



HIGHER EDUCATION COMPLETION AND RELATED FACTORS

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Abstract

In this paper data from all 50 U.S. states are used to examine factors associated with the level of educational attainment in the population. Specifically, this inquiry examines the relationship between the percentage of the adult population aged 25-39 with a college bachelors degree or more and sets of variables logically grouped under one of two categories: production of degree holders and net migration of degree holders. It was hypothesized that the production of college degree holders is related to factors such as the quality of the K-12 educational system, the quality of the higher education system, and homogeneity of the population. Factors related to net migration of college degree holders include measures of the vibrancy of the economy, quality of life, and relative tax burdens. Analysis demonstrated that nearly all of the variation across the states in the percentage of degree holders in the population can be explained by these factors. These findings are useful to both policymakers and education administrators across the states as they seek to understand needs and set the direction of higher education systems.

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In this paper data from all 50 U.S. states are used to examine factors associated with the level of educational attainment in the population. Specifically, this inquiry examines the relationship between the percentage of the adult population aged 25-39 with a college bachelors degree or more and sets of variables logically grouped under one of two categories: production of degree holders and net migration of degree holders. It was hypothesized that the production of college degree holders is related to factors such as the quality of the K-12 educational system, the quality of the higher education system, and homogeneity of the population. Factors related to net migration of college degree holders include measures of the vibrancy of the economy, quality of life, and relative tax burdens. Analysis demonstrated that nearly all of the variation across the states in the percentage of degree holders in the population can be explained by these factors. These findings are useful to both policymakers and education administrators across the states as they seek to understand needs and set the direction of higher education systems.

1. Introduction

The consideration of factors associated with states having a higher percentage of their adult population holding bachelor degrees (or beyond) has been a topic of inquiry and one of which note is often made. The interest is not only in which states rank highest in college-educated adults for their workforce, but also in what factors are associated with a high rank.

The first logical question at the outset of any analysis of the factors associated with states and their populations' level of educational attainment is why such a ranking might be important. Institutions of higher education often cite the relationship between the level of individual educational attainment and earnings. In a recent study (U.S. Census, 2004), it is noted that college graduates earn an average of \$51,000 per year, whereas non-graduates earn an average of \$28,000 per year. Vedder (2004) notes that the differential median earnings of full-time male workers with four years or more of college relative to male high school graduates rose from 44.99% in 1970, to 83.2% in 2001, whereas the differential for females rose from 56.16% to 73.62%. Further, Orleans (2004) states that:

the press for higher education has strong, economic motives in the United States and in Europe. Adults with a college education earn, on the average, 35-80% more than those with less education and their unemployment rate is far lower.

What is less clear is whether the correlation between education level and income varies on the larger scale of economic development for cities, counties, states or countries.

It is noted in the *Economist* (2004) that:

for individuals, the rewards to education are clear: those with higher qualifications earn, on the average, far more over a lifetime than the less qualified. But studies of whole economies over time have found only weak evidence that high or rising completion rates of secondary university education are associated with stronger growth. Or, in other words, to what extent is economic growth driven by the acquisition of "human capital"?

Orlans (2004), in an analysis of Allison Wolf's 1995 work on education and development, states that "such facts [referring to the correlation between individual income and education attainment level] lead many analysts to conclude that a nation cannot spend too much on education, and that the surest route to economic growth and prosperity is a well educated workforce."

He notes that Wolf sees the relationship of education to economic productivity as far more convoluted.

In his article that examines empirically the relationship between educational attainment and earnings, Vettters (2004) states that "no one seriously disputes the relationship between education and income." He goes on to state that "college attendance is a good financial investment." However, he too takes issue with assuming that this correlation for individuals extends to the level of regional economic development, noting that:

university presidents and even academic economists advocating more public funding of higher education, argue that university training enhances economic growth, both because of the human capital formed through university training of students, and from the technological advances.

However, in his empirical analysis he says that "the evidence suggests a negative correlation between public university spending and growth." This finding may be explained in part by data used in the study, which supports the notion that "increased university subsidies seem to do very little to promote greater access to higher education." Thus, increased public spending on higher education does not necessarily result in greater productivity of people with degrees.

Another related and important question is: What are the components of factors leading a high percentage of the population having a degree? The obvious determinants are the state's own high school graduates going on to obtain degrees and the migration patterns of people with and without college degrees. In fact, by definition the combination of these factors must account for the percentage of degree holders in a state's population.

The purpose of this study is not to question whether there is a relationship between individual income and individual education level. That is decided. Rather, the objective is to determine those factors associated with a higher percentage of the adult population having at least a college degree. Specifically, this inquiry examines the relationship between the percentage of the adult population aged 25-39 with at least a college degree and sets of variables logically grouped under one of two categories: The "production" of degree holders and the net migration of degree holders. The first hypothesis is that the production of college degree holders is related to factors such as the quality of the K-12 educational system, the quality of the higher education system, and homogeneity of the population. Also, factors related to net migration of college degree holders are hypothesized to include measures of the vibrancy of the economy, quality of life, and relative tax burdens.

In the next section, some stylized facts and theoretical considerations are presented. Embedded in this section is a review of the relevant literature. The empirical analysis is presented in section three, and section four offers a discussion of policy implications and concluding remarks.

2. Stylized Facts and Theoretical Considerations

Economists have devoted much attention to the role of human capital as an engine of economic growth (Mankiw, Romer, and Weil, 1992; Benhabib and Spiegel, 1994; Barro and Sala-i-Martin, 1995; Temple, 1999; Hanushek and Kimko, 2000; Krueger and Lindahl, 2001; Wossman, 2003; Englebrecht, 2003). However, the existing research examining the underlying determinants of human capital accumulation is relatively limited (Mankiw, Romer, and Weil, 1992; Temple, 1999). In the context of the present study, by definition the number of college degree holders in a state depends on the number of college graduates it produces plus the net migration of college graduates.¹ As shown in Figure one, there is a strong positive relationship between the percentage of the adult population aged 25-39 with at least a college degree and the proportion of a state's high school students who complete college within six years. Similarly, Figure two demonstrates the positive relationship between percentage of the adult population aged 25-39 with at least a college degree and the net migration of the young, single and college educated. As shown in Table one, states like Massachusetts, Connecticut, Colorado and New Jersey have an exceptionally high number of college graduates, each having rates of at least 34%. On the other hand, Arkansas, Mississippi, Nevada, and West Virginia have quite a low number of college graduates at 18% or less. Those states with a high number of college graduates tend to be successful in producing their own graduates and/or tend to attract (or at least not lose) college graduates from (to) elsewhere.

