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THE PRODUCTION AND MIGRATION OF EDUCATIONAL CAPITAL:
SOME STATES WIN AND OTHERS LOSE

By

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A Dissertation

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THE PRODUCTION AND MIGRATION OF EDUCATIONAL
CAPITAL: SOME STATES WIN AND OTHERS LOSE

By

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A Dissertation Approved on

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ABSTRACT

THE PRODUCTION AND MIGRATION OF EDUCATIONAL CAPITAL: SOME STATES WIN AND OTHER LOSE

Patrick J. Kelly

August 9, 2010

As state policymakers draw clearer connections between the college-level attainment of their residents and the corresponding economic and social benefits, there is great need for more data and information regarding the production and migration of educational capital. The purpose of this study is to address the following research questions: Which states in the U.S. are producing relatively large numbers of college graduates and which benefit (or not) from the production of other states by importing large numbers of college graduates? What are predictors of interstate migration of college graduates at the person and state levels? What are the most useful policy options for states to increase educational capital? What are the characteristics of some key state-level policies already implemented in certain states in the U.S.?

This study focuses primarily on the state as the unit of analysis. Coordinated and comprehensive policies aimed at increasing educational attainment are typically implemented at the state-level. It contains a comprehensive review of recent literature on the importance of educational capital, and the production and migration of educational capital. A variety of descriptive analyses are provided that gauge how well state systems of higher education produce college graduates and the degree to which states benefit (or

not) from importing college graduates. It also includes the results of a Hierarchical Linear Model (HLM) that tests the effects of person and state level characteristics on interstate migration of college-educated residents. At the person level, greater likelihood of interstate migration among college-educated adults is associated with Asians and Native Americans, males, younger adults, adults without children, higher degree-levels (e.g. doctorate vs. associate), and employment in high-skill occupations. At the state level, higher rates of interstate migration are associated with states that have substantially increased employment in high-skill occupations; creating greater demand for college-educated residents. Finally, the results of a focus group with seven state higher education policymakers provides a great deal of information regarding best policies and practices for the production of college graduates, and the ability of states to retain and attract educational capital.

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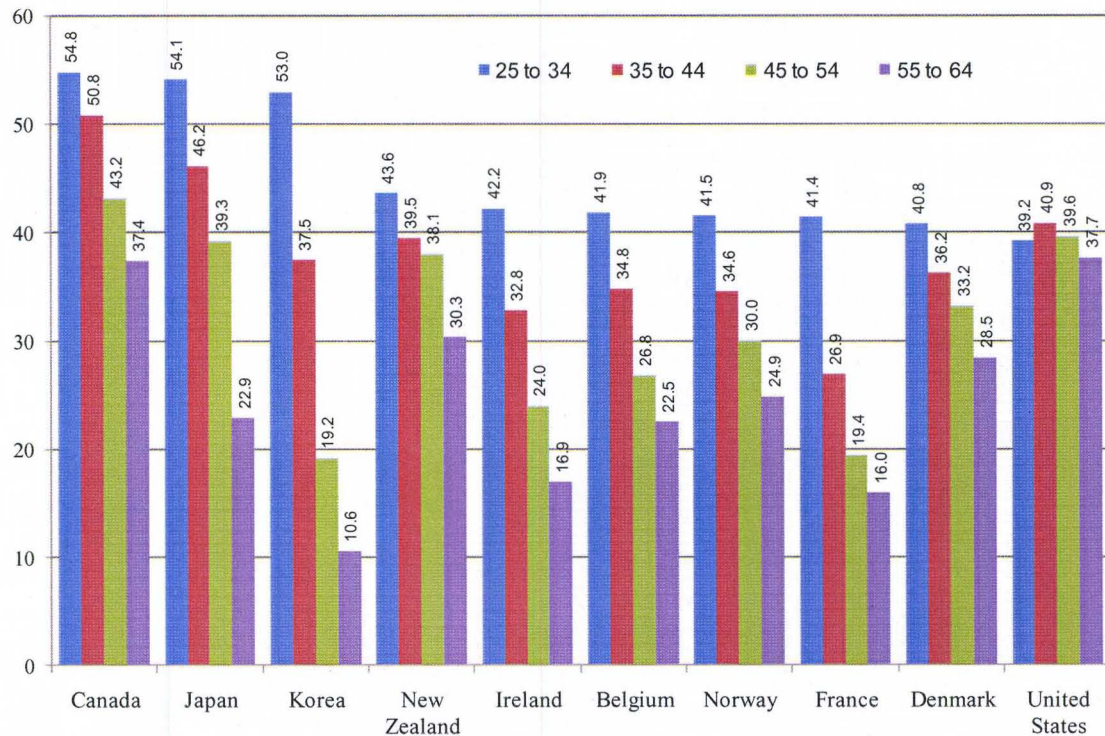
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CHAPTER 1

INTRODUCTION AND LITERATURE REVIEW

For quite some time, one of the United States' greatest strengths has been the high education levels of its residents, and the translation of the resulting knowledge into a vibrant economy that has afforded many Americans a great deal of opportunity and comfort. However, this competitive edge has begun to erode. Recent data reported by the Organisation for Economic Cooperation and Development (OECD) indicate the U.S. recently ranked tenth among the world's developed countries in the percentage of young adults aged 25 to 34 with a college degree (associates and higher). These individuals represent the future workforce in the U.S. Compared to the leading OECD countries, the U.S. is the only country where young adults are less educated than those who are 35 to 44 and 45 to 54 years of age (Figure 1). Reflecting its past dominance, the U.S. leads these countries only in the age-group that is quickly approaching retirement – those aged 55 to 64. The majority of these residents earned college credentials more than three decades ago.

Figure 1. Percent of Adults with College Degrees (Associate and Higher) – by Age-Group (2006)



Source: Organisation for Economic Cooperation and Development, Education at a Glance (2008)

The declining competitive standing of the U.S., along with the recognition of the importance of a college-educated citizenry in the global economy, has elevated the conversation among national and state postsecondary education policymakers regarding the educational attainment of our nation’s workforce. These circumstances probably fueled the following statement made by U.S. President Barack Obama in his inaugural address in February 2009:

“By 2020, America will once again have the highest proportion of college graduates in the world”
 - President Barack Obama, 2/24/09

The policy levers for postsecondary education in the U.S. reside largely at the state level. With the exception of federal Pell Grants, the vast majority of funds for public colleges and universities (which serve 78 percent of the nation’s undergraduate

students) come from direct state appropriations, and tuition and fees from residents of the state. Any national goal or imperative, therefore, must be carried out within fifty unique policy environments, in which state-level policymakers and stakeholders—governors, legislators, college and university presidents, business leaders—are key to overall success. To improve their state’s competitive position, they must grapple with two primary issues: the ability of the state’s system of higher education to produce college graduates and the ability of the state’s economic infrastructure to retain them and attract college-educated residents from elsewhere. It is the combination of these two forces that drives the ultimate educational attainment levels of a state’s population.

As state policymakers begin to realize the connection between college-level attainment economic and social benefits, the need for more information about the production and migration of educational capital becomes critical. Our economy and the market forces associated with it are increasingly dependent upon knowledge-based skills. With fewer exceptions than ever before, it is critical for individuals to attain some form of education beyond high school in order to compete in the global economy and experience even a lower-middle class lifestyle. The purpose of this study is to identify which states are winning or losing the competition to position themselves in the knowledge-based economy; more specifically, which states in the U.S. are producing relatively large numbers of college graduates, which states benefit from the production of other states by importing large numbers of college graduates, some of the economic and labor force conditions in states that attract or repel college graduates, and the best state policies and practices associated with increasing educational capital.

