mobility raised the migrants income above what it would have been in the absence of migration (Cox, 1971, 527). Moreover, when the migrants are compared with those who where already at the destination, they are likely to be better off than the non-migrants at least once an intial adjustment period is passed (Master, 1972, 412). However, the magnitude of the increase in the migrants' income might be overstated due to the fact that some migrants change their occupation as well as their location. In Cox's (1971) study, for example, both geographic and industrial mobility raise the migrant's income. As stated earlier, the Gravity Law hypothesises an inverse relationship between migration and distance. Distance serves as a proxy for the time and the money costs of migration and other costs that vary with distance; therefore, it is expected that migration will be detrred by distance (Wadycki, 1974, 111).

Some economists have noticed that transportation cost is not big enough to explain the deterrence effect of distance on migration (Greenwood, 1975, 398). Several explanations have been provided which indicate that distance has "picked up" the effects of significant omitted variables, namely, the availability of information and psychic costs (Schwartz, 1973, 1154). Psychic costs have been discussed by many economists. Sajaastad (1962, 85) argued that psychic cost is a private cost but not a social cost. Therefore, it is similar to consumers' surplus in the sense that it is not a real resource cost. Schwartz (1973, 1160) measured psychic cost by the frequency of visits to the old location. Using this measure he found that psychic cost increases with distance migrated. It is difficult to separate psychic cost from information availability, however. Sajaastad (1962, 84) suggested that one is strongly tempted to appeal to market imperfections, such as the lack of information, to explain the apparently high distance cost of migration. Unfortunately no simple way has been devised for testing the information cost hypothesis. Schwartz (1973, 1154-1167) argued that the weakness of the age effect relative to that of education supports the hypothesis that distance is really an information effect.

An alternative understanding for distance has been suggested, namely that of "psychological distance". Burford (1962, 78) argued that migration of labor from farms in a given county would be expected to depend closely on the

relative distance of farmers in that county from nonfarm economic opportunities. Measuring such distance, however, is not an easy task.

There seems to be fairly general agreement among economists who have investigated population movements in the United States, that the availability of jobs is an important factor in explaining the amount and the direction of interstate migration (Blanco,1963,77). Therefore, areas with high unemployment would experience high out-migration and low in-migration.

Empirical investigations of the unemployment effect on migration have produced contradictory results. Blanco (1963) tested the hypothesis that the change in the relative level of unemployment is the principal determinant of labor movement. This hypothesis was confirmed by his statistical analysis. In states where the number of new industrial jobs added annually was less than the natural addition to the population of working age, unemployment rose, and out-migration increased to other areas where job opportunities matched the labor supply more closely. Scholttman and Herzog (1985,959) reported that unemployment significantly increased the probability of both primary and repeat migration (Scholttman and Herzog,1985,959).

Wadycki (1974,111) argued, in contrast to the above, that "migration is expected to be deterred by high unemployment in the destination, however, his empirical results did not confirm that hypothesis". Lowry (1966,30)

reported that the evidence suggests that the total volume of out-migration from a given place depends on the size of and the structural properties of the resident population rather than on the absolute or the relative level of economic opportunities at that place. Miller (1973,403) argued that the growth rate of employment is the primary economic determinant of out-migration.

Molho (1984,333), working with a dynamic model for internal migration in Great Britian, concluded that in determining the direction of migration flows, unemployment rates substantially affected the short-run dynamics of migration over the estimation period ; however, the most important long-run labor market influence on employment-related migration streams was the growth rate of employment.

Finally, Greenwood (1975, 403) pointed out that, in general, several studies that examined the influence of unemployment rates on migration found unanticipated signs or insignificant coefficients on unemployment rate variables. Lansing and Miller (1967,89-98) explained the poor explanatory power of the unemployment variable as follows: Unemployment tends to be highest among the least mobile groups in the labor force such as persons of blue-collar occupation, or those of low skills and low educational levels.

Personal characteristics appear to be an important variable in the migration decision. Navratil and Doyle (1977,1148-53) analysed the effects of personal

characteristics on the migration decision by constructing two migration models. In the first model, the migration rate is hypothesised as a function of the average socioeconomic characteristics of the individuals in a group, and of the labor market characteristics of the destination area. The second model is a disaggregated version of the first model, where the migration rate is a function of the socioeconomic characteristics of each individual, and the labor market conditions of the destination area.

The empirical results of this study suggest that the process of aggregation seriously distorts the effect of personal characteristics, or at least masks some of the factors important to the individual's decision to migrate. Age is one example. The disaggregated model revealed that age has a negative impact on mobility, and it is highly significant, in conformity with the theoretical expectation. However, the aggregation process seriously distorted the effect of a person's age; i.e., in the aggregate model age is usually a positive and significant determinant of migration rates.

Several personal characteristics can be included as explanatory variables in migration studies; among these are age, race, education, life style, and family circumstances. The availability of micro data has enabled researchers to analyze the influence of personal characteristics such as these on the migration decision.

Suval and Hamilton (1965, 536-39) argued that past

migration studies have shown that there is a relationship between educational achievement and migration. Moreover, they concluded that the apparent correlation between education and migration increases with distance; i.e., as distance of migration increases so does the level of education for migrants of all sex and racial groups. Schwartz (1973, 1165) explained this kind of correlation between education and migration by arguing that the more educated the migrant the larger the market for his skills, thus the higher the possibility of migration.

Age has been discussed in several migration studies. Gallaway (1969, 171) pointed out that it is generally accepted that increasing age acts to discourage people from changing jobs. Moreover, educational selectivity in migration appears to operate most strongly among younger people (Suval and Hamilton, 1965, 546). This result is consistent with the migrant maximizing expected net returns from migration by maximizing the number of years he could work after migration.

Mincer (1978, 771) incorporated family circumstances into his study of the migration decision. He argued that the presence of family ties deters the migration of families or family members. Thus, married persons are less likely to move than singles, and the mobility of separated and divorced parents is by far the highest. However, when families are classified by education of husband they are more likely to move as the educated husbands' contributions

to family income are usually large enough to offest any loses that may occure in terms of wives' income.

Sandell (1977) studied the migration decision of a family with a working woman where a potential reduction in the wife's earnings was involved. He concluded that ceteris paribus, there is less geographic movement among families where both the husband and the wife are working (Sandell, 1977, 407).

In general the importance of personal characteristics is probably best summerized by Navartil and Doyle (1977, 1158) :"the personal characteristics of age, education, previous migration, and employment status prior to migration, all display patterns consistent with economic theory. Moreover, in terms of both significance of the coefficients and the computed elasticities, personal characteristics play a much more important role in the migration decision than do the characteristics of the destination area".

The climate of the origin and the destination states influences the migration decision; generally, moderate weather is preferred to extreme weather. Different specifications of temperature have been used in the migration literature as proxies for the climate, including the average annual temperature, and the average temperature in July and January (Cushing, 1987, 641).

College Student Migration

College student migration is different enough from human migration in general to warrant special treatment. The literature on college student migration is quite limited, however.

Tuckman (1970) developed an economic model to explain college student migration. Using a cost-benefit framework, he argued that the student will migrate from one state to another if his expected return from migration exceeds his cost (Tuckman, 1970, 184). He conceptualized gross migration as a function of family income, the average price charged by colleges within each state, the number of public colleges in each state, and the average amount of student aid reported within state colleges. Tuckman (1970,184) argued that: 1- states with lower-priced colleges should experience less out-migration than states with higher-priced colleges ; 2- a rise in family income should increase out-migration, and 3- the availability of a diversified set of college opportunities within a state should reduce the incentive to migrate. Tuckman (1970,185) proxied family income by state mean per capita income. The number of the public colleges within states was used as a proxy for travel cost. Tuckman reported the following results: as expected, a rise in income increases out-migration, an increase in the number of within-state public colleges reduces out-migration, and the average price of a state's college

education is positively correlated with out-migration. Student aid appears to be unimportant in determining out-migration. Tuckman's model of college student migration suffers some shortcomings: (1) he used the number of student migrants to public institutions only, failing to account for the substantial student migration to private institutions, (2) he ignored the economic conditions in the destination states - an important factor in general human migration studies- and (3) he did not consider institutional quality as a factor which could influence the student migration decision.

Long (1977, 160) hypothesized that student migration is a function of distance and of economic conditions in the sending and the receiving states, measured by unemployment and per capita income. He reported that this "model explained fully 74% of college student migration. This is even higher than the percentage of variance in the civilian non-college migration explained by the model" (Long, 1977, 162). A serious shortcoming of Long's model for college student migration is that it omits the educational considerations that the student makes before moving to another state, such as tuition and quality of the schools. Moreover, he did not consider the enviromental variables which may affect migration behavior; in other words, out-migration in his model is a function of economic variables only. More accurate specification of the college student migration decision seems necessary.