Table two shows that the top ten states as measured by degree holders have, on average, 33% of the population aged 25-39 with at least a college degree, whereas the bottom 10 states a rate of just 19.5%. Note also the success of the top 10 states in terms of

¹ Of course, we must also consider the migration patterns of non-degree holders.

graduating its own and in attracting college degree holders from elsewhere, especially in comparison with the bottom 10 states.

Figures one and two along with Tables one and two demonstrate the significant variation across the states in producing and attracting college degree holders, and importantly it clearly establishes the correlation between producing and attracting the college educated with the percentage of degree holders in the population. Why are some states so successful in producing and/or attracting college graduates? The research objective here is to understand the underlying factors that enable a state to produce, retain, and attract college graduates.

To achieve that objective information for all 50 states is collected from *America's Best Cities and States* (2004), *Government Finances* (2003), and the United States Census Bureau (2003), which together provide detailed information on numerous factors including economic dynamism, education, business climate, quality of life, public safety, etc. In *America's Best Cities and States* (2004), primary economic, demographic, and environmental data are used to create a series of indices used to characterize and rank the states. These measures are used to evaluate the factors related to success in terms of generating a high number of degree holders in a state.

Producing College Graduates

Effectiveness in producing college graduates depends on pre-college preparation as well as the resources devoted to higher education. The preparation of pre-college students depends on quality of K-12 system, as well as the underlying characteristics of the students and their families. In particular, it is hypothesized that a well-prepared more homogeneous population will require fewer educational resources to produce college graduates than

would a less-prepared, more diverse population. A number of measures of pre-college preparedness and homogeneity of population are examined:

- 1) Ranking based on school spending, student success, on standardized exams, high school graduation rates, teacher salaries, etc. (*Brightest*)
- 2) Ranking based on higher education funding per \$1,000 of income (*Higher education spending per income*)
- 3) Ranking based on higher education funding per capita (*Higher education spending per capita*)
- 4) Ranking based on the percent of the population that is foreign born (*Foreign born*)
- 5) Ranking based on the percent of population that is white (*Percent white*)
- 6) Ranking based on the poverty rate (*Poverty*)
- 7) Ranking based on K-12 teacher salaries (*K-12 teacher salaries*)
- 8) Ranking based on non English as primary language (*Non English*)
- 9) Ranking based on per pupil K-12 spending (*K-12 spending*)
- 10) Ranking based on K-12 pupil-teacher ratio (*Pupil-teacher ratio*)
- 11) Ranking based on the percent of population that is between the ages of 18 and 21 (*College age*)
- 12) Ranking based on total state population (*Total population*)

Migration of College Graduates

The other avenue by which a state can obtain a high number of degree holders is through migration. As summarized in Knapp and Graves (1989), there are a number of economic factors that may determine human migration decisions. A recent U.S. Census (2003) demonstrates that among the most mobile are those who are young and college educated. Linneman and Graves (1979) argue convincingly that migration flows have origins in a desire for location-specific amenities. In this context, rising per capita incomes nationwide lead to changes in demands for location-specific amenities, which in turn generate a predictable pattern of migration to more “livable” states. In earlier models of migration, researchers (Blanco, 1963; Lowry, 1966; and Mazek, 1969) focused on demand-side characteristics. In this framework, migration is driven by availability of high-wage jobs. On the other hand, the work of Borts and Stein (1964) emphasized the supply-side

approach to regional growth and decline. With the supply-side approach, migration patterns are driven by excess supply of labor in rural areas—workers migrate to urban areas in search of employment. Regardless, both the demand- and supply-side approaches suggest that in-migration will occur in states with strong and diverse economies.

This brief theoretical discussion helps identify two categories of variables that may drive migration patterns of the college educated--environmental and economic characteristics. A number of variables that may determine migration patterns are examined:

- 1) Ranking based on factors associated with fostering business activity (*Most competitive*)
- 2) Ranking based on indices that measure technology, globalization and innovation (*New economy*)
- 3) Ranking of leading cyber technology industry companies and employees (*Cyber technology*)
- 4) Ranking of safety based on crime rates, poverty, violence prevention and high school dropouts (*Public safety*)
- 5) Ranking based on total general revenues per capita (*Revenue per capita*)
- 6) Ranking based on total general revenues per \$1,000 of income (*Revenue per \$1,000 income*)
- 7) Ranking based on various measures of toxic substances disposed on land (*Least land polluted*)
- 8) Ranking based on a variety of factors including measures of median household income, weather, high school graduation rates, etc. (*Most livable*)
- 9) Ranking of generosity based on charitable contribution rates (*Most generous*)
- 10) Ranking based on least burdensome taxation (*Taxation*)
- 11) Ranking based on least polluted air (*Least air pollution*)
- 12) Ranking based on least polluted water (*Least water pollution*)
- 13) Ranking based on leading cyber technology employment (*Cyber employment*)
- 14) Ranking based on the level of technology-related infrastructure available (*Technology infrastructure*)
- 15) Ranking based on factors favorable to small business (*Small Business*)
- 16) Ranking based on factors favorable to conducting business (*Business*)

Our analysis is not predicated on the notion of causality between the factors listed above and the number of degree holders. In fact, in some cases causality may work in both directions. For example, it may be that “high tech” companies strategically locate in states

that have a well-educated work force. The focus in this paper is on identifying the factors related to a high proportion of degree holders in the population, at the same time being cautious in noting that the relationships observed in the analysis do not necessarily identify the direction of causality.

3. Empirical Analysis

A multiple regression analysis was undertaken to identify the factors related to the proportion of college degree holders aged 25-39 in the population. Factors related to the number of degree holders are generally categorized into two groups, as previously noted: the production of degree holders and the migration decisions of degree holders.