For several reasons, this study focuses primarily on the state (as opposed to cities or metropolitan areas) as the unit of analysis. Coordinated and comprehensive policies aimed at increasing educational attainment are typically implemented at the state-level. State policymakers are increasingly acknowledging the link between increased educational capital in their states and resulting increases in personal income and the state's tax base. Recent examples of the types of policies implemented at the state-level include scholarships designed to keep the brightest students in state, coordinated efforts to link the strategic planning activities of higher education and economic development, and increased participation of the business community in statewide higher education planning. Examples of these types of activities within states are examined in this study through focus group interviews. Additional analyses examine the personal characteristics of cross-state migrants with college degrees, selected characteristics of states that influence in- and out-migration of college educated residents, and the impact of degree-production on the education levels of the states' populations.

The remainder of this chapter consists of a review of the literature. It is organized into three major topics: educational capital, the production and migration of educational capital, and economic conditions that impact the accumulation of educational capital. Distinctions between individual and state level characteristics are provided throughout.

Educational Capital

The term "educational capital" has become the current language used to describe the general level of educational attainment in a state's population. High levels of educational attainment are related to higher incomes for individuals, and thus to tax revenues and economic activity. Populations with high levels of educational capital also

make fewer demands on expensive social services like welfare and corrections, while they indirectly save public resources through improved health and better lifestyle choices. Better educated individuals are also able to successfully negotiate increasingly complex decisions about health care, personal finance, and retirement—choices that were once made for them by government or their employers (Ewell, Jones, and Kelly, 2003).

The term “educational capital” has been defined as “a reservoir of knowledge and skills” (Callan and Finney, 2002) or a “high level of relevant knowledge and skills” (Ewell, et al, 2003). While the term “educational capital” is relatively new, its meaning is closely tied to that of human capital. The literature on human capital has accumulated for more than a century and is not extensively reviewed here. But a few more recent and influential works help to lay a theoretical foundation for many of the analyses conducted in this study.

“Human capital is the attributes of a person that are productive in some economic context. Often refers to formal educational attainment, with the implication that education is investment whose returns are in the form of wage, salary, or other compensation. These are normally measured and conceived of as private returns to the individual but can also be social returns” (www.econterms.com, The Online Glossary of Research Economics). The theoretical framework that supports the concept of human capital is based largely on the notion that human capital investments take place at the individual and governmental levels, and both are characterized by positive rates of return. Individuals experience greater earnings and quality of life and the society at large experiences a more productive labor force that leads to economic growth. “Human capital theory holds that education, whether formal or on-the-job, is an investment both for the individual and the society that

devotes resources for providing it. Individuals decide on how much to invest based on their expected private return, whereas governments base their decisions to invest or subsidize human capital on the social return” (Langelett, 2002).

Gary Becker, perhaps the most notable author on the topic of human capital, quantified the monetary returns of a college education in a variety of ways. Overall, he found that the average monetary rate of return for a college education is between 11 and 13 percent in the United States – and that it differs substantially by race and gender, with white males having the highest rates of return (Becker, 1993). Nonetheless, there is a net effect even after taking these factors into account. He acknowledged that measuring societal returns is much more difficult; nevertheless “it is clear that all countries that have managed persistent growth in income have also had large increases in the education and training of their labor forces” (Becker, 1993).

In his summary of 20th century research on human capital, George Langelett postulates that “economists have identified nine ways in which education to individuals also contributed to economic growth to the country as a whole: (1) education changes knowledge and people’s perceptions and expectations of themselves and the society around them, (2) education, through investment in human beings, results in a more efficient use of existing resources, (3) there is a positive correlation between literacy and life expectancy, (4) education can make a net contribution to economic growth, even if the rate of return is lower than other forms of capital because the investment in education would otherwise be consumed, (5) research is one of the traditional functions of education, leading to the development of new technology, including both new products and more efficient use of existing ones, (6) education increases the level of human

capital, the know-how or acquired ability of workers, which in turn raises the efficiency of the workforce, (7) there is a positive correlation between education and people's ability to adapt to change, (8) as demand increases for the education required for high-paying jobs, it is in the self-interest of educational systems to provide the supply, and (9) as education levels increase for women in developed countries, the opportunity costs of staying at home to raise a family rises, leading to both increases in labor force participation and reductions in fertility rates" (Langelett, 2002).

Foreshadowing many of the more recent works reviewed below was a book entitled *Investment in Learning: The Individual and Social value of American Higher Education* (Bowen, 1977). It linked college-level learning to individual benefits such as private monetary returns, moral development, consumer behavior, and health. It also established relationships between higher education and societal benefits such as research, public service, economic productivity, citizenship, and human equality.

More recently, *Higher Learning, Greater Good: The Private and Social Benefits of Higher Education* (McMahon, 2009) broadens the notion of human capital and more closely ties human capital theory to the policies and practices of U.S. higher education. McMahon expands the traditional concept of human capital (that focuses almost exclusively on the increased production associated with the acquisition of knowledge and skills) to include the private non-market and social benefits of higher education. "Productive human capital skills are not just used on the job. They are carried home with the individual, and affect the productivity and value of his or her time there. They are also used and are productive during time spent in the community" (McMahon, 2009). Many

of the private non-market and social benefits associated with higher levels of education are highlighted in the next section below.

McMahon relates his findings regarding the private and social benefits of higher education to many of the general failures of higher education policy in the U.S. at both the federal and state levels. He concludes that higher education policy has not responded adequately to the challenge of addressing the skills deficit in the U.S. Higher education policies initiatives have not fostered joint efforts between K-12 and higher education to secure the kind of funding reforms needed to successfully carry out their missions, have failed to reach across the public-private and university-community college divides to stress their roles and common overall mission, are promoting strategies of protectionism rather than strategies for reducing the skills deficit, and are very inward looking – tending to focus on internal campus management rather than an overall public agenda (McMahon, 2009). In addition, higher education policy research has been slow to incorporate recent research in modern human capital theory, and thus provides inadequate information regarding the individual and societal benefits associated with higher learning (McMahon, 2009). These inadequacies occur at a time when the stakes for higher education are as high as at any time in history; with mounting pressure to improve (or at least maintain) our nation’s ability to compete in an increasingly knowledge-based global economy and the necessity to garner new sources of revenue in the wake of diminishing state and federal resources.¹

The vast body of literature on human capital focuses largely on education and training in general, and the accumulation of relevant knowledge and skills – e.g. high

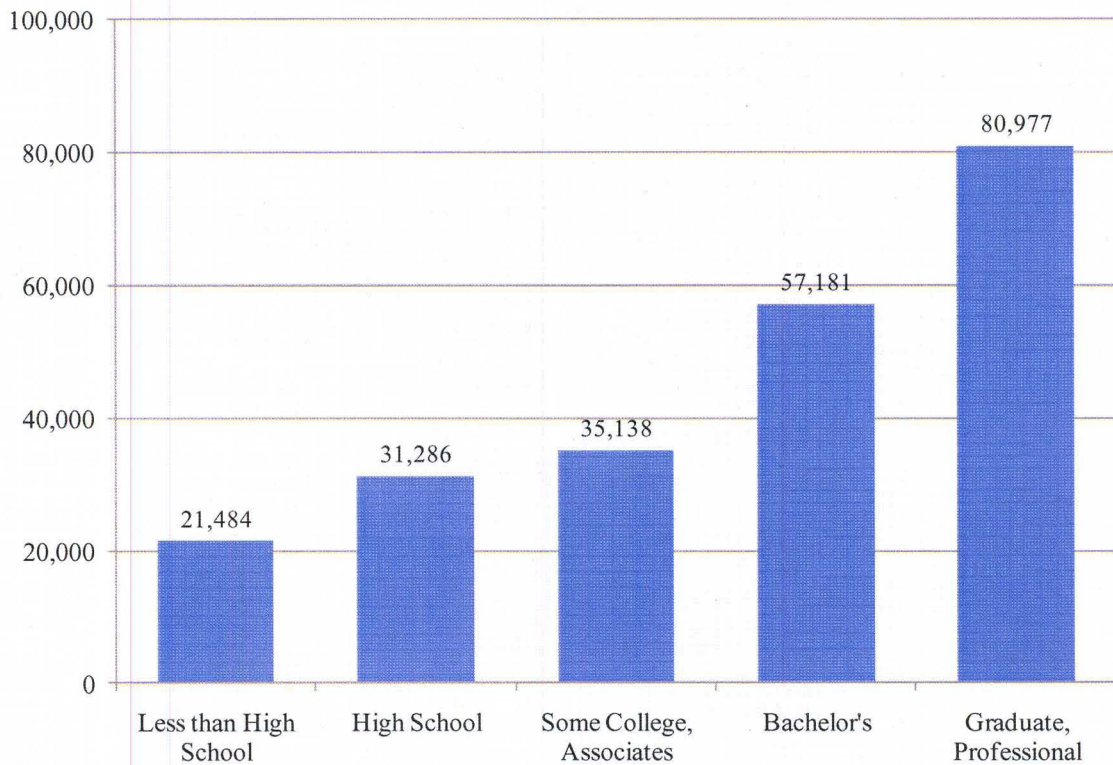
¹ The higher education policy environment – as it relates to the development of educational capital is discussed in more detail in the following chapter.