McHugh and Morgan (1984) viewed student migration as an investment decision; therefore, the student will migrate to another state to attend college if the discounted stream of benefits from attending that institution and moving to that location exceeds the cost (McHugh and Morgan, 1984, 271). Economic, environmental, and institutional variables were included in their model.

The per capita income and the growth rate of employment in both the origin and the destination states were the economic variables. McHugh and Morgan hypothesised that the level of per capita income in the origin state positively influences out-migration, and that the level of per capita income and the growth rate of employment in the destination state positively affect in-migration to that state. Moreover, students are most likely migrate from states with low growth rates of employment.

For the enviromental vriables, McHguh and Morgan argued that migrants, both students and non-students, make similar considerations; therefore, student migration is positively correlated to the net migration ratio of non-students to the destination state (McHugh and Morgan, 1984,271).

McHugh and Morgan also incorporated institutional variables in their analysis. The quality of the institution may be an important variable in the student migration decision through its effect on expected earnings after grduation. They argued that if schools are not available in the state, there is a higher possiblity that students will

migrate. Average non-resident tuition and fee levels in the destination state are hypothesised to be negatively related to migration. The resident tuition and the tuition charged by private schools in the origin states are positively related to out-migration.

As in all migration models, distance was included as an independent variable with the expectation that it would negatively affect out-migration. Another distance-related variable is the intervening opprtunities, measured by McHugh and Morgan as the mean distance between the origin state and all other states in the U.S.A. The coefficient of this variable was expected to be positive.

Finally, they included the number of freshmen students in the origin state as a proxy for the population of potential migrants. This variable is expected to positively affect out-migration (McHugh and Morgan,1984,272).

McHugh and Morgan's empirical results revealed that the economic variables in the destination state appear to be important determinants of student migration;however, the economic variables in the origin state did not perform as well as the economic variables in the receiving states. Per capita income in origin states appears to be more important than the growth rate of employment. This implies that it is the economic capacity to migrate, rather than the probability of employment in the origin state, that is important.

Non-student migration to the destination state has a

significant positive influence on student migration. This supports the hypothesis that students are attracted for economic and non-economic reasons to the same types of areas which attract other migrants.

Distance, as expected, has a deterrent effect on out-migration. The results with respect to the tuition variables do not in general attribute much importance to tuition and fees in the migration decision (McHugh and Morgan, 1984,274).

The McHugh and Morgan study has several limitations. First, the authors used the number of freshmen non-resident students at public four-year colleges and universities only in 1974. Thus, they failed to account for the influence that migration to private schools has on overall student migration. The present study will account for both populations. Second, McHugh and Morgan used the net migration rate of non-students to the destination state as a proxy for the influence of enviromental factors. There is a high correlation between this ratio and income and employment, however. Therefore, a better measure for the environmental variable is appropriate to avoid possible multicolinearity.

Third, McHugh and Morgan model did not include a cost of living variable. The principal indicator of this cost for students, namely, room and board charges by educational institutions, varies considerably from state to state, however.

Fourth, McHugh and Morgan included the number of college freshmen from the origin state as a measure of the potential pool of student migrants. A model of college student migration should account, however, for the supply side of the educational market as well as the demand side. Therefore, a more accurate measure of educational opportunities should be incorporated, such as the ratio of high school graduates to the number of admissions available in the universities in each state.

Fifth, financial aid cosiderations were not incorporated in the McHugh-Morgan study. This factor should be accounted for in models of college student migration, as the availability of such aid may affect a student's educational cost.

Sixth, the unemployment rate was not included in the McHugh-Morgan model. Human migration studies usually include this variable, however.

Seventh, the data used by McHugh and Morgan are quite old (1974). Data on interstate college student migration is now available for more recent years. Analysis of these data may reveal significant differences between the 1970s and 1980s. The present study is based on a model which is more complete in the sense that it includes several varaibles omitted by previous researchers. It also incorporate better proxies for some of the varaibles included in previous studies, and it uses more recent data. These features of the model are discussed in detail in the next two chapters.

CHAPTER III

COLLEGE STUDENT MIGRATION : A THEORETICAL FRAMEWORK

Interstate migration of college attendees may be viewed as either an investment or a consumption decision. The student in the latter case attends college to obtain current consumption benefits. Climate, college environment, or location may yield positive satisfactions outweighing travel and housing costs (Tuckman, 1970, 184). However, the consumption approach raises the problem of valuing benefits at different points in time (Tuckman ,1970 ,184).

Migration has been traditionally viewed as an investment decision. Schultz argued that "much of what we call consumption is really an investment in human capital. Direct expenditures on education, health and internal migration to take advantage of better job opportunities are clear examples" (Schultz,1961,1). Following the contention of Schultz, Sjaastad suggested that" we treat migration as an investment that increases the productivity of human resources, an investment which has costs and which also renders returns"(Sjaastad,1962,83). Bowles studied migration as an investment decision where the migrants try to maximize the net returns from migration (Bowles,1970,356).

How can we estimate the magnitude of human investment? Generally we could use the practice followed in estimating the value of nonhuman capital,i.e., by expenditures made to produce the capital goods. In the case of human capital, however, it is difficult to make such an estimation because of the difficulty of distinguishing between expenditures for consumption and for investment. Three classes of expenditures could be recognised in this respect: the first one is pure consumption expenditures, the second is pure investment, and the third has both consumption and investment effects. Most relevant activities are in the third class. This is why the measurement of capital formation by expenditures is less useful for human investment than for investment in nonhuman capital. Therefore, an alternative way of estimating human investment, namely by its yield rather than by its cost, would be more appropriate (Schultz,1961,9).

The decision-making unit in the migration model requires some discussion; is it an individual or a family decision? Mincer argued that past economic studies of migration did not distinguish between personal and family decisions (Mincer, 1978, 749). Mincer studied migration as a family decision where he argued that net family gain rather than net personal gain (of the"head") motivates migration of the household (Mincer, 1978, 750).

What is the appropriate decision making unit in the present study ? Since only one member of the family is

moving, the family framework is not appropriate. However, since it is most likely that the freshman student shares with his family his decision as to where to migrate and which school to choose, it is appropriate to look at the migration decision as a joint one, i.e., both the student and the family make the decision jointly. What are the practical implications of this decision framework? The migration decision would affect family income because the typical family makes some financial contribution toward its son's or daughter's education. This relationship requires the use of some measure of family income as an independent variable.

Given the family's financial commitment, it will be concerned about the quality of the schools its children are going to attend. This concern is captured, for both the family and the student, in the quality variables used in the present research.

The family members will experience psychic costs, as well as financial costs, in direct relation to the distance its members migrate. Both the student and other family members will opt for a closer location, ceteris paribus, to lessen these costs. The distance variable used in this study is a proxy for these costs.

In summary, the more important relevant variables that might affect family well being due to the migration of a child to attend school in another state are captured by variables included in the present study.

College student migration could be influenced by monetary as well as non-monetary factors. Therefore, in modeling the migration decision, all costs and returns which result from migration should be accounted for. Since the student and his family are assumed to be rational economic agents who make decisions in a cost-benefit framework, it is expected that the location that is choosen will maximize the present value of the the expected net return from migration.

Costs of and returns from college student migration can be introduced as follows. Let J be a student living in Oklahoma who has a chance to move to another state, say California. What factors might make him and his family choose California above all other states in the U.S? Student migration is similar to general human migration in many respects; however, it is different in other respects. Therefore, those differences and similarities should be accounted for while modeling the costs and returns from the migration decsion.

The student and his family will look at the quality differentials between the schools in California and elsewhere, because the higher the quality of the schools the higher the quality of the degree, hence the higher the expected earnings (McHugh and Morgan, 1984, 271). The student and his family will also consider the tuition differentials among states, favoring the state which charges less tuition and fees, adjusted for differences in the financial aid available.

There are differences among states in the cost of living and the student will want to, and be urged to go to, the least expensive area. If this student is a freshman, he most likely will live on the campus, especially at the beginning. Thus, room and board charges by the college will be the most relevant cost of living variable. Therefore, other things equal, the student will migrate to the state with lowest room and board charges.

As do other migrants, the student and his family will look at economic variables like income and employment opportunities. While at school he might consider a part-time job. Therefore, he will move to the state which enables him to make the highest net part-time earnings.