Data

These data are collected for all states; definitions and data sources for all variables included in the analysis are presented in Table three. Many of the measures of state characteristics come from *America's Best Cities and States* (2003) which presents a series of indices and then uses the indices to characterize and rank the states. Detailed information regarding the specific characteristics used to form the indices is also provided. Included in the analysis are demographic and government finance characteristics: rankings based on total state population, college-age population, state and local total general revenues per capita, and state and local total general revenues per \$1,000 of income. Given the interest in helping state policymakers and school administrators better understand the underlying factors related to the differences in the number of degree holders across the states, all variables are formulated as easy-to-interpret rankings. The dependent variable, a ranking based on the proportion of the population aged 25-39 with at least a college degree,

is obtained from the U.S. Census Bureau. Given that ranked data are used, it is not necessary to report summary statistics such as means.

Method of Analysis

To evaluate the factors associated with having a high proportion of degree holders in the population, a multiple regression analysis was undertaken in which degree holders was assumed to be a function of factors associated with producing college graduates and with attracting college degree holders from elsewhere:

$$\text{Degree holders}_j = \beta_1 + \beta_2(\text{production}_{ij}) + \beta_3(\text{net migration}_{ij})$$

where “production” represents a vector of i variables related to the production of degree holders for state j and “net migration” represents a vector of i variables related to the net migration of college degree holders. Initially, twenty-eight factors were evaluated. A step-wise regression procedure was used to obtain the estimates that generated the best-fitting regressions. As a result, a number of factors that did not contribute to explaining the variation across the states in the proportion of degree holders in the population were omitted.² As shown in the correlation matrix found in the appendix, a number of explanatory variables were highly correlated with one another. Also, the interested reader may find it informative to review the simple correlations between the dependent variable and the explanatory variables.

Results

Table four summarizes five regressions. In columns one and two, regressions that include as explanatory variables factors associated with the production of degree holders are presented. In columns three and four, factors associated with retaining/attracting

² Factors not included in the estimations presented are: *Taxation, Least air pollution, Least water pollution, Poverty, K-12 teacher salaries, Non English, K-12 spending, Pupil-teacher ratio, Cyber employment, Business, and Technology infrastructure.*

degree holders are presented. Column five contains a comprehensive regression in which both production factors and migration factors are included.

Consider first columns one and two, the regressions related to the production of college graduates. Column one shows that a state that has a high ranking for pre-college preparation (*Brightest*) will produce more college graduates. Moving up in the rankings five places will increase the proportion of degree holders in the population by a full percentage point. Similarly, states that utilize more resources for higher education on a per capita basis will tend to produce more college graduates. However, in what appears to be a contradiction, higher education spending as a percentage of income is negatively associated with the number of college graduates. There is a non-linearity in the higher education per income variable suggesting that for some states there is a potential to realize gains from increased spending while for other states the opposite may be true.

To illustrate, assume there are two states with the same population but one is a high-income state and the other is a low-income state. For concreteness, suppose the high-income state has a level of per capita income of \$2,000, whereas the low-income state has a level of per capita income of \$1,000. Suppose each state devotes \$100 per capita to higher education, or 5% of per capita income for the high-income state and 10% of per capita income for the low income state. Now suppose that both states increase per capita higher education spending to 200, or to 10% and 20% for the high- and low-income states, respectively. The high-income state increased spending by five percentage points, but the low-income state increased income by 10 percentage points. In this example, the low-income state has the potential to realize a larger negative effect from the coefficient on higher education spending per income than will the high-income state. That is, the

relatively high spending-low income states may realize losses in terms of generating a higher percentage of degree holders in the population from increased higher education spending (due to the relatively heavy burden of funding higher education), but relatively low spending-high income states are more likely to realize gains.

These three variables account for 67% of the variation in the dependent variable as measured by the adjusted *R*-square. In other words, 67% of the variation in the ranking of a state by percentage of degree holders is accounted for by education system factors.

In column two the focus is on factors related to homogeneity of the population. In this regression, a higher percentage of foreign born is associated with more college degree holders, as is a higher percentage of whites in the population. The regression in column two explains 33% of the variation in proportion of college degree holders in the population.

Turning to the factors that affect the migration patterns of the college educated, consider the regression results presented in columns three and four. In column three the rankings for *New economy* and *Cyber technology* are positively correlated with college degree holders in the population: The presence of new economy and cyber-related employment appears to attract/retain college graduates. However, *Small business* is negatively correlated with degree holders. One possible explanation for this result is that the existence of a thriving small business environment may generate a higher opportunity cost of obtaining a college degree due to lost wages from lucrative employment.³ State and local government revenue per capita is positively correlated with college degree holders—evidence that this subset of the population values the services provided by sub-national governments. On the other hand, state and local revenue as a percentage of income is

³ It is well known that entrepreneurs such as Bill Gates, founder of Microsoft, chose to forego completing a college degree in order to pursue entrepreneurial interests.

negatively correlated with the number of degree holders, a result that is consistent with the coefficients on per capita higher education spending and higher education spending per \$1,000 of income. This finding suggests that high spending-low income states may realize losses from increased spending, but low spending-high income states could realize gains. The regression in column three accounts for 72% of the variation in degree holders across the states with economy and taxation factors.

Column four shows that each measure of environmental amenity included in the analysis (*Least land pollution, Most livable, Most generous*) is positively correlated with degree holders in the population. Fifty-six percent of the variation in degree holders is accounted for by environmental factors.

The results presented in columns one-four are generally supportive of the hypotheses. In column five, a regression in which all factors are combined is presented. Again, using a step-wise regression procedure, we omitted some factors that were not statistically significant and did not contribute to the overall explanatory power to the regression. With a few exceptions, the results presented in column five are consistent with those presented in columns one-four. Generally, better pre-college preparation and a better-funded higher education system (as measured on a per capita basis) will generate more college graduates. Again, the coefficient on higher education funding as a proportion of income is negative and significant. Somewhat surprisingly, the coefficient on *Percent white* is reversed, indicating that a higher percent white population is associated with fewer college degree holders. This result demonstrates that once other factors are controlled, having a homogeneous population does not necessarily translate into a more highly educated work force. *Cyber technology* is still an important positive factor. Interestingly,

Public safety is positive and significant, an indication that college degree holders are either more easily produced in, or tend to migrate to, areas with a strong public safety record. Lastly, *College age population* and *Total population* are included as additional control variables; each variable is negatively correlated with degree holders in the population. The adjusted R -square in this summary regression is 0.85—exceptional for a cross-sectional analysis. Using 11 variables that characterize states' ability to produce, retain, and attract college graduates, the analysis is able to explain most of the variation in college degree holders across the states.