school completion, on-the-job training, college completion, etc. Older studies tended to focus much more on the attainment of a high school credential at a time when completing high school yielded substantial returns, both to the individual and the production levels of the workforce. More recent works (like McMahon's) have begun to focus on college credentials as the milestone for measuring rates of investment versus return. It is important to note that college attainment (adults with college degrees, associate and higher) is generally used as a proxy for educational capital in this literature. This recognizes the fact that "high levels of relevant knowledge and skill" are not necessarily the same as high levels of education attainment. Data are not available on the skill levels of individuals who receive training in less formal ways (e.g. on the job training, certification training, etc.), at least in the public data sets provided by the U.S. Census Bureau.

Individual Benefits of Higher Levels of Education

The most powerful marketing tools used throughout the U.S. by state higher education organizations and colleges and universities include visual displays of the strong relationship between educational attainment and personal income. These are intended to convey a message to potential students that higher levels of education will lead to higher earnings and, thus, a greater quality of life. Figure 2 displays for the nation as a whole the dramatic increase in personal income at each stage of educational attainment. The average annual earnings for bachelor's degree-earners are nearly double the average for those who earn just a high school diploma (\$57,181 vs. \$31,286). U.S. residents who earn a graduate or professional degree earn nearly three times as much as those with high school diplomas.

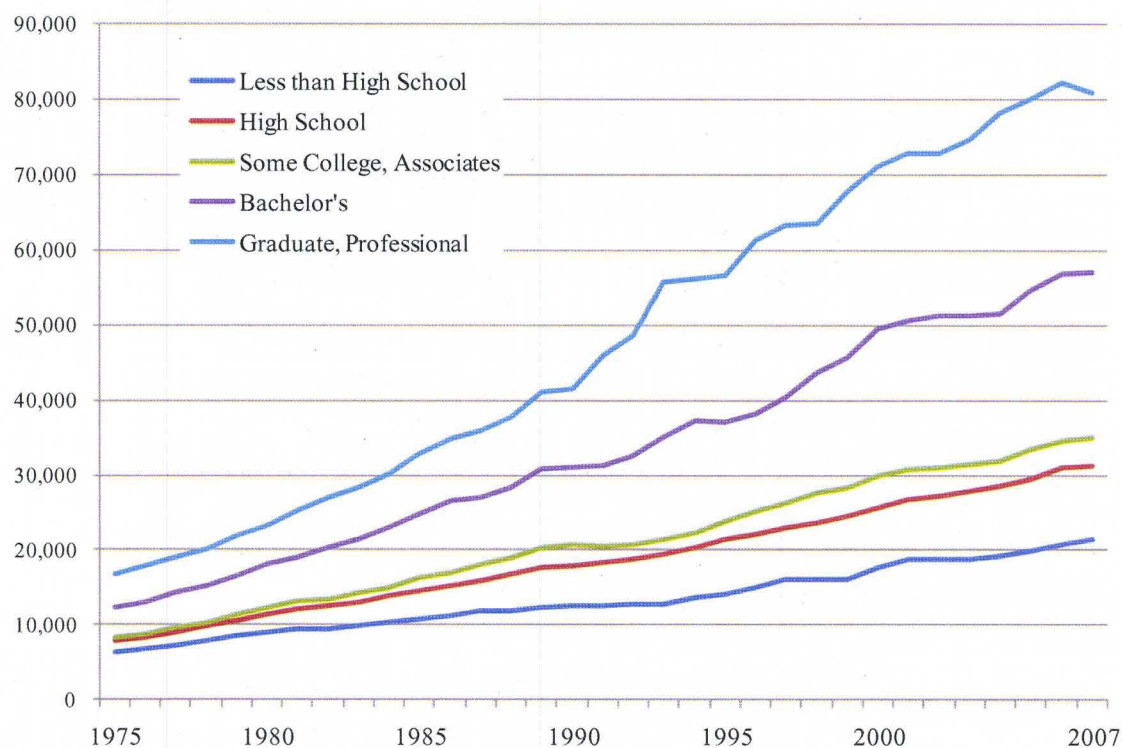
Figure 2. Average Earnings by Education Level (2007)



Source: US Census Bureau, Current Population Survey, 2007

Figure 3 shows further that the difference between earnings attributable to high school and college attainment is widening – indicating that a college education generates more income relative to its alternative than ever before and, if trends continue, the disparity is likely to widen even more. While this picture varies from state to state, it points to the increasing need for individuals to attain at least some level of education beyond high school. These and related findings are constant reminders to state policymakers about the importance of college-level degree production. The difference in earnings at the state-level between residents with a high school diploma and a college degree will be examined in this study – with respect to its impact on the migration of educational capital.

Figure 3. Average Earnings by Education Level – From 1975 to 2007



Source: US Census Bureau, Current Population Survey, 1975 to 2007

While the positive relationship between earnings and levels of education is the most common focus among many researchers and policy analysts, there are many other non-market factors associated with educational attainment. Recent publications such as *Education Pays: The Benefits of Higher Education for Individuals and Society* (Baum and Ma, The College Board, 2007) and *The Price We Pay: Economic and Social Consequences of Inadequate Education* (Belfield and Levin, 2007) effectively establish the relationships between higher levels of education and individual factors such as: health, poverty, incarceration, and employment. Adults with bachelor's degrees and higher, compared to those with just a high school diploma, are more likely to be covered by employer-provided health insurance (nearly 70 percent vs. 50 percent), nearly three times less likely to be unemployed, much less likely to be living in households in poverty (6 percent compared to 11 percent), and far more likely to engage in activities that lead to

healthier lives – higher rates of exercise and lower rates of smoking (Baum and Ma, 2007).

McMahon's (2009) research, using a variety of procedures, establishes statistically significant relationships (and the monetary return) between individuals earning a bachelor's degree and their self-rated health, smoking cessation, life expectancy, health of children, cognitive development of children, family size, and consumption and saving. All combined, the annual value of these non-market private benefits total \$38,080 – more than the average annual earnings increase of \$31,174 (the direct market value earning a bachelor's degree).

Public Benefits of Higher Level of Education

Many of the individual benefits associated with a college degree also translate into public benefits, and reductions in public costs at the federal and state levels. Adults with bachelor's degrees and higher are more than three times less likely to be dependent on Medicaid than those with just a high school diploma – 6 percent vs. 19 percent (Baum and Ma, 2007). A recent analysis conducted by Waldfogel, Garfinkel and Kelly (2007) reveals that 16.9 percent of single mothers with just a high school diploma participate in the federal Temporary Assistance to Needy Families (TANF) program, 30.8 percent participate in the Food Stamp program, and 23.8 percent used federal housing assistance. The rates for single mothers with education beyond high school are 0.8 percent TANF participation, 18.1 percent Food Stamp use, and 14.7 percent use housing assistance. Finally, data from the U.S. Bureau of Justice Statistics indicate that, in the year 2002, less than three percent of the nation's prison population had earned college degrees (associate

and higher), while nearly 40 percent of general adult population has earned college degrees. Adults with college degrees are very unlikely to be incarcerated.