The student and his family also will consider employment prospects, and he will move to the state which has the highest growth rate of employment (Miller, 1972, 403), and /or the lowest rate of unemployment.

The environmental qualities of the state will affect the student's choice of location, and he will choose the state which has the best enviromental qualities, including temperature, snowfall, crime rates, etc. (Cebula and Vedder, 1973, 205).

Finally, distance is another factor which influences the location choice of the student and his family, and he will choose the state which makes moving expenses, as well as the cost of visiting family during breaks, the least (Wadycki, 1974, 111).

More formally, the student and his family are expected to choose the state which maximizes the present value of the expected net return (R) from college education.

Assuming that only returns captured by the student count, that the typical freshman enters college at age 18, and retires at age 65, the goal is to maximize:

$$RJ^{DO} = \sum_{t=1}^{4} \frac{I_{Jt} + F_{Jt} + EVV_{Jt} - T_{Jt} - RB_{Jt} - TVC_{J}}{(1 + r)^t}$$

$$+ \sum_{t=5}^{47} \frac{Y_{Jt} + ENV_{Jt}}{(1 + r)^t}$$

Where:

$RJ^{DO} = R^{D}_{Jt} - R^{O}_{Jt}$ = Net expected return (monetary + non monetary) to student J from migration from origin to destination.

$I_{Jt} = I^{D}_{Jt} - I^{O}_{Jt}$ = Part time earnings in the destination and the origin states, respectively.

$F_{Jt} = F^{D}_{Jt} - F^{O}_{Jt}$ = Financial aid available in the destination and the origin states, respectively.

$T_{Jt} = T^{D}_{Jt} - T^{O}_{Jt}$ = Tuition and fee charged by institutions in the destination and the origin states,

respectively.

$RB_{Jt} = RB^{D}J_{t} - RB^{O}_{Jt}$ = Room and board charged by institutions in the destination and the origin states, respectively.

TVC_{Jt} = Travel cost between the destination and the origin states.

$ENV_{Jt} = ENV^{D}_{Jt} - ENV^{O}_{Jt}$ = The environmental qualities of the destination and the origin states, respectively (proxy for non monetary rewards).

$Y_{Jt} = Y^{D}_{Jt} - Y^{O}_{Jt}$ = Percapita income in the destination and the origin states, respectively.

r = Discount rate.

t = Year.

CHAPTER IV

EMPIRICAL ANALYSIS OF THE MODEL

The purpose of this chapter is to present the empirical analysis of the model developed in chapter III. The model presented in chapter III contains the main factors that are expected to explain the college student migration decision. In this chapter a linear version of this model is developed, the independent variables of this model are explained, the signs of the coeffecients of these variables are specified, the data sources are described, and the results of the Ordinary Least Squares (OLS) estimates are presented.

Three versions of this model were developed and estimated to explain the migration of new college freshmen. The first focuses on all freshmen in both public and private colleges and universities, the second focuses on those attending public institutions only, and the third focuses on those attending private institutions only.

The Empirical Model

The following discussion focuses upon all freshmen college migrants as the population of the analysis. Later on migration to public and private institutions will be considered seperately.

The following equation will be used to examine the behavior of college student migrants:

$$
\begin{aligned}
(4.1)\quad Y_1 = {} & a_0 + a_1 IW^D + a_2 IW^O + a_3 PT^D + a_4 PT^O + a_5 PVT^D \\
& + a_6 PVT^O + a_7 F^D + a_8 F^O + a_9 RB^D + a_{10} RB^O \\
& + a_{11} HDO + a_{12} Y^D + a_{13} Y^O + a_{14} EMP^D \\
& + a_{15} EMP^O + a_{16} U^D + a_{17} U^O + a_{18} DEN^D \\
& + a_{19} DEN^O + a_{20} TEMPJA^D + a_{21} TEMPJA^O \\
& + a_{22} TEMPJU^D + a_{23} TEMPJU^O + a_{24} RANK^D \\
& + a_{25} RANK^O + a_{26} EXP^D + a_{27} EXP^O + a_{28} MIG81 \\
& + a_{29} Adj + a_{30} POP^O + a_{31} POP^D + U
\end{aligned}
$$

Where:

Y_1 = The percentage of the freshmen student residents of the origin state who migrated to the destination state to attend college in 1984.

IW^D, IW^O = Average earnings of low-skilled workers in the destination and the origin state respectively (proxy for the opportunity to earn part-time income).

PT^D, PT^O = Tuition and fee charges by public institutions in the destination and the origin states, respectively.

PVT^D, PVT^O = Tuition and fees by private institutions in the destination and the origin states, respectively.

F^D, F^O = Financial aid available from educational intitutions in the destination and the origin states

RB^D, RB^O = Room and Board charges in the destination and the origin states, respectively.

HDO = Distance between the principal city of the origin state and that of the destination state (proxy for travel, psychic, and information costs).

Y^D, Y^O = Per capita income (proxy for family income) in the destination and the origin states, respectively.

EMP^D, EMP^O = Growth rate of employment in the destination and the origin states, respectively (proxy for post-graduate employment opportunities).

U^D, U^O = Unemployment rate in the destination and the origin states, respectively.

DEN^D, DEN^O = Density or pressure index, measured by the ratio of the number of full-time equivalent (FTE) of college students to the number of high school gradutes in the destination and the origin states, respectively.

$TEMPJA^D$, $TEMPJA^O$ = Average January temperature in the destination and the origin states, respectively (proxy for the environmental variable).

$TEMPJU^D$, $TEMPJU^O$ = Average July temperature in the destination and the origin states, respectively (proxy for the environmental variable)

$RANK^D$, $RANK^O$ = Ranking of the higher education institutions in the destination and the origin states, respectively (proxy for the quality of the institutions).

EXP^D, EXP^O = Operational expenditures per FTE by the higher education

institutions in the destination and the origin states, respectively (proxy for the quality of the institutions).

MIG81 = past migration of friends and relatives.

Adj = A dummy variable, with one for a neighboring state and zero otherwise.

POP^D, POP^O = The high school graduates of the destination and the origin states, respectively.

U = The error term.

a_0 is the constant term. $a_1....a_{28}$ are the coefficients of the independent variables.

Given that this is a from-to analysis, the following are the expected signs of the coefficients.

1. Part-time income in the destination state is expected to positively influence the gross migration rate from the origin to the destination, thus, $a_1 > 0$. The higher the part-time income in the origin state, ceteris paribus, the lower the out-migration rate, or $a_2 < 0$.

2. Higher public tuition charges by institutions in the destination state are expected to reduce in-migration,

therefore, $a_3 < 0$. Higher public tuition charges in the origin state are expected to encourage out-migration, thus, $a_4 > 0$.

3. Private tuition charges would have the same effects as public tuition charges, therefore, $a_5 < 0$ and $a_6 > 0$.

4. Financial aid availability at institutions in the destination state is expected to increase in-migration,thus, $a_7 > 0$. In contrast, the availability of financial aid at institutions in the origin state discourages out-migration, or $a_8 < 0$.

5. Higher room and board charges at institutions in the destination state are expected to negatively influence the in-migration rate, thus, $a_9 < 0$. Conversely, higher room and board charges at institutions in the origin state increase out-migration, so, $a_{10} > 0$.

6. Distance is an impediment to out-migration , so $a_{12} > 0$.

7. Higher per capita income in the destination state is expected to positively influence in-migration, thus, $a_{12} > 0$. Out-migration from the origin state is also positively related to per capita income in that state, or $a_{13} > 0$.

8. A higher growth rate of employment in the destination state increases in-migration, thus, $a_{14} > 0$. A higher growth rate of employment in the origin state decreases out-migration, thus, $a_{15} < 0$.

9. A higher unemployment rate in the destination state is expected to reduce in-migration, so $a_{16} < 0$. A higher

unemployment rate in the origin state is expected to encourage out-migration, thus, $a_{17} > 0$.

10. The density of the student population in the destination state is expected to negatively influence in-migration, or $a_{18} < 0$. Out-migration is positively related to the density of the student population on the origin state, thus, $a_{19} > 0$.

11. Temperature affects the in-migration rate as follows: since people do not like either very hot or very cold weather it is expected that: $a_{20} < 0$, $a_{22} < 0$, $a_{21} > 0$, $a_{23} > 0$.

12. Higher quality institutions in the destination states are expected to attract migrants to these states, thus, $a_{24} > 0$, $a_{26} > 0$; higher quality institutions in the origin states would reduce the out-migration rate, so $a_{25} < 0$, $a_{27} < 0$.

13. Previous migration of friends and relatives is expected to encourage out-migration of others at a later date, thus, $a_{28} > 0$.