Conclusions

First, and most clearly, the criterion variable, percentage of adults in a state having a bachelors degree or higher, is very predictable from a weighted combination of variables grouped under production factors and migration factors (Adjusted $R^2 = .85$). The findings demonstrate that nearly all of the variation across the states in the percentage of degree holders in the population can be explained by these factors. These findings are useful to both policymakers and education administrators across the states as they seek to understand needs and set the direction of higher education systems.

Further, within production factors those predictors clustered around the educational system account for more of the variance (Adjusted $R^2 = .67$) than do those associated with homogeneity of the population (Adjusted $R^2 = .33$) although both multiple R 's are significant. Additionally, within the migration factors those variables clustered around the economy and taxation are more strongly correlated with the criterion (Adjusted $R^2 = .72$) than are those associated with environment and quality of life (Adjusted $R^2 = .56$) although

both are significant. The sheer magnitude of the multiple correlations and the amount of the variance in the criterion for which the predictors account indicate that the percentage of adults in a state holding a degree is very “explainable” and patterned. Further analysis of these patterns yields more detail.

An interesting perspective on the results occurs where the rankings of states for their percentage of their own high school graduates obtaining a degree within six years (Iowa and Massachusetts are the highest and Alaska the lowest) is compared with their ranking for the percentage of adult residents having at least a bachelor’s degree (Massachusetts again is the highest and West Virginia is the lowest). Table five is a selection of 12 states rank ordered. The rankings are based on the gap between the rankings for high school grads obtaining a degree and the adult population with a degree. These 12 states are selected from the 50 states because they are illustrative of the production and net migration factors.

Consider the four subsets of states represented by three states in each for a total of 12 in Table six. The four subsets may be called exporters, importers, high/highs and low/lows. The first three states on the list are “exporters” of college graduates. They are high on production of degree holders as explained by predictors in the regressions, such as pre-college preparation and more resources per capita for higher education; however, they are low in net in migration, explained by factors such as strong new economies and cyber technology involvement. Iowa is tied for first in the nation in its rank for high school grads obtaining degrees, yet the state is below the median ranking for the percentage of adults with degrees (27.5). Maine is 10th in production, but 33rd in adults with degrees. Indiana is 15th in production but 37th in those with degrees. These states produce college graduates

for other states and “export” them. Such states need to closely examine the role of higher education as an economic development engine. Higher education needs to be part of a strong, coordinated effort to build an economy that will retain or re-attract a higher percentage of a state’s own citizens earning college degrees.

Now consider the subset of the three states at the bottom of Table five. They are importers of college graduates, meaning their ranking for production of college graduates is much lower than the ranking for adults having a degree. Only five states produce a lower percentage of college graduates than Georgia (44.5), yet Georgians are well above the median (18th) in ranking for degree holders. The net in migration is high due to a strong new economy, attractive quality of life, etc. Hawaii is very similar (40.5 and 17th). Also in this subset, but somewhat different, is Colorado, which is slightly above average in production (23rd) but very near the top in degree holders (3.5). Colorado is an extremely strong net in-migration state. These states need to consider the relative advantages, and possibly disadvantages, of “growing their own.”

Next, consider the six states mixed together in the middle of Table five. These states are not off balance in their production of degree holders. There are two subsets represented here. High/highs produce a high percentage of college grads and have a high percentage in their population. These states include Massachusetts (1.5 and 1st), Connecticut (5.5 and 2nd), and Minnesota (7th and 7th). These states are associated with the positive production factors and are high on net in-migration factors. Similarly, the low/lowers are in balance because they are low on both sets of predictors. These states include: Nevada (48th and 49th), Arkansas (44.5 and 47th) and New Mexico (48th and 44th).

Considering the high degree in predictability of the percentage of adults with degrees in a state (Adjusted $R^2 = .85$) and predictors associated with both productivity and net migration reported in this study, some policy implications occur. Obviously, the desirable circumstance is to have good pre-K-12 education, strong investment in education, excellent college preparation, a vibrant new economy, and an attractive quality of life. In other words, circumstances such as those in states such as Massachusetts, Connecticut and Minnesota are ideal. Similarly, states should hope to move away from the patterns of Arkansas, Nevada, and New Mexico. It is the states with imbalances that provide some thought-provoking examples.

Policymakers must recognize the “natural” circumstances in which they find themselves and draw plans to optimize strengths. Clearly Iowa wants to produce a high percentage of college graduates. Residents should be proud of their higher education system. On the other hand, “the build it and they will come” strategy does not fully apply when “building” college grads and assuming that a robust new economy will follow. Insofar as providing education to the citizens of the state is concerned, Iowans should be pleased; however, more creativity is needed from all, including higher education, to build the type of economy that will retain more citizens with degrees. This is easier said than done when working against certain “natural” constraints but it is not all demographics and location. Kansas, which is similar in many ways to Iowa, although aided by the metropolitan area of Kansas City, is high in both production (12th) and percentage with degrees (12.5). The same set of demographic and location similarities may be seen in Minnesota and Wisconsin, but with very real differences in higher education investment and in economic development. The role of higher education as an economic development

engine cannot be overemphasized. The foresight of policymakers is needed to make significant investments in that aspect of higher education.

Perhaps the more interesting question is that of the “importers.” Are states such as Georgia content to depend upon their strong economy and attractiveness to bring in college graduates while failing to produce their own in significant numbers? They may be, but what about their educational obligations to their own citizens and what about the sustainability of such a set of circumstances? Policymakers confronted with these demographics should form compacts with their higher education systems, compacts that require additional graduates for additional funding in clear and unambiguous ways. The issues raised by Vettters (2004) and others concerning the relationship between investment in higher education and the production of more degree holders should not be forgotten.