In addition to cost savings associated with decreased welfare, health, and corrections expenditures for individuals with higher levels of education, highly educated individuals are much more likely to engage in civically-responsible behaviors. Data from the Bureau of Labor Statistics and the U.S. Census Bureau indicate that 76 percent of young adults (aged 25 to 44) with bachelor's degrees and higher voted in the 2004 general election, compared to only 49 percent with just a high school diploma; and 43 percent with bachelor's degrees and higher volunteer through an organization, compared to only 19 percent with a high school diploma (Baum and Ma, 2007).

As he did with the private non-market benefits of higher education, McMahon (2009) quantifies the statistical relationships and monetary returns between earning a bachelor's degree (as opposed to just a high school diploma) and many societal factors. Obtaining a bachelor's degree increases the likelihood of (1) behaviors contributing to democratization (time devoted to civic, political, and charitable institutions), (2) time and money spent on human rights issues, (3) behaviors associated with political stability (higher quality political leadership, less engaged in external conflict, more realistic economic expectations, better economic planning, less corruption in government and business, and less involvement of military and/or religion in politics), (4) higher life expectancy, (5) reduced inequality, (6) lower rates of crime, (7) lower public welfare, health and corrections costs, and (8) improved environmental conditions – though indirect (sanitation, water quality, renewable energy, preservation of forests and wildlife, park development). Much of the research associated with environmental conditions

occurs in research universities – which are much more prevalent in highly educated societies. All combined, the annual monetary value associated with these societal benefits is estimated to be \$27,726 per bachelor degree produced.

While many state policymakers acknowledge the relationships between higher levels of education and (1) reductions in public spending, and (2) a more publicly engaged citizenry, their push to increase college degree-production is perhaps most influenced by the relationship between educational attainment and personal income (described above) – and the resulting impact of higher levels of education on the state’s revenues and tax base. Table 1 displays the Pearson Correlation coefficients for all possible combinations of the following four variables: percentage of adults aged 25 to 64 with college degrees (associate and higher), personal income per capita, total taxable resources² per capita, and actual tax revenues³ per capita. The 50 states are the units of analysis.

² Total taxable resources are the sum of Gross State Product (in-state production) minus components presumed not taxable by the state plus various components of income derived from out-of-state sources. (Source: State Higher Education Executive Officers: using data from the Bureau of Economic Analysis, the Office of Economic Policy, and the U.S. Department of Treasury).

³ Actual tax revenues are the general revenues derived from taxation by state and local governments. (Source: State Higher Education Executive Officers: using data from the U.S. Census Bureau).

Table 1. Relationships between States Educational Attainment, Total Taxable Resources, Actual Tax Revenues, and Personal Income per Capita

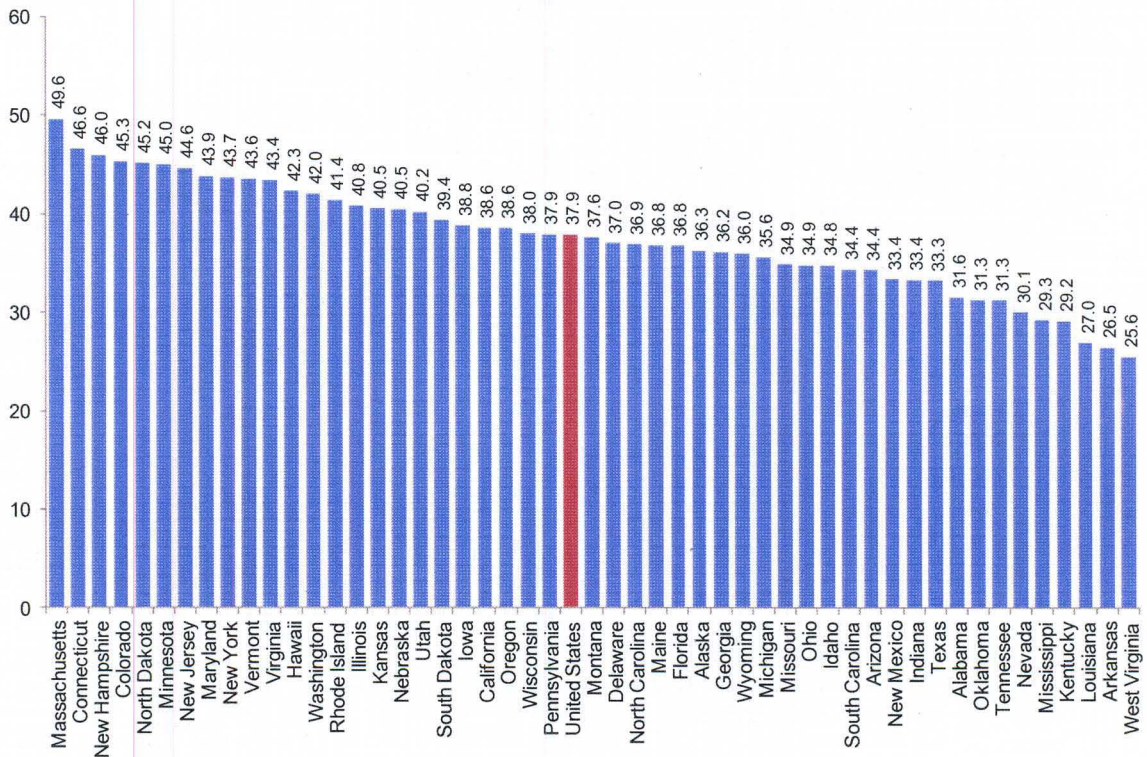
Taxable Resources, Tax Revenues, Educational Attainment, and Income	Pearson Correlation	Total Taxable Resources per Capita	Actual Tax Revenues per Capita	Percent of Adults 25 to 64 with Associate Degrees and Higher	Personal Income per Capita
Total Taxable Resources per Capita	Pearson Correlation	1.000			
	Sig. (2-tailed)				
Actual Tax Revenues per Capita	Pearson Correlation	0.749	1.000		
	Sig. (2-tailed)	0.000			
Percent of Adults 25 to 64 with Associate Degrees and Higher	Pearson Correlation	0.543	0.582	1.000	
	Sig. (2-tailed)	0.000	0.000		
Personal Income per Capita	Pearson Correlation	0.836	0.796	0.767	1.000
	Sig. (2-tailed)	0.000	0.000	0.000	

Source: State Higher Education Executive Officers: 2008 Survey of Higher Education Finance; U.S. Census Bureau: 2008 American Community Survey; U.S. Bureau of Economic Analysis

The strongest relationships are between educational attainment and personal income (0.77), personal income and actual tax revenues (0.80), and personal income and total taxable resources (0.84) – with a value of 1.0 being a perfect correlation. All of the relationships are statistically significant at the 0.01 level. Each correlation coefficient is positive, indicating that as one variable increases, so does the other. While correlation coefficients do not necessarily imply cause and effect, the strength of these statistical relationships indicate strong associations among the variables. As the percentages of adults with college degrees increase in states, so do personal income and state tax revenues per capita. These relationships enable higher education policymakers and stakeholders to make a broader and more compelling case for educating state residents. Of all the factors associated with an educated citizenry, the relationship between an education and state wealth is perhaps the most influential in a policy setting; nearly all state legislators strive to build a more prosperous state.

It is important to understand that states vary dramatically in the proportion of their residents with college degrees. Figure 4 displays the percentage of working-aged adults with college degrees in 2008. Massachusetts has nearly twice the percentage of residents with college degrees as does West Virginia. Connecticut, New Hampshire, and Colorado are also among the most educated states, while many of the southern states are among the least educated.