14. Students are tempted to migrate to neighboring states, as a mean of minimizing the psychic cost and the cost of visiting their families, thus $a_{29} > 0$.

15. The larger the number of the high school graduates in the destination state the less the cabability of the colleges in the destination state to admit students, thus $a_{30} < 0$. The larger the number of high school graduates in the origin state the greater the out migrantion to other

states, $a_{31} > 0$.

Data Sources And Measures Of Variables

Data available are state totals and averages, so the analysis by necessity must be cross-sectional across states. The year 1984 was chosen because it is the most recent year for which data about college student migration and the other necessary variables were available at the time the analysis was done.

The basic student migration data used in the present study are obtained from a U.S. Department of Education data tape titled Residence and Migration of College Students-Fall 1984. Migrants are classified by state of origin and state of destination. All fifty states as well as the District of Columbia are included. This sample yields 2550 observations of the dependent variable.

The variation to be explained is that which occurs in the gross out-migration rate of first-time freshmen from each origin state to all possible destination states. The gross out-migration rate is found by dividing the gross migration level by the number of high school graduates in the state of origin. The gross migration rate is preferable to the gross migration flow because it can be interpreted as a migration probability and its use reduces the likelihood of heteroscedasticity (Yap , 1977, 224).

The part-time income figures are calculated by using

earnings of low-skilled workers, based on the assumption that freshmen students will most likely hold such jobs. The most recent data for the earnings of low-skilled workers was obtained from Census of Service Industries, 1982, Bureau of the Census, U.S. Department of Commerce. Average earnings by state were found by dividing the total wage and salary payments of all establishments by the number of employees. The resulting figures were divided by two to reflect the fact that students usually work only part-time.

Tuition and fee charges for both public and private institutions are published in the Digest of Education Statistics (U.S Department of Education, 1984). State averages are weighted averages, where the weights are FTE enrollment by institution. FTE enrollment in the states higher education institutions were also obtained from The Digest Of Education Statistics.

Financial assistance to college students is available from both public and private sources. Some financial aid programs are available to all needy students, such as College Work Study and Guaranteed Student Loans; however, some programs are only available to the residents of the state, as in Oklahoma's Tuition Aid Grant Program. Average financial aid figures were found by weighting the total financial aid payments by FTE enrollment. Data for College Work Study, Supplemental Educational Opportunity Grant Program, and National Direct Student Loan Program were obtained from the U.S Department of Education (Office of

Financial Assistance, 1984). Data for Scholarships and Fellowships were obtained from the U.S Department of Education (Office of Educational Research and Improvement, 1986).

Data for the total grant aid awarded by state programs were obtained from the 16th Annual Report, Academic Year 1984-1985 (National Association of State Scholarship and Grant Programs, 1986). Data for Guaranteed Student Loans were obtained from the Federal Student Financial Assistance and Categorical Programs, National Center for Education Statistics, U. S Department of Education, 1980).

Total room and board charges were weighted by FTE to obtain average room and board charges. Data for room and board charges are available from the Digest of Education Statistics (U.S Department of Education, 1984).

Distance is measured by the highway mileage between the principal cities-the most populated ones- of the origin and the destination states. Mileages are based upon the routes usually followed by motorists using highway systems. Distance data were obtained from the Road Atlas and Vacation Guide: U. S./Canada/Mexico (Rand McNally, 1973). The air mileages for both Alaska and Hawaii have been used instead of highway mileages.

The per capita income figures are published in the Statistical Abstract of The United States (U.S Department of Commerce, 1984). Per capita income is used in this study as a proxy for average family income. This proxy may partially

corrects for the unequal distribution of income across states, and for variation in family size. However, per capita income is believed to be the best indicator of how much income is available to the average student with which to pay for a college education.

Density or the pressure index on the colleges and universities was calculated by dividing FTE enrollment into the number of high school graduates in the state. Data for this variable are available in the Digest of Education Statistics (U.S Department of Education, 1984).

Average temperature for both January and July normally reflect the average temperature during the coldest and the hottest months of the year in most locations in the United State. These temperatures are used because people like neither hot nor cold weather and they are attracted by moderate weather (Brian,1987,647). Temperature data were obtained from the County and City Data Book (U.S Department of Commerce, Bureau of the Census, 1983).

The quality of the institutions has been measured by two variables:

1. Widely -cited ratings of the institutions, where colleges have been rated on a scale from 1 to 8 , 1 being unranked and 8 the highest ranked (see apendix II). In computing the state average ranking, the ranking of each institution has been weighted by the number of full time students in each institution. The rating and the full-time enrollments in the institutions were obtained from

Comparative Guide to American Colleges (Cass and Birnbaum, 1985).

2. Expenditures by each institution on teaching and research activities per full-time student, which is often considered to be a reflection of the quality of the educational inputs which are the most relevant to the teaching quality provided by the institution. Data for these expenditures were obtained from State Higher Education Profiles (Office of Educational Research and Improvement, U.S Department of Education, 1985).

The influence of past migration is captured by the college student migration which occured in 1981 (the closest year to 1984) for which the migration data were available). It is assumed that returning or visiting friends and relatives of 1984 migrants from the home state provide information about the schools and the environment in the destination states which might encourage more migration. Data for 1981 migration were obtained from the data tape, Residence and Migration of College Students, Fall-1981 (U.S Department of Education, 1982).

Data for both the unemployment rate and the growth rate of employment were obtained from the Statistical Abstract of U.S (U.S Department of Commerce, Bureau of the Census, 1984).

Data for the number of high school graduates were obtained from the Digest of Education Statistics (U. S Department of Education, 1984).

Data for the dummy variable representing the adjacent states were costructed as follows: 1 for the neighboring states, and zero otherwise.

The Empirical Results

Based upon the development in the preceeding chapters three estimates of the gross out-migration rate equation were made. The first one involves the gross out-migration rate to all-four year colleges and universities, Y1, as the dependendt variable, the second estimate uses the gross out-migration rate to all four-year public colleges and universities, Y2, and the third estimate uses the gross out-migration rate to all four-year private colleges and universities, Y3. Y1 was regressed on all the explanatory variables in equation 4.1. Y2 was regressed on all relevant explanatory varaibles in equation 4.1, i.e., all institutional related variables for public institutions (tuition, room and board, expenditures, ranking) as well as all other economic and environmental variables. Y3 was regressed on all relevant explanatory variables in equation 4.1, i.e., all institutional variables for private institutions (tuition, room and board, expenditures, ranking) as well as all other economic and environmental varaibles.

The results of the ordinary least squares (OLS) estimations of the relationships between Y1, Y2, and Y3 and the relevant sets of explanatory variables are reported in

Tables I, II, and III. The regression coefficients are presented along with t-statistics, the value of which determines whether the coefficient is significantly different-at .95 or better- from zero or not. The coefficient of correlation (R^2) is also presnted for each procedure to test the goodness of fit.

Part-time income(IW) in the destination state was hypothesized to positively influence the migration rate. For all students (Table I) the part-time income coefficient is positive, which is expected, and insignificant. The part-time income coefficient in the origin state carries a negative sign, as predicted; however, it is insignificant.

For students attending public institutions only (Table II), the coefficient on part-time income in the destination and the origin states have the expected signs, however, the coefficient is significant for the destination states and insignificant for the origin states.

For students attending private institutions only (Table III), the coefficient of the part-time income in the destination states has a positive sign as expected and it is significant; it is positive for the origin states, which was not predicted, but insignificant.