As noted in the introduction, “for individuals the rewards of higher education are clear, but the extent to which human capital production drives economic development is not so clear.” (Economist, 2004) In other words, a better economy is associated with more people having college degrees, but not necessarily with how states get those degree holders, whether through production or import.

Policymakers and educators should exercise extreme caution when inferring that more investment in higher education → more degree holders → more robust economy. These assumptions do not generally hold. First, higher investment has not always resulted in more graduates. Second, more college graduates do not necessarily produce a better economy. Higher education clearly has a role in economic development but it must be carefully crafted in keeping with the demographics of the state in terms of both production and net migration of degree holders.

Finally, when states do invest more in higher education it should be in the form of a compact with the institutions. Outcomes in terms of measurable increases in graduates or formation of greater job demand in the economy should be specified.

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Table 1
College Degree Holders

State	Percent of population 25-39 with bachelor's degree or higher, 2000	Percent of high school graduates completing college within 6 years	Net Migration Rate of young, single, college educated, 1995-2000
Massachusetts	38.8	28	-4.6
Connecticut	34.9	26	-69.7
Colorado	34.1	18	157.7
New Jersey	34.1	24	-13
Maryland	33.8	18	32.2
Virginia	32.1	20	38.4
Minnesota	31.7	25	15.5
New York	31.0	18	-11.3
Illinois	30.1	19	12.4
New Hampshire	30.1	27	-114.8
Vermont	29.9	21	-143.5
Kansas	28.9	22	-104.7
Rhode Island	28.5	26	-147
Washington	28.5	16	96.5
Delaware	27.7	19	-13.9
Nebraska	27.6	22	-130.3
Hawaii	27.3	13	-69.8
Georgia	26.9	12	150.5
California	26.7	17	92.7
Pennsylvania	26.7	27	-112.4
North Dakota	26.4	24	-282
Oregon	25.8	15	103.5
Utah	25.8	16	-69.8
Montana	25.5	17	-161.5
North Carolina	25.4	18	50.2
Wisconsin	25.4	22	-107.7
Iowa	25.0	28	-220.1
Missouri	25.0	18	-47
South Dakota	24.8	22	-215.9
Michigan	24.2	18	-86.7
Ohio	24.2	17	-88.2
Texas	24.0	11	48.7
Florida	23.5	14	40.1
Maine	23.5	23	-80.1
Arizona	23.4	14	109.9
Alaska	22.2	6	38.9
Indiana	22.1	21	-142.3
Tennessee	22.1	14	15.2
Idaho	22.0	14	5.9
South Carolina	21.8	14	-40.7
Wyoming	21.6	18	-109.2
Alabama	21.3	13	-116.3
Oklahoma	21.3	12	-125.9
New Mexico	21.2	11	-93.3
Louisiana	19.8	12	-130.2
Kentucky	19.4	13	-62
Arkansas	18.2	12	-90.4
Mississippi	17.8	13	-134.1
Nevada	17.6	11	281.8
West Virginia	16.6	15	-197.1

Table 2
College Degree Holder Summary Statistics

	Percent of population 25-39 with bachelor's degree or higher, 2000	Percent of high school graduates completing college within 6 years	Net Migration Rate of young, single, college educated, 1995-2000
Mean--Top 10 States	33.1	22.3	4.3
Mean--Bottom 10 States	19.5	13.0	-77.7
Mean—Overall	25.7	17.9	-44.9
Standard Deviation—Overall	4.9	5.3	109.1