Figure 4. Percent of Adults Aged 25 to 64 with College Degrees – Associate and Higher (2008)



Source: U.S. Census Bureau, 2008 American Community Survey

These data, along with the supporting evidence above that education matters, are key to this study. States that have high levels of educational attainment have benefitted from either producing relatively large numbers of college graduates or importing them from outside the state – or varying combinations of both. Conversely, states with low levels of educational attainment either produce few college graduates and/or export them

to other states. Chapter 3 provides a great deal of information regarding these two constructs, and the relative positions of states on each. In the end, the varying patterns of production and migration across states yield different policy implications for state higher education policymakers. There is not a “one size fits all” strategy for increasing educational capital in states.

The Production and Migration of Educational Capital

While some individual characteristics associated with interstate migration are addressed in this study, it focuses primarily on the production and migration of educational capital at the state-level and its impact on state higher education policymaking. As Bound, Groen, Kezdi, and Turner (2001) point out: “Framing the analysis at the state-level reflects the observation that it is state policymakers who determine the level of institutional subsidy for higher education and often the associated tuition at public colleges and universities”. The majority of policy levers in public postsecondary education are at the state level – where policymakers are often responsible for financing the enterprise, regulating tuition and fees, developing systems of accountability, setting goals for the state, and defining the roles and missions of institutions.

In some states, efforts to more clearly articulate the linkages between an education system and educational capital have arisen primarily out of aims to improve and reform public higher education policies. Recent publications such as *Measuring Up: The State-by-State Report Card for Higher Education* (published biennially by the National Center for Public Policy and Higher Education from 2000 to 2008) are beginning to help redefine the role of state higher education policymaking from

managing institutions of higher education to creating and implementing a public agenda where the institutions collectively serve to achieve broad state goals. The report card grades states (from A to F) not on the productivity of individual institutions but on how well state systems of K-12 education prepare students for college, college participation, the affordability of college attendance, college completion, and the degree to which the state benefits from its higher education enterprise⁴. Specifically, the completions and benefits categories of the report card present an intriguing dilemma for public policy because of their link to economic development and the welfare of the citizens in state. In a clear way, they remind state policymakers that it is possible to have a relatively productive higher education system (with respect to producing college graduates) while the state experiences poor levels of educational capital. Thus, it is not only how many college graduates a state produces but also how well it retains its graduates and imports graduates from outside the state that determines its educational capital. These phenomena are the primary focus of this study⁵.

In general, the struggle for states to maintain and increase educational capital is a supply and demand issue: how do policies affecting the production of college-educated workers compare to incentives for location choice of college-educated workers (Bound, et al., 1991)? Policies affecting the production of educational capital – the supply side – are generally the easiest for policymakers to understand. Many state systems of higher education are subject to varying forms of performance measurement (accountability) associated with degree productivity, both in terms of the number of degrees produced and the retention and graduation rates of students. Effectively dealing with the demand-side,

⁴ The 2008 version of the report card can be accessed at <http://measuringup2008.highereducation.org>.

⁵ The “Completion” category of *Measuring Up* is discussed in more detail later in this chapter.

on the other hand, requires state policy leaders to break down the silos of higher education and economic development and create joint planning and performance measurement strategies among these agencies. Some specific examples of states that are establishing a policy framework for doing so are discussed in the final chapter.

In *Leave No Stone Unturned: A Human Capital Approach to Workforce Development*, Conway (2001) asserts that “there are four basic ways the South could expand its supply of human capital: build the skills of youth and incumbent workers, stop the leakage of people out of the labor market, increase domestic and foreign in-migration into the region, and facilitate business relationships with overseas producers.” While these assertions are rather general and refer to the southern region, they point to the cross-cutting approach needed to address the issue of educational capital.

Historically, states have successfully created political bodies – either governing or coordinating boards – which essentially measure the enrollment, number of degrees produced, academic productivity, research activity, and the fiscal conditions of their higher education institutions. More recently, in states such as Indiana, Kentucky, and North Dakota, policymakers are more clearly defining higher education’s role in serving the people of the state, creating jobs, and generating research activity that results in economic growth – all aimed at increasing the educational attainment of the state’s residents⁶. Viewed from the standpoint of educational capital, a principle policy objective for any polity is to increase the number of individuals with high levels of relevant knowledge and skills among its citizens (Ewell, et al., 2003). For states, this is a matter of educational “stock” – not just high levels of production. Therefore, attaining

⁶ These specific state initiatives are reviewed in Chapter 5.

high levels of educational capital requires two quite different approaches: producing more college-educated workers and creating and/or maintaining an economy that demands and attracts them. Recent state performance with respect to these two phenomena is presented in chapter 3.

The Production of Educational Capital

As noted earlier, there are coordinated efforts in many states to measure the volume and historical patterns of degree production by postsecondary institutions – even by academic field. Also, publications such as the *Digest of Education Statistics*, published annually by the National Center for Education Statistics (a branch of the U.S. Department of Education), report the volume of degree production by state. However, many of these efforts – by just reporting the actual numbers of degrees awarded – fall well short of providing meaningful information regarding a state’s degree production relative to its population in need of higher education, and relative to workforce demand.

“*Measuring Up: The State-by-State Report Card for Higher Education* is a series of biennial reports cards that provides the general public and policymakers with information to assess and improve higher education in each state. The report cards evaluate states because they are primarily responsible for educational access and quality in the United States.” (National Center for Public Policy and Higher Education, 2008). Among a variety of performance measures for state systems of education, it provides several measures for college retention and completion at the state level, and provides comparative benchmarks for the best-performing states. These measures are combined

to derive an overall grade for college completion (from A to F). Table 2 contains these measures for the state of Kentucky – which received a grade of B.

Table 2. Completion Measures from *Measuring Up 2008*

Completion	Kentucky		Top States
	Early 1990s	2008	
Persistence (20%)			
1st year community college students returning their second year	53%	55%	66%
Freshmen at 4-year colleges returning their second year	69%	70%	82%
Completion (80%)			
First-time, full-time students completing a bachelor's degree within 6 years	37%	47%	65%
Certificates, degree, diplomas at all colleges and universities per 100 undergraduate students	12	21	21
Certificates, degree, diplomas at all colleges and universities per 1,000 adults with no college degree	15	32	44

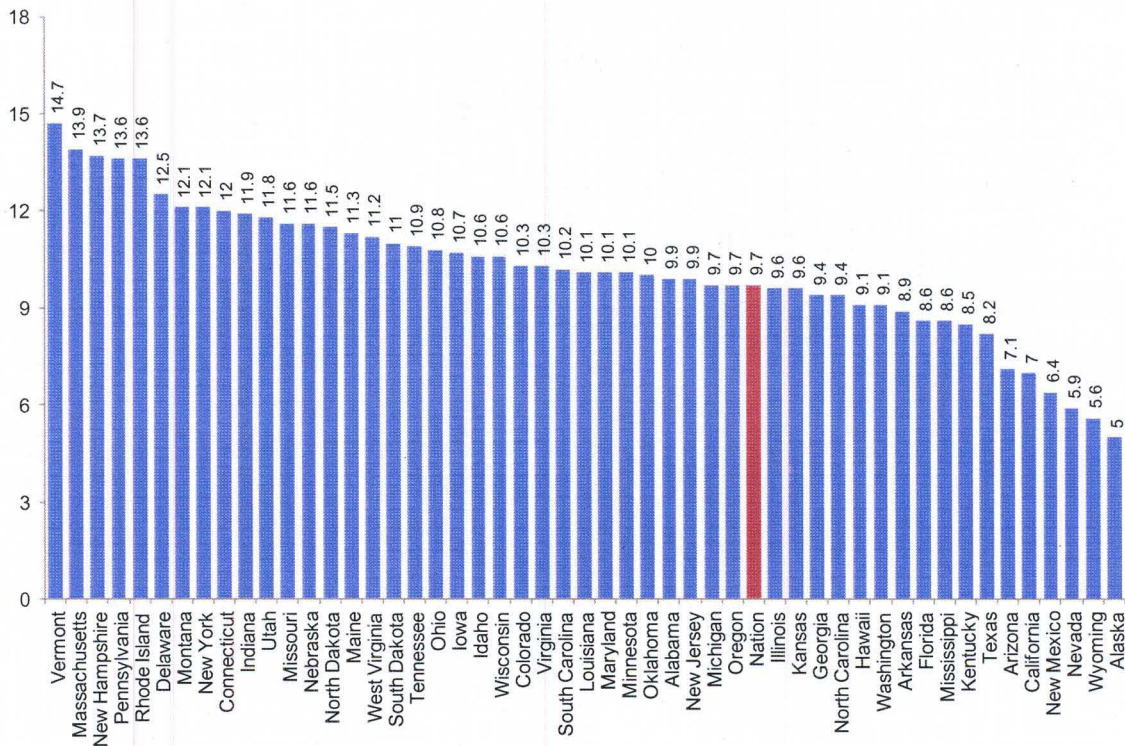
Source: National Center for Public Policy and Higher Education, *Measuring Up 2008*