Nonresident tuition charges in the destination state were expected to negatively affect the migration rate. Results reported in tables I, II,and III show that the coefficient on tuition charges is negative as expected for Y1, Y2, and Y3, it is significant for Y1 and Y2, but

TABLE I

ORDINARY LEAST SQUARE (OLS) ESTIMATE OF THE GROSS OUT MIGRATION RATE TO ALL INSTITUTIONS AND THE SET OF ALL INDEPENDENT VARIABLES

DEPENDENT VARIABLE Y_1	EXPECTED SIGN	COEFFICIENT	T VALUES	
Constant	NA	0.01275	2.965	
IW^D	+	1.75835	0.880	Insignificant
IW^O	-	-3.05170	-1.417	"
PT^D	-	-4.88197	-2.257	
PT^O	+	0.00001	4.236	
PVT^D	-	-3.28274	-2.304	
PVT^O	+	-2.30628	-1.276	
F^D	+	-2.01548	-0.362	
F^O	-	0.00001	1.555	
RB^D	-	0.00001	1.932	
RB^O	+	4.86552	0.957	
HDO	-	-9.21706	-6.973	
Y^D	+	5.98689	0.131	
Y^O	+	7.25338	0.513	
EMP^D	+	0.00002	1.109	
EMP^O	-	0.00001	0.789	

TABLE I (CONTINUED)

DEPENDENT VARIABLE Y_1	EXPECTED SIGN	COEEFI-CIENT	T VALUES
UD	-	-0.00094	-1.485
U^0	+	-0.00023	-3.634
DEN^D	-	0.00012	1.084
DEN^0	+	0.00010	0.845
$TEMPJA^D$	-	0.00002	2.134
$TEMPJA^0$	+	0.00006	4.710
$TEMPJU^D$	-	-0.00008	-2.534
$TEMPJU^0$	+	-0.00014	-4.655
$RANK^D$	+	0.00026	1.432
$RANK^0$	-	0.00006	0.383
EXP^D	+	3.58969	3.974
EXP^0	-	2.01112	0.186
MIG81	+	0.00001	29.519
Adj	+	0.00502	12.201
POP^D	-	-3.00872	-11.524
POP^0	+	6.46242	2.257
R^2		0.50	
DW		1.82	

TABLE II

ORDINARY LEAST SQUARE (OLS) ESTIMATE OF THE GROSS OUT MIGRATION RATE TO PUBLIC INSTITUTIONS AND THE SET OF ALL INDEPENDENT VARIABLES

DEPENDENT VARIABLE Y_2	EXPECTED SIGN	COEFFI-CIENT	T VALUES
Constant	NA	0.00594	2.033
IW^D	+	2.86886	2.228
IW^O	-	-2.32746	-1.902
PT^D	-	-4.26625	-2.959
PT^O	+	7.20802	3.242
T^D	-	--	--
PVT^O	+	--	--
F^D	+	-7.53546	-1.931
F^O	-	-3.08711	-0.711
RB^D	-	1.26713	0.375
RB^O	+	2.88858	0.937
HDO	-	-4.73805	-5.381
Y^D	+	-8.68814	-1.152
Y^O	+	2.55687	0.313
EMP^D	+	0.00001	1.191
EMP^O	-	0.00001	1.163

TABLE II (CONTINUED)

DEPENDENT VARIABLE Y_2	EXPECTED SIGN	COEEFICIENT	T VALUES
UD	-	-0.00001	-0.272
U^0	+	-0.00001	-2.858
DEN^D	-	0.00022	3.091
DEN^0	+	-0.00003	-0.423
$TEMPJA^D$	-	-0.00001	0.195
$TEMPJA^0$	+	0.00002	2.758
$TEMPJU^D$	-	-0.00003	-1.526
$TEMPJU^0$	+	-0.00005	-2.678
$RANK^D$	+	0.00008	0.714
$RANK^0$	-	-0.00003	0.286
EXP^D	+	3.00738	4.400
EXP^0	-	5.21522	0.759
MIG81	+	0.00001	21.923
Adj	+	0.00245	9.127
POP^D	-	-1.52023	-8.286
POP^0	+	6.84006	0.375
R^2		0.37	
DW		1.74	

TABLE III

ORDINARY LEAST SQUARE (OLS) ESTIMATE OF THE GROSS OUT MIGRATION RATE TO PRIVATE INSTITUTIONS AND THE SET OF ALL INDEPENDENT VARIABLES

DEPENDENT VARIABLE Y_3	EXPECTED SIGN	COEFFI-CIENT	T VALUES
Constant	NA	0.23715	2.735
IW^D	+	0.00003	8.050
IW^O	-	7.35694	0.017
PT^D	-	- -	- -
PT^O	+	- -	- -
PVT^D	-	-2.44198	-0.086
PVT^O	+	-0.00000	-2.033
F^D	+	-0.00001	-1.704
F^O	-	0.00002	0.151
RB^D	-	-0.00003	-3.710
RB^O	+	0.00000	0.819
HDO	-	0.00000	-1.812
Y^D	+	-9.77537	-0.112
Y^O	+	-1.43931	-0.051
EMP^D	+	0.00117	3.059
EMP^O	-	-0.00000	-0.010

TABLE III (CONTINUED)

DEPENDENT VARIABLE Y_3	EXPECTED SIGN	COEEFICIENT	T VALUES
UD	-	-0.00164	1.268
U^0	+	-0.00098	-0.669
DEN^D	-	0.00318	1.425
DEN^0	+	0.00145	0.562
$TEMPJA^D$	-	-0.00081	-3.073
$TEMPJA^0$	+	0.00028	0.980
$TEMPJU^D$	-	-0.00041	-0.647
$TEMPJU^0$	+	-0.00154	-2.336
$RANK^D$	+	-0.00180	-0.497
$RANK^0$	-	-0.00168	-0.456
EXP^D	+	-0.00000	-3.257
EXP^0	-	-0.00000	-0.816
MIG81	+	0.00036	40.98
Adj	+	-0.01835	-2.355
POP^D	-	-5.33715	-10.32
POP^0	+	-6.95044	-1.219
R^2		0.52	
DW		2.00	

insignificant for Y3.

Resident tuition charges in the origin state were hypothesized to encourage out migration. Results for Y1 and Y2 show a coefficient with positive signs as expected, and both are significant. The coefficient for PVTO (Table III)is negative and is insignificant, however.

The financial aid available at the destination state, FD, was expected to positively influence the migration rate. Results from all three estimates reveal an unexpected negative sign for the financial aid coefficient. This coeffecient is insignificant for Y1 ,Y2 and Y3. The out-migration rate was expected to be positively related to financial aid availability in the origin state. Results from estimates for Y1 and Y3 show a positive sign for the coefficient of FD, which is not predicted, and statistical insignificance for Y1 and Y3. The coefficient of FO is as expected for Y2, but statistically insignificant.

Room and Board charges by institutions in the destination state, RBD, were hypothesized to decrease the migration rate. Results reported in tables I and II show a positive sign for this coefficient, contrary to expectations. In both cases the coefficient is insignificant. However, the estimation for Y3 yields the expected sign for RBD and a statistically significant coefficient. Room and Board charges by institutions in the origin state were expected to increase out migration. Results from all three estimates confirm this expectation

with respect to sign of the coefficient; however, the coefficients are all insignificant.

Distance, HD, was expected to decrease out migration. Results from all estimates show that the distance coefficient has a negative sign as predicted. It is highly significant for the first two estimates but insignificant for the third one.

Per capita income in the destination state, YD, was expected to increase the migration rate. Results reported in table I show a positive sign for Y^0. Results reported in tables II, and III show that the coefficient of YD carries a negative sign. The value of this coefficient is statistically insignificant for Y1, Y2, and Y3. Results for per capita income in the origin state seem to be in conformity with expectations, as the coefficient has a positive sign for Y1 and Y2, although it is insignificant. However, it has a negative sign for Y3, contrary to expectation, and it is statistically insignificant.

Good employment opportunities in the destination state were hypothesized to encourage in migration. Results from all procedures reveal that the coefficient of EMPD carries a positive sign, as expected. Its value is insignificant for Y1 and Y2 but highly significant for Y3. A higher growth rate of employment in the origin state, EPMO, was expected to discourage out migration. Results reported in Tables I , II and III show that the coefficient of EMPO has a positive sign for Y1 and Y2, contrary to expectations; however, there

is a negative sign in the case of Y3. In all cases, the value of the coefficient is not statistically different from zero. The unemployment rate, UD, was expected to reduce the migration rate to the destination states. Results from tables I and II show that the coefficient of UO has a negative sign, as expected for Y1 and Y2, but a positive sign for Y3. However, it is insignificant for all three estimates. Unemployment in the origin state, UO, was hypothesized to encourage out-migration. However, results in Tables I , II and III do not support this contention as the coefficient carries a negative sign in all three cases, and the estimated values of the coefficient are statistically different from zero for Y1 and Y2, but not for Y3.

The density of the college freshmen population in the destination state, DEND, was hypothesized to discourage migration. Results from all three estimates show that the coefficient has a negative sign, contrary to expectations and it is statistically significant for Y1 and Y2, but insignificant for Y3. Density of the college population in the origin state, DENO, was expected to increase out migration. Results reported in tables I and III reveal that the coefficient has a positive sign, as expected, but that its value is insignificant. However, Table II indicates that the coefficient has a negative sign in the estimate of Y3, contrary to expectations. Its value is also insignificant in this case.