Figure 1

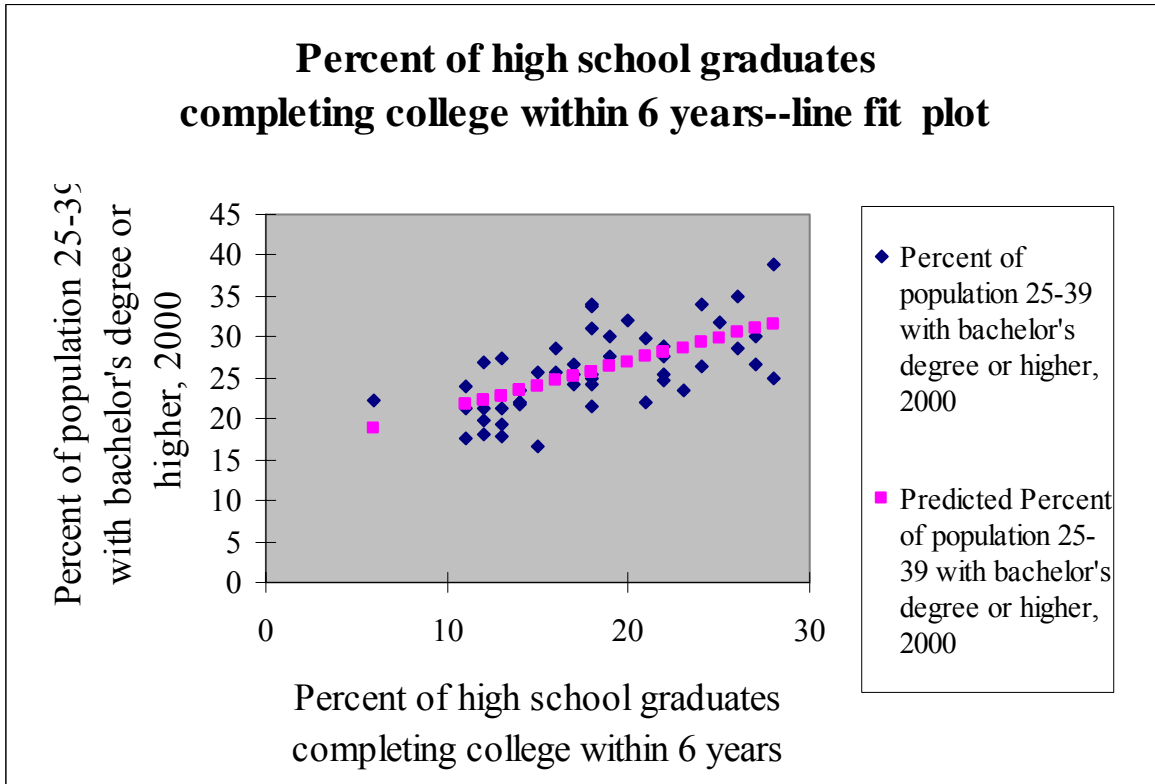


Figure 2

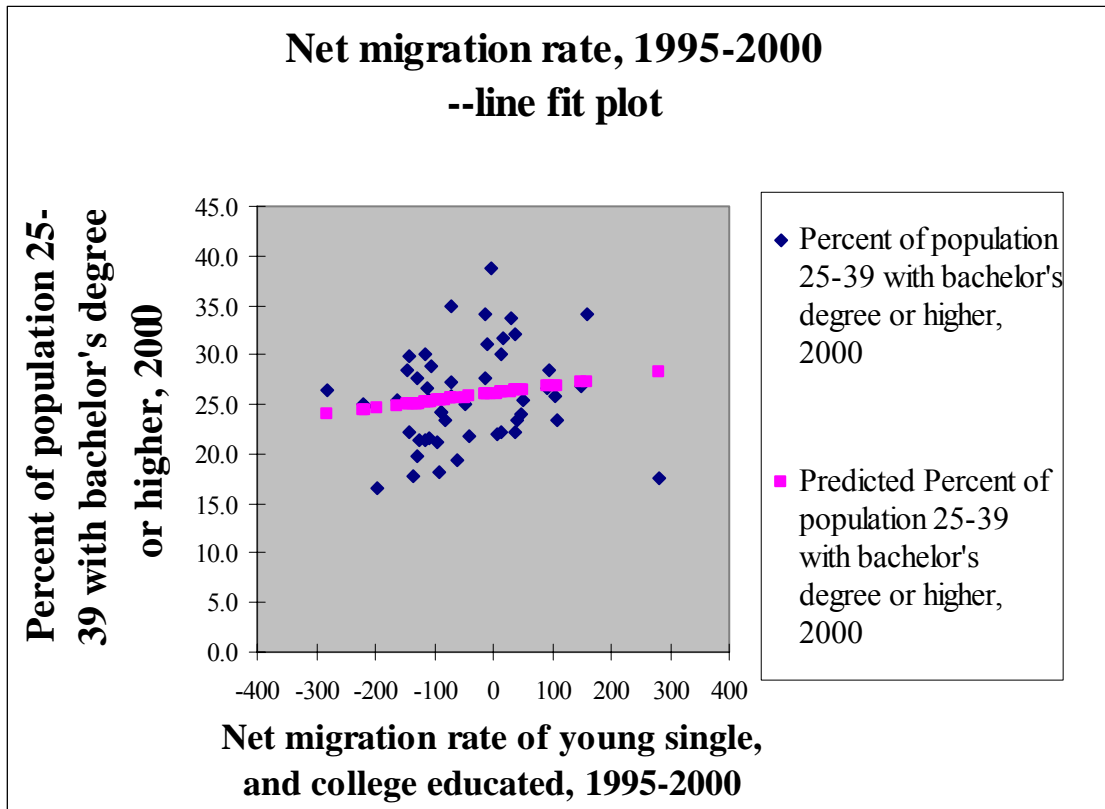


Table 3—Variable Definitions and Data Sources

Variable Name	Definition	Data Source
Degree holders	Ranking based on the percent of state population 25-39 with bachelor's degree or higher	Census
Brightest	Ranking based on school spending, student success, on standardized exams, high school graduation rates, teacher salaries, etc...	Census
Higher education spending per \$1,000 income	Ranking based on funding of higher education funding per \$1,000 of income	ABCS
Higher education spending per capita	Ranking based on higher education funding per capita	ABCS
Foreign born	Ranking based on the percent of the population that is foreign born	Census
Percent white	Ranking based on the percent of population that is white	Census
Most competitive	Ranking based on factors associated with fostering business activity	ABCS
New economy	Ranking based on indices that measure of technology, globalization and innovation	ABCS
Small business	Ranking based on small business survival and growth indices	ABCS
Cyber technology	Ranking of leading cyber technology industry companies and employees	ABCS
Public safety	Ranking of safety based on crime rates, poverty, violence prevention and high school dropouts	ABCS
Revenue per capita	Ranking based on total general revenues per capita	GF
Revenue per \$1,000 income	Ranking based on total general revenues per \$1,000 of income	GF
Least land pollution	Ranking based on various measures of toxic substances disposed on land	ABCS
Most livable	Ranking based on a variety of factors including measures of median household income, weather, high school graduation rates, etc...	ABCS
Most generous	Ranking of generosity based on income charitable contribution rates	ABCS
College age population	Ranking based on percent population between 18 and 21 years of age	ABCS
Total population	Ranking based on total state population	Census
Taxation	Ranking based on least burdensome taxation	ABCS
Least air pollution	Ranking based on least polluted air	ABCS
Poverty	Ranking based on the poverty rate	ABCS
K-12 teacher salaries	Ranking based on K-12 teacher salaries	ABCS
Non English	Ranking based on non English as primary language	ABCS
K-12 spending	Ranking based on per pupil K-12 spending	ABCS
Pupil-teacher ratio	Ranking based on pupil-teacher ratio	ABCS
Cyber employment	Ranking of leading cyber technology industry employment	ABCS
Technology infrastructure	Ranking based on the level of technology-related infrastructure available	ABCS
Least water pollution	Ranking based on least polluted water	ABCS
Business	Ranking based on factors favorable to business	ABCS
Data Sources: ABCS (America's Best Cities and States); Census (United States Census Bureau); GF (Government Finances)		

Table 4--Regression Results
(absolute value of t-statistic in parentheses)