These have become standard measures used for persistence and completion in the higher education community. Kentucky, for example, performs well below the average of the top states on each of these measures – with the exception of the second measure under “Completion”, where it matches the top state performance. The postsecondary system in Kentucky awards many more one-year and less-than-one-year undergraduate certificates relative to its student body than do many other states. This study, however, does not focus on certificate production because they lack the more rigorous standardized definitions of associate degrees and higher, and there is not a designated category for them in the U.S. Census data, which are used extensively throughout this study.

The National Center for Higher Education Management Systems, on its website <http://www.higheredinfo.org>, also provides measures for college completion that provide a general sense of state-level degree productivity relative to enrollment (for associate and bachelor’s degrees) – a measure of the efficiency with which students move through the

system to completion. For example, Figure 5 shows the performance of state systems of higher education (public and private institutions) at the baccalaureate level. Vermont awards nearly three times as many bachelor’s degrees relative to its undergraduate student body than Alaska. Massachusetts, New Hampshire, and Pennsylvania are other top performers and Wyoming, Nevada, and New Mexico award very few bachelor’s degrees to undergraduate students.

Figure 5. Bachelor’s Degrees Awarded as a Percent All Undergraduates (%) 2004-05



Source: National Center for Higher Education Management Systems

While these measures (and those used in *Measuring Up*) are important indicators of the ability of systems of higher education to produce degrees, they are not effective measures of degree production relative to the needs of state populations. States can have relatively efficient institutions that produce few graduates relative to the population in need (e.g. adults with no college degree). Under the lens of the overall “production of

educational capital”, it is important to utilize a measure that gauges how well a state system of postsecondary education produces college graduates relative to the size of the population in need. This is the focus of this study.

The Migration of Educational Capital

For states, the complement of producing college graduates is creating and maintaining an economy that attracts educational capital from other states and countries. Having institutions of higher education that produce relatively large numbers of college graduates may have very little impact on the mobility of educational capital and its accumulation in certain areas of the U.S. For example, does Indiana’s economy create enough demand for the graduates produced by institutions like Indiana University, Purdue University, and Notre Dame? Does the state of Georgia produce enough college graduates to supply the increasing demands of Atlanta’s economy – one of the fastest growing metropolitan areas in the U.S.? For policymakers in West Virginia – which ranks last in the percentage of adults with a bachelor’s degree or higher – a question of great importance is not only “how do we produce more college graduates?” but also “how do we create an economy that demands them?”

Many studies have shown the impact of migration on certain areas of the U.S. Some have focused primarily on the total numbers of migrants from one area or state to another. Others have focused on the characteristics of those who are more likely to move. But very little attention has been given to the impact of these mobility patterns on states’ levels of educational capital and the labor market and economic conditions that drive certain patterns of mobility.

A series of reports released by the United States Census Bureau highlight the migration patterns across the U.S. by state from 1995 to 2000. Some general findings include:

- Overall Migration – Florida, Georgia, and North Carolina experienced the highest net in-migration and New York, California, and Illinois experienced the highest net out-migration. The highest rates of in-migration (normalized by the size of the population) occurred in Nevada, Arizona, and Georgia and the highest rates of out-migration occurred in Hawaii, Alaska, and New York. The largest state-to-state flow in the U.S. was the movement from New York to Florida. (U.S. Census Bureau, October 2003)
- Migration by Race – Non-Hispanic whites were more likely to move to a different state than other ethnic groups. “Conversely, Blacks and Hispanics were more likely to have made intra-county (short-distance) moves than whites. These differences to some extent reflect differences in characteristics like education, which is positively related to the likelihood of moving long distances” (U.S. Census Bureau, 2003). Florida had the largest net gain of Non-Hispanic Whites, Georgia had the largest net gain of Blacks, Nevada had the largest net gain of Asians, and Florida had the largest net gain of Hispanics. (U.S. Census Bureau, October 2003)
- Migration of Young, Single, College-Educated Residents (Ages 25 to 39) - This analysis found that California, Georgia, and Colorado experienced the largest net in-migration of young, single, college-educated residents and Nevada, Colorado, and Georgia had the highest rates of these in-migrants. Conversely, Pennsylvania, Ohio, and Michigan were the largest net-exporters of residents with these characteristics and North Dakota, Iowa, and South Dakota exported the largest numbers relative to their population. The most interesting patterns occurred in states like Missouri, Kentucky, and Indiana – which were net importers overall but exporters of college-educated residents. The reverse is true for California, Illinois, and Maryland – which were net exporters overall but net-importers of young, single, college-educated residents. (U.S. Census Bureau, November 2003)

Mortenson (2003) applied a useful approach to addressing the notion of interstate migration of educational capital in a very simple (but indirect) way. He calculated the number of bachelor’s degrees produced in each state from 1989 to 2000 and compared number change in the adult population (25 and Older) with a bachelor’s degree or higher

over the same time period. Some states produced substantially more four-year graduates over this time period than was reflected in the change in the bachelor's attainment levels of their adult population. The inverse was true of other states. These findings indirectly point to patterns of in- and out-migration of bachelor's degree earners. "The big gainers, controlling for the number of bachelor's produced, were Nevada, Alaska, Florida, Colorado, Georgia, Maryland, Oregon, and Minnesota and the big losers were Montana, Wyoming, North Dakota, Louisiana, and Vermont" (Mortenson, 2003). While this is not a direct measure of in- and out-migration of educational capital it points to important policy issues at the state-level. Some states can afford to produce relatively fewer bachelor's degrees because they import graduates from other places – and vice-versa. The limitations of this approach are that it doesn't account for the migration patterns of college-going students who leave their home state to attend college but then return home after they earn their degrees (a limitation that is only partially addressed in this study), it only accounts for bachelor's degrees, it provides a very limited picture of the impact of in- and out-migration of educational capital by state, and it does not back-out the migration and rapid growth of the retirement-age population – a segment of the population that participates in the workforce at much lower rates.

To gain a better understanding of the phenomenon of residential mobility, it is useful to know the personal attributes that predict it. In a study of residential migration and Georgia's labor force, Helling and Ertas (2002) found that the movers in the labor force were predominately young, white, college educated, working in management and professional occupations, and had relatively high household incomes. They also found that "current Georgia residents in the labor force who moved were more likely than their

counterparts elsewhere in the U.S. to have moved across state or national boundaries”.

The study of Georgia was based on a sample of 749 state residents participating in the labor force in fall of 2000, and provides many descriptive statistics on residential movers and non-movers – disaggregated by age, race/ethnicity, gender, level education, type of occupation, industry of employment, and household income. It included both within-state migration and in-migration from out-of-state.

In a study entitled *Migration of Recent College Graduates: Evidence from the National Longitudinal Survey of Youth*, Yolanda Kodrzycki (2001) points out that “In the context of today’s tight labor markets, as well as projections of continued growth in demand for workers with high skills, various states are considering how to retain and attract recent college graduates.” The research, based on a nationally representative sample of 6,000 young adults, found that movement across states occurred at about the same frequency among high school dropouts and high school graduates, but then increased significantly for residents at each subsequent stage of educational attainment. “Recent college graduates tended to move away from states with poorer job attributes while preferring to remain in coastal locations” and “recent college graduates are less likely to move away from their home state if it offers high average pay for college graduates” (Kodrzycki, 2001). Given the size of the sample, the impact of the migration patterns of these college-educated adults on each individual state could not be determined.