January temperature in the destination state was expected to reduce the migration rate. Results in table I show that the coefficient has a positive sign for all freshmen. This is not as expected, and the size of the coefficient is significant. Results in Tables II also carries the wrong sign but results in table III confirm the expectation regarding the sign. The value of the coefficient of $TEMPJA^{D}$ is insignificant for Y2 and significant for Y3. The January temperature in the origin state was expected to increase out-migration. Results from all estimates show the coefficient has a negative sign, as predicted. Its value is significant for Y1 and Y2 but insignificant for Y3. July temperature in the destination state was hypothesized to discourage in migration. Results reported in Table I show the coefficient with a positive sign, which was not expected, and significant value. Results for Y2 and Y3 reveal a negative sign, as expected, and the coefficient is insignificant for both cases. July temperature in the origin state was hypothesized to positively influence the out migration rate. Results from all procedures indicate a negative sign for the coefficient, contrary to expectations, and the size of the coeffecient is significant for all estimates.

The rank of institutions in the destination state, RANKD, was expected to increase the migration rate. Results from the first two estimates (Tables I and II) indicate that the coefficient is positive, but statistically

insignificant. Results reported in table III show a coeffecient for RANKD with negative sign, and insignificant value. Higher rankings of institutions in the origin state were hypothesized to reduce out migration. Results in tables I and II show a coefficient on RANKO which is positive, but statistically insignificant. Results from the third estimate reveal the expected negative sign, but a statistically insignificant coefficient, as well.

Operational expenditures by institutions in the destination state, EXPD, were hypothesized to increase the migration rate. Results in Tables I and II appear to confirm this expectation as the sign of the coefficient is positive and its size is highly significant. However, the third estimate shows a significant coefficient with a negative sign.

Operational expenditures in the origin state, EXPO, were expected to negatively affect out migration. Results from the first and the third estimates show the coefficient with a negative sign as expected but it is statistically insignificant in both cases. Results from the estimate of Y2 show the coefficient of EXPO to be positive and insignificant.

Past migration of friends and relatives , MIG81, was expected to encourage out-migration. All three estimates confirm expectations: the coefficient on MIG81 has a positive sign and it is highly significant.

Neighboring states were expected to attract more

migrants than other states. The results reported in Tables I and II show the coefficient of Adj with a positive sign as expected, and highly significant value. Results from the third estimate, however, reveal a negative sign and significant value.

States with large numbers of high school graduates were expected to accept a small number of freshmen students from other states. The results from all estimates confirmed this expectation, as all coefficients have a negative sign and they are highly significant. The larger the number of the high school graduates in the origin state, the higher the expected out-migration rate from that state. The results reported in Tables I and II show the coefficients with the expected sign and significant value for the first estimate, but an insignificant value for the second estimate results from the third estimate reveal an unexpected and insignificant sign.

CHAPTER V

INTERPRETATION OF RESULTS

In the last chapter the regression results were reported in tables I, II and III. These results will be discussed further in this chapter.

Gross Migration to All Institutions

The findings regarding the gross migration rate to all institutions, Y1, were reported in table I. Part-time income in the destination state has the right sign, but it is not significantly different from zero. This indicates that part-time earnings in the destination state have no or little effect on the out- migration decision. This variable is used in this study for the first time. Part-time income in the origin state has the right sign but it is also insignificant. Thus, part-time income earning opportunities appear to play little role in the migration decision.

The tuition charged by public institutions in the destination state has a negative sign and its value is significant. It can be concluded with a high degree of confidence, then, that states with higher-priced colleges and universities exhibit lower rates of in-migration than states with lower-priced institutions. Tuition charges by

public institutions in the origin state have a positive and significant effect on out-migration, however. Thus, we offer the tentative conclusion that tuition differentials for public education work as expected, and we believe that the results of the present study are basically consistent with the findings of Tuckman (1970), Campbell and Siegal (1967), and McHugh and Morgan (1984) who reported that high non-resident tuition has a negative impact on the level of student immigration.

Tuition charges by private institutions in the destination state has a negative and significant effect on in-migration, as expected. Tuition charges by private institutions in the origin state has a negative, but insignificant, effect on out-migration. McHugh and Morgan (1984) reported similar results. This is reasonable as the differences between tuition charges by private institutions in the destination states relative to those in the origin states are not generally as big as the difference in tuition charges by public institutions.

Financial aid available in both the destination and the origin states carry unexpected signs and both are insignificant. This probably implies that students don't attach much importance to the financial aid package while making the decision to migrate. These results are consistent with Tuckman's (1970) finding that the availability of financial aid is not important to the student's migration decision. This result is not totally

surrprising in light of the fact that much of the financial aid package is federally-funded, so that the student is eligible for a substantial portion of the financial aid package regardless of his residency status. Moreover most of the financial aid package consists of loans which the student might not want, and college work study. Students might find a similar or a better job, however, than that provided by the college work study program.

Room and board charges by institutions in the destination state has a positive but insignificant effect on migration. This variable is also used in this study for the first time. Room and board charges by institutions in the origin state has a negative but insignificant effect on out-migration. This implies that students don't consider room and board charges to be very important in the migration decision.

Distance has a negative and highly significant effect on the migration of college students. The greater the distance the smaller the likelihood of migration. We have made no attempt to determine the basic factors for which distance is a proxy. Our results are consistent with those reported by McHugh and Morgan (1984), Schwartz (1973), and in many studies of other kinds of migrants (Greenwood, 1975).

Per capita income in the destination state has a positive but insignificant effect on migration. This implies that income at the destination state plays alittle

role in the migration decision. The role of this variable is similar to the role of the part-time income in the destination state. These results are consistent with those reported by McHugh and Morgan(1984).

Per capita income in the origin state has a positive but insignificant effect. This implies , but does not ensure, that the higher the per capita income in the origin state the more likely are college freshmen to migrate to other states, presumably because the richer the average family the more able that family will be to send a son or daughter to college in another state. However, individuals in higher income families may also have better and /or more information as well as more ability to invest in education. Results reported in the present study are consistent with the results of Tuckman (1970), and McHugh and Morgan (1984).

The growth rate of employment in the destination state has the expected positive sign; however, the value of the coefficient is insignificant. This may mean that, even though students consider job opportunities in the destination state, their availability is not that important in the migration decision of freshmen. This result is consistent with the results of McHugh and Morgan (1984).

The growth rate of employment in the origin state has a positive but insignificant effect on out migration. Although the relationship is weak it may be a sign that the healthier the economy of the state the more able is the average family to send a son or daughter to another state,

and that the student will not stay in the home state even if there are good job opportunities. Of course, the job opportunities available could be for jobs for which college freshmen do not envision competing.

The unemployment rate in the destination state has a negative but insignificant effect on out-migration. Thus, current labor market conditions in the destination state are not important in the migration decision. The unemployment rate in the origin state has a negative and highly significant effect on out-migration. Although this result is not expected it could be explained as follows: the higher the unemployment rate the less fortunate the average family in the origin state, and the less capable it is of sending its sons or daughters to college in another state. These results might be summarized by saying that job market conditions in the destination state might affect the student's decision, while job market conditions in the origin state might affect the abilities of families to send their children to college in another state.

Density of the student population in the destination state has an unexpected positive but insignificant effect on in-migration. Significant capacity was added to the nation's colleges and universities in the 1960s and 1970s, and enrollment may have been down relative to capacity in 1984, providing ample room for in migration. Density in the origin state has an expected positive but insignificant effect on out-migration. Given the result for the

destination states, we attach greater significance to the lack of statistical significance than to the sign. The density variable of this study plays the same role as the population of the origin state in the general human migration literature.

The January temperature in the destination state has an unexpected positive and significant effect on in migration. Perhaps a few students are attracted to colder areas for their skiing facilities or other winter activities.

The January temperature in the origin state has an expected positive and highly significant effect on out migration. Apparently students in the colder states want to move to states with more moderate weather.

The July temperature in the destination state has a negative and highly significant effect on in-migration, in conformity with the hypothesis of the present study. The July temperature in the origin state has an unexpected negative and highly significant effect on out-migration. Apparently students in the warmer states do not want to move to those with colder climates.

The rank of the institutions in the destination states has an expected positive but insignificant effect on in-migration. This finding is not consistent with that of McHugh and Morgan (1984) who reported that" the rank of the destination is significant but of unexpected sign, while the rank of the institutions in the origin state has an unexpected positive and insignificant effect on out-

migration". To explain these results they argued that the institutions have a large influence on who will be admitted. Alternatively there might be some students looking for high quality institutions, but there are others at the same time who, due to their poor educational background, are looking for low quality institutions. Thus the effects on the quality variable are cancelled out. From the above results and their discussion, it seems that the rank variable is an unimportant determinant of the student migration decision even though there are strong a proiri reasons to believe that it should be important. However, the rank variable performed considerably better in the other two estimates, i.e., when public and private institutions were considered separately.