Dependent Variable: Percent of population 25-39 with bachelor's degree or higher

Independent Variable	Production Factors		Migration Factors		All Factors (Column 5)
	(Column 1) Educational System	(Column 2) Homogeneity	(Column 3) Economy and Taxation	(Column 4) Env. Factors	
Constant	29.93*** (8.19)	0.42 (0.01)		19.35*** (3.63)	
Brightest	0.22** (2.598)				0.18** (2.04)
Higher education spending per \$1,000 income	-1.58*** (8.60)				-0.82*** (3.63)
Higher education spending per capita	1.20*** (6.69)				0.56*** (3.02)
Foreign born		0.67*** (5.07)			0.18* (1.69)
Percent white		0.33** (2.54)			-0.46*** (3.23)
Most competitive			0.26*** (2.77)		
New economy			0.32** (2.69)		0.21 (1.44)
Small business			-0.25** (2.73)		
Cyber technology					0.67*** (2.79)
Public safety					0.52*** (4.35)
Revenue per capita			0.22* (1.91)		
Revenue per \$1,000 income			-0.46*** (3.85)		
Least land pollution				0.21** (2.10)	0.10 (1.34)
Most livable				0.40*** (3.60)	
Most generous				0.37*** (3.43)	
College age population					-0.16* (1.72)
Total population					-0.45** (2.02)
Adjusted R²	0.67	0.33	0.72	0.56	0.85
*Indicates significant at the 90 percent level with a two-tailed test. **Indicates significant at the 95 percent level with a two-tailed test. ***Indicates significant at the 99 percent level with a two-tailed test.					

Table 5
Those Earning Degrees and Degree Holders

State	% Graduating in six years	Rank	% with Degrees	Rank	Gap
Iowa	28	1.5	25	27.5	26
Maine	23	10	23.5	33.5	23.5
Indiana	21	15.5	22.1	37.5	22
Arkansas	12	44.5	18.2	47	2.5
Nevada	11	48	17.6	49	1
Minnesota	25	7	31.7	7	0
Massachusetts	28	1.5	38.8	1	(0.5)
Connecticut	26	5.5	34.9	2	(3.5)
New Mexico	11	48	21.2	44	(4.0)
Colorado	18	23	34.1	3.5	(19.5)
Hawaii	13	40.5	27.3	17	(23.5)
Georgia	12	44.5	26.9	18	(26.5)