A more recent work entitled “Stability and Change in Individual Determinants of Migration: Evidence from 1985-1990 and 1995-2000” conducted by Tolbert, Blanchard, and Irwin (2006) confirms that those who migrate out of their labor market are more

likely to be: White than Black and Hispanic, male, a college graduate, younger, not married, and without children. It also concludes that these patterns are stable over the two time periods from 1985 to 1990 and 1995 to 2000. Their research utilized the public use data from the U.S. Census Bureau – then five percent samples for the 1990 and 2000 decennial censuses. This study uses the same data resource (from the 2000 census), and focuses on very similar predictor variables for the individual determinants of migration (including additional independent variables for type of occupation) but is limited to college graduates since it aims more specifically to determine the characteristics of college-educated residents who migrate from one state to another.

A study entitled “Who Will Stay and Who Will Leave,” conducted by the Southern Technology Council (2001), unveiled even more detail about personal characteristics that predict the likelihood of migrating from state-to-state. From a survey of nearly 8,000 recent college graduates, they concluded that “graduates are more likely to end up employed in-state” if they:

- Are foreign students subsequently employed in the US
- Majored in a field other than engineering or the physical sciences
- Were older than average for their class
- Attended a large college in a large metropolitan area
- Attended a college in a large state

On the other side of the equation according to the Southern Technology Council (2001), graduates are less likely to be employed in-state if they:

- Graduate in engineering and the physical sciences
- Have a high grade-point average
- Graduate from a research intensive institution

- Graduate from a historically black college or university
- Command an above-average starting salary upon graduation

The above analysis doesn't examine the local availability of jobs for college graduates. It also focused on the student or graduate as the unit of analysis – not the state. While the findings are more focused on recent college graduates than the movement of educational capital as a whole, they are important as state policymakers increasingly explore policies designed to keep college students and graduates in state. Policymakers have more policy levers at hand to influence the retention of college students and graduates than they do for retaining and attracting older educated workers. Strategies and approaches to state-level policymaking – with regard to the retention and attraction of college graduates – will be discussed in Chapter 4.

It is important to note that many of the migration studies reviewed above were conducted using data from the late 1990s and the early years of this decade. A recent report published by the Brookings Institution entitled “The Great American Migration Slowdown: Regional and Metropolitan Dimensions” shows that the overall migration rate of U.S. residents between the years 2007 and 2008 reached its lowest point since World War II (Frey, 2009). Twenty three states, mostly in the intermountain west and southeast showed reduced in-migration or a switch from net in-migration to net out-migration. The report attributes the slowdown to an “unprecedented run up in both housing values and housing-related debt, and the diminished ability to find new jobs in more desirable areas” (Frey, 2009). Frey's conclusions are also drawn from data provided by the U.S. Census Bureau: the 2008 Current Population and American Community Survey.

Economic Conditions that Impact the Accumulation of Educational Capital

One of the threads woven throughout this study is the impact of economic conditions on the accumulation of educational capital and the relationships between education, the workforce, and economic development across the 50 states. In chapters three and five, it also addresses the importance of linking higher education and economic development policies when developing state-level strategies to increase the education levels of state residents. The following excerpt is from *The Emerging Policy Triangle: Economic Development, Workforce Development, and Education* (Jones and Kelly, 2007).

“Whether their responsibilities are national, state, regional, or local, individuals who make and implement public policy all want to ensure economic growth and prosperity. All understand that the American way of life is fundamentally dependent on economic competitiveness. They also understand the rest of the equation: strong economies are characterized by an abundance of well-paying jobs; and overwhelmingly, well-paying jobs are held by individuals who have knowledge and skills obtained through education beyond high school. Where physical capital drives industrial economies, human capital drives economies in the information age.” (Jones and Kelly, 2007)

While conditions of economies and economic development (very broad topics in and of themselves) are not the primary focus of this study, it would be short-sighted to ignore them when addressing the production and migration of educational capital in states, along with existing and potential policies for improving the educational attainment of state residents. Given what we know about the economic conditions and the development of educational capital in countries from the wealth of literature on human capital, it is not unreasonable to assume that state-level economic conditions are also associated with the accumulation of educational capital.

The shape of the U.S. economy has changed dramatically over the past several decades. Carnevale and Rose (1998), in *Education for What? The New Office Economy*, assert that “higher education has created a new economy, which in turn has rewarded those better-educated employees with higher wages.” They found that, over the past several decades, there has been a dramatic increase in college-level attainment for nearly all jobs in the U.S. and the relative earnings of college-educated workers has increased sharply after 1979 (Carnevale and Rose, 1998). Other findings include:

- The traditional industrial labor model economy has been replaced by the office, which accounts for nearly 60 percent of the jobs for people with college degrees, 50 percent of all earnings, and most of the job growth in the last two decades.
- Actual factory work, especially low-skilled, has tended to flow toward countries with cheap labor, leaving behind the office to plan, manage, and coordinate the work.
- Explosive growth of leisure and entertainment – restaurants, travel, health clubs, gambling, cable and satellite television, computer games and the internet – which has changed the mix of final demand, which drives the need for different types of workers.
- A larger proportion of our labor force has become involved with managing physical and monetary resources – employment in finance, insurance, and real estate firms increased substantially from 1959 to 1995.

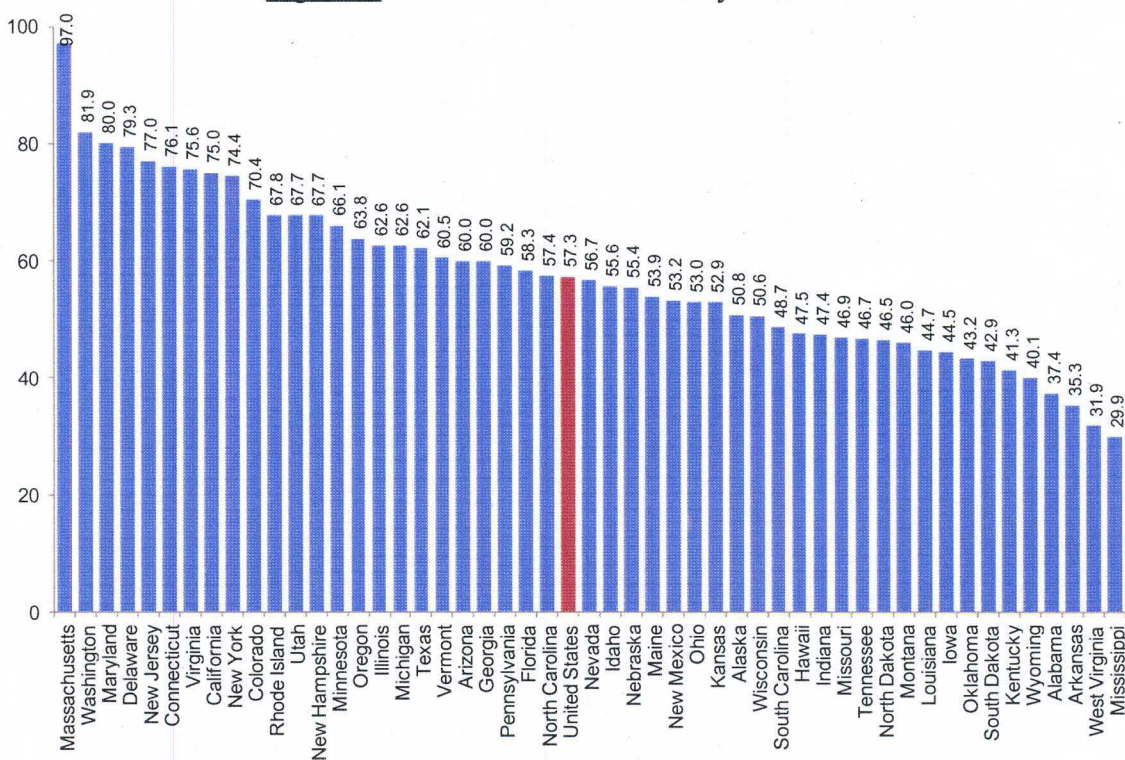
While the above research was conducted more than a decade ago, it reflects peak economic conditions in the U.S. during the late 1990s. The proportion of U.S. employment in high-skilled occupations has leveled off in the past decade or so. For example, in 2000, 33.6 percent of all U.S. workers were employed in management and professional occupations, compared to 32.6 percent in 2008.