Expenditures per student in the destination state has an expected positive and significant effect on in-migration. This result is contrary to the findings with regard to school rank, in so far as the higher expenditures mean higher quality schools. Expenditures per student in the origin state has an expected negative but insignificant effect on out-migration. This probably implies that the student doesn't attach great importance to the quality variable in the origin state. Generally speaking, then, the quality variable does not seem to be very important in the student decision to migrate. This result is consistent with the results reported by McHugh and Morgan (1984).

The past migration of friends and relatives has an

expected positive and highly significant effect on migration. This result supports the contention that past migrants send back information and might provide essential help to the new migrants in the beginning, reducing the pain of being away from their families. Studies have shown that migration generates additional migration (Nelson, 1959, 43-74, Greenwood, 1970,). The past migration variable has the highest and most consistent explanatory power of the variables used in this study.

The neighboring states are attracting a large number of college freshmen as the adjacent border coeffecient has a positive and significant effect on college student migration. These results imply that students are encouraged to travel short distances to attend college.

The population of high school graduates in the destination state has a negative and highly significant effect on college student migration. Thus the larger the number of the high school graduates in the destination state the lower the capacity to accept students from other states. This result might be explained by the fact that states want to obsorb its own students first before taking students from other states.

The population of high school graduates in the origin state carries a positive sign and it is highly significant. Therfore, the higher the number of high school graduates in the origin state the higher the rate of out-migration. This effect is similar to the effect of the population

variable in general human migration studies.

Migration of Freshman Students By Type of Control

In this section, results from the second and the third estimates which are different from the results of the first estimate will be discussed. To detect the differences between migrants to both public and private institutions separate models were formulated. It was thought that a public vs private specification for the college migrants might improve the understanding of the migration decision for each group.

Part time income in the destination state has a positive and highly significant effect on in-migration for both estimates. The strong significance of the part-time income variable lends support in the ceteris paribus context to the contention that states with higher part-time income exhibit higher in-migration. This implies that students do want to hold a part-time job while at school to partially finance their education. The significance level of this result is much higher than the results of the first estimate which did not appear to be significant. The strong significance of part-time income in the destination state implies that the immediate earnings to the student from part-time job may be crucial in the migration decision.

Part-time income in the origin state for the third estimate has a positive but insignificant effect on out-migration. These results imply that part-time income in the

destination is more important than part-time income in the origin. This result is consistent with the general finding in the human migration literature that the economic conditions in the destination states matter more than those of the origin states (Miller, 1973). Financial aid available in the origin state for the second estimate has a negative but insignificant effect on out-migration. This is a different result than in the first estimate, but probably of limited explanatory value. Room and board charges by private institutions in the destination state for the third estimate has a negative and highly significant effect on in-migration. The strong significance of the room and board variable implies that the cost of living in the destination state, proxied by room and board charges, influences the migration decision for the student who wants to attain private education.

The distance variable for the third estimate, i.e., migration to private institutions, has a negative but insignificant effect on out-migration. This implies that the distance effect on migrants to private institutions is not as important as that effect on migrants to public schools. Per capita income in the origin state has a negative but insignificant effect on out-migration of students to private institution. January temperature in the destination state has a negative and insignificant effect on in-migration of public school students but a significant effect on private college students. This implies that

students do not want to move to cold areas, contrary to the results obtained for the estimate of the combined population.

The rank of the insitutions in the origin state has a negative but insignificant effect on in-migration for both the public and private college estimates. These results suggest that students consider the quality of the institutions of their home state as they want to get their degree from good institution i.e., they are looking for a good degree. These results are contrary to those obtained in the first estimate.

Working with seperate migration data for public and private institutions yielded more expected results than when working with migrants as one group. This is true for the quality variables, the temperature variable as proxy for the enviromental variable, tuition, and part-time income. These results support the view that migrant groups must be divided to understand the determinants for each group's migration behavior.

The adjacent border coefficient for the third estimate carries a negative sign which was not expected and its value is significant. Finally, the population of the high school graduates in the origin state carries the wrong sign and it is insignificant which is different than the results of the first two estimates.

The traditional "push-pull" classification of variables has been tried by the researcher, to see which variables

really matter. It has been argued that the demographic characteristics of the origin state are the most important variables in the out-migration decision; however, the economic characteristics of the receiving area are the most important variables in the decision to migrate to an area (Hoover, Edgar & Giarratani, Frank, 1984, 276).

The push variables in this study were as follows: tuition, room and board charges, population of high school graduates, unemployment, density, and temperature of January and July in the origin state. The pull variables were part-time income, financial aid, per capita income, growth rate of employment, the rank of the institutions, and the operational expenditures per student in the destination state.

the results of this study reveal that the economic variables in the destination area are the most important pull variables, as the coefficients of the part-time income and per capita income have the highest t-values, especially for the general case and the private-only case. The results of the second estimate reveal that the most important variable is the expenditures per student.

Regarding the push variables, the results consistently show that the most important variable is the population of high school graduates, with a t-value ranging from 3.3-8.2. These results seems to be in conformity with previous findings.

CHAPTER VI

SUMMARY, POLICY IMPLICATIONS, AND LIMITATIONS

The primary objective of this study is to investigate the determinants of college student migration in the United States. The student is considered a migrant if he attends a college in a different state than the state where he recieved his high school diploma.

The data used in this research are place-to-place for 50 states, as well as Washington D.C. These data support a "from-to" analysis in which each student has 50 possible destinations. The data are cross-sectional for the year 1984, which was chosen as it is the most recent year with comprehensive data available.

In the fall of 1984, 13% of college freshmen students migrated to another state to attend school. Some areas experienced much higher percentages of out-migrants, such as Washington, D.C (47%), New Hampshire (39%), and New Jersey (37%). Public and private institutions almost equally shared these migrants (U.S. Department of Education, 1984, 1).

In deciding to migrate, the student is assumed to make his decision in an investment framework, i.e., migration is an investment in human capital which will increase the

productivity of the student due to his formal education. Therefore, the student is expected to migrate if the present value of the discounted expected benefits -monetary and nonmonetary- exceed the present value of the discounted expected cost-monetary and nonmonetary- of attending the college.

A modified gravity model was used to formulate the migration behavior of the student. Institutional, environmental, and economic variables for both the destination and the origin states were used in the present study.

Migration functions were estimated for three groups of students where the migration rate served as the dependent variable in a regression equation. Specifications of the dependent variable were: 1) all migrants as a percentage of all high school graduate residents of the origin state, 2) migrants to public colleges as a percentage of all high school graduate residents of the origin state, and 3) migrants to private colleges as a percentage of all high school graduate residents of the origin state. Migrant students were the first-time freshmen migrants.

The ordinary least squares (OLS) estimation technique was used. The following general results were reached:
1- Tuition charges by public institutions matter more than tuition charges by private institutions, primarily because of the larger difference between resident and nonresident tuition charges at public institutions at the destination

state.

2- Part time income in the destination state appears to be more important than that in the origin state, especially when migrants to public institutions were considered seperately from migrants to private institutions.

3- Financial aid availability appears to be unimportant to the student's decision to migrate, probably because most of the financial aid package is available to the student regardless of residency status.

4- Room and board charges are not very important in the migration decision; however, those charges in the origin state appear to influence the migration decision more than room and board charges in the destination state.

5- Distance is a strong deterrent to migration especially for the general case and for the migrants to the public schools. Migrants to private schools are not strongly influenced by distance.

6- Per capita income in the destination state didn't perform as expected, as the higher the per capita income in the destination state the less the in-migration to that state. Per capita income in the origin state performed much better than its destination counterpart; however, it was not statistically significant.

7- Job opportunities in the destination state influence the migration decision, and students tend to migrate to states which have good job market conditions, whereas job market conditions in the origin state didn't perform as expected.

These results appear to be consistent with the results obtained in general human migration studies: namely, economic conditions in the destination state matter more than those condititons in the origin state.

8- Density of the student population in the destination state didn't perform as expected. Density of the student population in the origin state, however, appears to push the students out of their home state, especially for the general case, and for private institutions.