Appendix --Correlation Matrix of All Variables Used in the Analysis

	Degree Holders in Pop.	Most Comp.	New Econ.	Small Business	Bus.	Tax.	Rev. per capita	Rev. per income	Poverty	Tech. infrast.	Cyber employ.	Cyber tech.	Least water poll.	Least land poll.	Least air poll.	Most livable	Public safety	Most gen.	Foreign born	Non English	Percent White	Pupil-teacher ratio	K-12 spend.	K-12 teacher salaries	Brightest	Higher educ. spending per income	Higher educ. spending per capita	College age	Total pop.
Degree Holders in Population	1	0.643	0.736	-0.149	-0.113	-0.056	0.335	-0.503	0.669	0.757	0.433	0.418	0.077	0.462	0.207	0.644	0.417	-0.613	0.515	-0.437	0.033	-0.167	0.472	0.500	0.393	-0.529	-0.200	0.369	0.181
Most Competitive	0.643	1	0.547	-0.091	-0.298	0.103	0.327	-0.240	0.684	0.558	0.140	0.091	0.150	0.267	0.309	0.825	0.625	-0.368	0.147	-0.115	0.459	-0.104	0.325	0.198	0.526	-0.264	-0.054	0.052	-0.121
New Economy	0.736	0.547	1	0.127	0.180	0.079	0.300	-0.503	0.490	0.924	0.648	0.629	0.026	0.110	0.069	0.428	0.099	-0.615	0.782	-0.719	-0.169	0.257	0.360	0.634	0.134	-0.534	-0.249	0.495	0.418
Small Business	-0.149	-0.091	0.127	1	0.594	0.579	-0.438	-0.397	-0.045	0.155	0.336	0.339	-0.164	-0.279	-0.402	-0.158	-0.489	0.085	0.122	-0.073	-0.368	0.452	-0.392	0.083	-0.502	-0.125	-0.194	0.062	0.345
Business	-0.113	-0.298	0.180	0.594	1	0.280	-0.236	-0.248	-0.285	0.231	0.670	0.673	-0.473	-0.380	-0.646	-0.356	-0.696	0.080	0.312	-0.211	-0.508	0.434	-0.231	0.325	-0.408	-0.105	-0.135	0.038	0.756
Taxation	-0.056	0.103	0.079	0.579	0.280	1	-0.269	-0.301	0.000	0.055	0.160	0.136	-0.050	-0.278	-0.117	0.025	-0.207	0.084	-0.001	-0.006	-0.126	0.229	-0.203	0.027	-0.167	-0.193	-0.209	0.186	0.108
Revenue per capita	0.335	0.327	0.300	-0.438	-0.236	-0.269	1	0.395	0.312	0.247	-0.091	-0.082	0.280	0.146	0.346	0.220	0.269	-0.355	0.321	-0.327	-0.013	-0.036	0.540	0.445	0.259	-0.084	0.127	0.248	-0.145
Revenue per income	-0.503	-0.240	-0.503	-0.397	-0.248	-0.301	0.395	1	-0.451	-0.504	-0.582	-0.583	0.107	-0.258	0.132	-0.375	0.002	0.434	-0.431	0.328	0.089	-0.068	-0.101	-0.389	-0.116	0.575	0.407	-0.423	-0.449
Poverty	0.669	0.684	0.490	-0.045	-0.285	0.000	0.312	-0.451	1	0.501	0.148	0.151	0.206	0.342	0.257	0.838	0.594	-0.651	0.303	-0.198	0.306	-0.036	0.432	0.431	0.469	-0.366	-0.107	0.382	-0.060
Technology infrastructure	0.757	0.558	0.924	0.155	0.231	0.055	0.247	-0.504	0.501	1	0.703	0.687	-0.067	0.119	-0.042	0.475	0.083	-0.579	0.677	-0.619	-0.170	0.182	0.355	0.603	0.202	-0.442	-0.159	0.371	0.477
Cyber employment	0.433	0.140	0.648	0.336	0.670	0.160	-0.091	-0.582	0.148	0.703	1	0.985	-0.485	-0.071	-0.550	0.124	-0.354	-0.278	0.543	-0.413	-0.323	0.283	0.108	0.532	-0.033	-0.403	-0.218	0.388	0.924
Cyber Technology	0.418	0.091	0.629	0.339	0.673	0.136	-0.082	-0.583	0.151	0.687	0.985	1	-0.476	-0.075	-0.585	0.097	-0.378	-0.312	0.542	-0.406	-0.341	0.267	0.140	0.569	-0.034	-0.422	-0.231	0.431	0.940
Least water pollution	0.077	0.150	0.026	-0.164	-0.473	-0.050	0.280	0.107	0.206	-0.067	-0.485	-0.476	1	0.051	0.728	0.122	0.374	-0.306	0.111	-0.169	0.215	-0.023	0.055	-0.058	0.079	-0.104	-0.102	0.077	-0.592
Least land pollution	0.462	0.267	0.110	-0.279	-0.380	-0.278	0.146	-0.258	0.342	0.119	-0.071	-0.075	0.051	1	0.219	0.354	0.354	-0.282	0.024	0.031	0.121	-0.491	0.438	0.131	0.366	-0.276	-0.151	0.134	-0.145
Least air pollution	0.207	0.309	0.069	-0.402	-0.646	-0.117	0.346	0.132	0.257	-0.042	-0.550	-0.585	0.728	0.219	1	0.312	0.533	-0.291	0.144	-0.263	0.246	-0.204	0.129	-0.110	0.211	-0.054	0.012	-0.059	-0.739
Most livable	0.644	0.825	0.428	-0.158	-0.356	0.025	0.220	-0.375	0.838	0.475	0.124	0.097	0.122	0.354	0.312	1	0.710	-0.456	0.110	-0.093	0.531	-0.270	0.345	0.147	0.632	-0.248	-0.048	0.106	-0.125
Public safety	0.417	0.625	0.099	-0.489	-0.696	-0.207	0.269	0.002	0.594	0.083	-0.354	-0.378	0.374	0.354	0.533	0.710	1	-0.332	-0.124	0.085	0.709	-0.268	0.273	-0.125	0.523	-0.089	-0.036	0.000	-0.539
Most generous	-0.613	-0.368	-0.615	0.085	0.080	0.084	-0.355	0.434	-0.651	-0.579	-0.278	-0.312	-0.306	-0.282	-0.291	-0.456	-0.332	1	-0.547	0.465	-0.083	-0.065	-0.566	-0.676	-0.312	0.577	0.369	-0.557	-0.140
Foreign born	0.515	0.147	0.782	0.122	0.312	-0.001	0.321	-0.431	0.303	0.677	0.543	0.542	0.111	0.024	0.144	0.110	-0.124	-0.547	1	-0.935	-0.451	0.354	0.249	0.687	-0.070	-0.374	-0.108	0.477	0.402
Non English	-0.437	-0.115	-0.719	-0.073	-0.211	-0.006	-0.327	0.328	-0.198	-0.619	-0.413	-0.406	-0.169	0.031	-0.263	-0.093	0.085	0.465	-0.935	1	0.455	-0.308	-0.207	-0.544	0.108	0.286	0.051	-0.357	-0.279
Percent White	0.033	0.459	-0.169	-0.368	-0.508	-0.126	-0.013	0.089	0.306	-0.170	-0.323	-0.341	0.215	0.121	0.246	0.531	0.709	-0.083	-0.451	0.455	1	-0.314	0.130	-0.333	0.636	-0.063	-0.194	-0.201	-0.429
Pupil-teacher ratio	-0.167	-0.104	0.257	0.452	0.434	0.229	-0.036	-0.068	-0.036	0.182	0.283	0.267	-0.023	-0.491	-0.204	-0.270	-0.268	-0.065	0.354	-0.308	-0.314	1	-0.258	0.266	-0.444	0.091	0.050	0.154	0.309
K-12 spending	0.472	0.325	0.360	-0.392	-0.231	-0.203	0.540	-0.101	0.432	0.355	0.108	0.140	0.055	0.438	0.129	0.345	0.273	-0.566	0.249	-0.207	0.130	-0.258	1	0.595	0.586	-0.438	-0.236	0.380	0.060
K-12 teacher salaries	0.500	0.198	0.634	0.083	0.325	0.027	0.445	-0.389	0.431	0.603	0.532	0.569	-0.058	0.131	-0.110	0.147	-0.125	-0.676	0.687	-0.544	-0.333	0.266	0.595	1	0.131	-0.513	-0.230	0.605	0.496
Brightest	0.393	0.526	0.134	-0.502	-0.408	-0.167	0.259	-0.116	0.469	0.202	-0.033	-0.034	0.079	0.366	0.211	0.632	0.523	-0.312	-0.070	0.108	0.636	-0.444	0.586	0.131	1	-0.207	-0.127	-0.005	-0.152
Higher education spending per income	-0.529	-0.264	-0.534	-0.125	-0.105	-0.193	-0.084	0.575	-0.366	-0.442	-0.403	-0.422	-0.104	-0.276	-0.054	-0.248	-0.089	0.577	-0.374	0.286	-0.063	0.091	-0.438	-0.513	-0.207	1	0.883	-0.593	-0.285
Higher education spending per capita	-0.200	-0.054	-0.249	-0.194	-0.135	-0.209	0.127	0.407	-0.107	-0.159	-0.218	-0.231	-0.102	-0.151	0.012	-0.048	-0.036	0.369	-0.108	0.051	-0.194	0.050	-0.236	-0.230	-0.127	0.883	1	-0.365	-0.168
College age	0.369	0.052	0.495	0.062	0.038	0.186	0.248	-0.423	0.382	0.371	0.388	0.431	0.077	0.134	-0.059	0.106	0.000	-0.557	0.477	-0.357	-0.201	0.154	0.380	0.605	-0.005	-0.593	-0.365	1	0.336
Total population	0.181	-0.121	0.418	0.345	0.756	0.108	-0.145	-0.449	-0.060	0.477	0.924	0.940	-0.592	-0.145	-0.739	-0.125	-0.539	-0.140	0.402	-0.279	-0.429	0.309	0.060	0.496	-0.152	-0.285	-0.168	0.336	1