9- Low January temperature in the origin state appears to drive out students to another state especialy for public-only and private-only cases. Meanwhile, high July temperature in the destination state fairly strongly discourages in-migrants, especialy for the general case. Students are leaving the cold states but they are not moving to the hot weather states, implying that students prefer moderate rather than extreme weather. 10-Rank of the institutions in the destination state as a proxy for the institution's quality is not influencial in the migration decision of students to public institutions. Rank of the institutions in the origin state didn't perform as expected. 11-Regardless of the specification, expenditures per student in the destination state significantly encourage in-migration to that state. Expenditures per student in the origin state appear to negatively influence the out-migration rate; however, this influence is not equal to the pull effect of the expenditures per student at the

destination state. 12-Past migration of friends and relatives strongly encourage out-migration. This probably means that previous migrants provide inforrmation or help to those who remained in the origin state. This finding conforms to the general finding in migration studies that migration generates migration.

13- The higher the number of high school graduates in the destination state the less in-migration to that state. The higher the number of high school graduates the higher the out-migration rate from that state.

14- Students are strongly attracted by schools in adjacent states, independent of distance.

Policy Implications

From the results of the study reported in Tables I, II, and III, several policy implications could be drawn for both college and state decision-makers.

Colleges usually want to attract good quality students. School officials must understand the factors which lead students to choose a specific school in order to formulate institutional policies that will attract them. State officials who care about economic growth are also concerned about the inflow and outflow of college students. They also need to understand the determinants of student migration in order to design state policy that will influence these flows.

There are two types of policy variables: those which

directly influence the choice of school and location, and those which indirectly influence this decision. The direct policy variables are tuition, financial aid, room and board charges, and instructional expenditures per student. The indirect policy variables are per capita income, the unemployment rate, part-time income for unskilled workers, and the employment growth rate.

The results of this study indicate that only two of these variables significantly influence the migration decision; namely, tuition (especially for public schools), and expenditures per student. It may be useful, however, to know how much difference a change in each of these variables would make in terms of affecting the rate of student migration.

Toward this end we have determined the elasticity of the migration rate with respect to each of these variables. These elasticities are reported in Table IV.

TABLE IV

ELASTICITIES OF POLICY VARIABLES

VARIABLE	GENERAL		Public only		Private only	
	Origin	Dest	Origin	Dest	Origin	Dest
Public Tuition	.35	.75	.50	.80	--	--
Private Tuition	-.43	-1.23	--	--	-1.32	.46
Instructional Expenditures	.40	.74	.95	.15	-.1	.90

The partial public tuition elasticity of migration is less than unity in the general and public-only cases. An elasticity of .35, for example, means that a 1% increase in public tuition will increase the out-migration rate by only .35 percent. The estimates in Table IV suggest that migration rates are not very responsive to public tuition charges in either the origin or the destination states. This finding implies that states who are interested in increasing revenues from student tuition could raise tuition charges without losing a large number of their students to other states. The estimates in Table IV indicate, however, that private schools may not be so fortunate.

The partial instructional expenditures elasticity of the migration rate is less than unity. This implies that significant increase in expenditure per student would have only a modest effect in the migration of first-time college freshmen.

Limitations and Suggestions for Further Research

Although the results of this study indicate that the cross-sectional regression model yields useful results, there are some data which could improve its explanatory power if they were available. This is true, for example, of data on the personal characteristics of migrants, such as family ties or the migration history of the family. Such variables prove to be important determinants of other kinds of human migration (Navratil and Doyle 1977, 1148-53), and this researcher believes that this variable could be significant in explaining college student migration, as well.

The explanatory power of the model could also be improved if migrants to two-year colleges could be seperated from migrants to four-year colleges. unfortunately, the Office of Education data tapes do not permit such a seperation. Further work on this aspect of the problem would seem worth while from the viewpoint of both college and state officials.

The explanatory power of the model may also be improved with the inclusion of information on expected major field of study, race, and more specific residence of migrants. Surely, policy-makers interested in curiculum design, racial issues, and competition along state borders would support the need for further research of this type.

Finally, we recognize that the college migration

decision may or may not have an important effect on resource allocation. Data regarding the location decision of freshmen migrants upon their graduation are badly needed to determine the number who stay the course in school. Beyond this, it is essential to know if they stay in the state from which they receive a degree, if they migrate further, or if they return home.

Resolution of these issues provides a full research agenda for the future. They are, however, beyond the scope of this study.

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APPENDIX I

GROSS FLOWS OF 600 MIGRANTS OR MORE FROM ONE STATE TO ANOTHER

APPENDIX I

GROSS FLOWS OF 600 MIGRANTS OR MORE FROM ONE STATE TO ANOTHER

FROM	TO	GROSS FLOW
NJ	PA	8039
NJ	NY	5485
NY	PA	4450
CT	MA	3290
ILL	IA	2943
ILL	IN	2510
CA	AZ	2429
ILL	WI	2413
CT	NY	2287
NJ	MA	2284
MA	RI	2222
MN	WI	2184
VA	NC	2156
MA	NY	2073
PA	NY	1850
NY	CT	1835
PA	OH	1679
MO	ILL	1675
MA	NH	1672
MD	VA	1620

APPENDIX I (Continued)

NH	MA	1584
FL	GA	1487
OH	IN	1407
NH	VA	1354
MD	PA	1351
NY	FL	1341
MI	ND	1331
NY	OH	1312
WV	MI	1303
GA	AL	1263
CT	RI	1253
NY	DC	1247
NY	VA	1191
RI	MA	1177
NY	RI	1158
CA	UT	1144
NJ	DE	1139
FL	AL	1118
OK	KY	1093
NY	MD	1063
PA	MD	1044
FL	NC	1026
CT	PA	1016
MA	CT	1007
NJ	CT	979

APPENDIX I (Continued)

PA	VA	976
OH	MI	968
MI	KS	965
MN	OH	965
PA	MA	945
MA	VT	942
PA	DE	920
MD	DC	888
ILL	MI	880
SC	ND	878
MA	ME	871
MI	ILL	861
NJ	FL	854
WA	OR	852
MD	ND	836
PA	WV	829
CA	MA	801
IA	MO	790
NJ	DC	787
ILL	MN	763
GA	TN	734
CA	OR	714
NY	NJ	696
DE	PA	683
NY	VT	681

APPENDIX I (Continued)

GA	SC	680
TN	MS	677
OR	WA	676
NY	MI	669
MA	PA	651
TX	OK	651
ILL	OH	643
CT	NH	628
CO	AZ	623
IA	NE	622
OK	TX	609
LA	MS	608
MN	IA	606
WA	CA	601
ID	UT	601

APPENDIX II

RANKING OF THE HIGHER EDUCATION INSTITUTIONS BY CONTROL AND STATE

APENDIX II

RANKING OF THE HIGHER EDUCATION INSTITUTIONS BY CONTROL AND STATE

STATE	PUBLIC	PRIVATE	BOTH
AL	1.00	1.11	1.05
ALASKA	1.00	- -	1.00
AZ	2.45	1.00	1.72
AR	1.00	1.27	1.13
CA	2.19	2.33	2.22
CO	1.82	2.29	1.89
CT	1.84	3.96	2.73
DE	2.77	1.00	2.70
DC	1.00	4.25	3.79
FL	1.22	2.53	1.72
GA	1.88	1.76	1.85
HA	1.00	1.00	1.00
ID	1.99	1.00	1.91
ILL	2.43	2.69	2.52
IN	1.04	3.16	1.74
IA	2.88	2.71	2.87
KS	1.59	1.09	1.51
KY	1.15	1.21	1.16
LA	1.00	3.54	1.30

APPENDIX II (Continued)

ME	1.74	4.92	2.87
MD	1.40	3.61	1.77
MA	1.67	4.19	2.92
MI	2.15	1.77	2.07
MN	4.36	2.15	3.64
MS	1.00	1.55	1.06
MO	1.35	2.24	1.59
MT	1.00	1.00	1.00
NE	1.51	2.50	1.76
NV	1.00	- -	1.00
NH	1.64	4.08	2.78
NJ	1.68	2.20	1.86
NM	1.09	2.09	1.15
NY	1.98	2.64	2.37
NC	2.12	2.68	2.32
ND	1.00	1.00	1.00
OH	1.58	2.57	1.84
OK	1.00	1.48	1.07
OR	1.26	2.80	1.51
PA	1.70	3.11	2.57
RI	1.64	3.56	2.79
SC	1.96	1.81	1.91
SD	1.09	2.01	1.23
TN	1.00	2.30	1.34
TX	1.22	2.29	1.38

APPENDIX II (Continued)

UT	1.00	1.97	1.41
VT	2.43	3.14	2.72
VA	2.40	2.80	2.48
WA	1.35	2.21	1.55
WV	2.47	1.15	2.31
WI	1.85	2.72	1.99
WY	1.00	- -	1.00

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* For further explanation of apendix II see page 38

VITA

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