While the shape of the U.S. economy has changed dramatically, how do economic conditions vary by state? Measuring the strength of state economies – as opposed to

metropolitan areas – is a relatively new concept. In 1999, the Progressive Policy Institute created the “State New Economy Index,” which is a composite index designed to measure how well states are positioned for the “new economy”. The index has evolved with the addition and revision of several indicators, and is currently produced by the Kauffman Foundation. The term “new economy” is defined by the Kaufmann Foundation as “a global, entrepreneurial, and knowledge-based economy in which the keys to success lie in the extent to which knowledge, technology, and innovation are embedded in products and service.” The index is derived from 29 performance-related indicators designed to measure state performance in five areas: knowledge jobs, globalization, economic dynamism, the digital economy, and innovation capacity. A complete list of the measures used in the 2008 State New Economy Index is shown in Appendix 1.

While the New Economy Index is designed to measure the overall economic strength of states, there is an underlying recognition that knowledge and skills are a critical component of strong economies. In the “knowledge jobs” category of the index are state-level performance measures associated with employment in high-skilled occupations, the educational attainment of the state’s adult population, and the education levels of recent immigrants from abroad – each of which is addressed at length in this study. Figure 6 displays the overall State New Economy Index scores for each of the 50 states – ranked high to low. Massachusetts, Washington, and Maryland have the strongest conditions for global, entrepreneurial, and knowledge-based economies; and Mississippi, West Virginia, and Arkansas the weakest.

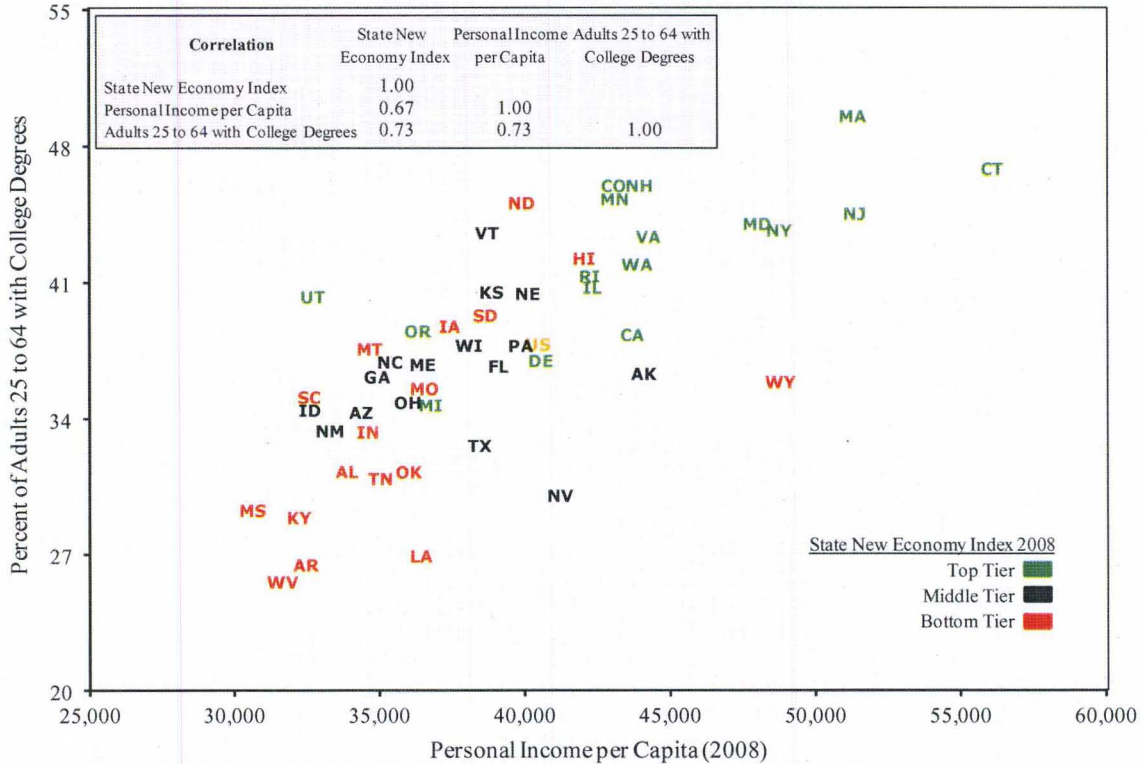
Figure 6. The State New Economy Index - 2008



Source: Kauffman Foundation (2008)

Figure 7 displays the three-way relationship between educational attainment, personal income per capita, and scores on the State New Economy Index. Generally, the states with the highest levels of education and personal income have the highest score on the New Economy Index, and vice-versa. There are more exceptions and outliers in the middle of the scatter plot – for example Utah, North Dakota, Nevada, and Wyoming. Despite these, the correlation coefficients among each of these three variables are still fairly high.

Figure 7. The Relationship between Educational Attainment, Personal Income, and the State New Economy Index (2008)



Source: U.S. Census Bureau: 2008 American Community Survey; Bureau of Economic Analysis; Kauffman Foundation

The Corporation for Enterprise Development (CFED) also produces a state-level evaluation of economic conditions entitled The Development Report Card for the States (DRC). It is designed primarily to gauge how well states are positioned to “develop” future economic growth. “It uses 67 measures to provide a relative, state-by-state assessment of economic development, assigning grades in three main areas: Performance (economic climate for a wage-earner), Business Vitality (economic climate for a business), and Development Capacity (how a state is positioned for the future)” (CFED, 2007). In addition to human capital, the DRC focuses on the business climate in states and how well the states are positioned to generate new business and attract business from outside the state.

With the exception of those associated with high-skilled employment, the educational attainment of state residents, and the migration of college-educated residents, many of the measures used in the State New Economy Index and the Development Report Card for the States are beyond the scope of this study. Nonetheless, each of these products helps to bring some potential state policy options to the table. Those that can be more effectively linked to the missions of colleges and universities are a focal point in chapters four and five of this study – particularly those that might impact the accumulation of educational capital in states.

Chapter 3 of this study provides a wealth of descriptive statistics on the ability of state systems of higher education to produce college graduates, the interstate migration of college-educated residents, and the relationships between these two phenomena and overall educational attainment in states. Different states face different issues with respect to the development of educational capital. Some states are in a more competitive position on the production-side while others rely heavily on their ability to import college graduates from out-of-state – with many combinations in between. Therefore, the production of degrees should be a primary concern for some states, while the ability to retain and attract college graduates should be a primary concern for others.

Chapter 3 also provides an inferential statistical analysis that assesses individual and state-level characteristics that affect interstate migration of college-educated residents. College-educated individuals with certain characteristics are more likely to migrate from one state to another than others. And states with certain characteristics are more likely to benefit from importing outside talent than others.

Finally, Chapter 3 addresses the policy environment that state higher education policymakers toil in as they try to address the accumulation of educational capital. There are no easy fixes. Effective policy requires a great deal of sustained effort, and the ability to capitalize on unique political opportunities. It also hinges on more effective linkages between the state's higher education enterprise and (1) the elementary and secondary pipeline that prepares students for college, and (2) its economic conditions that absorb or repel its graduates. Within any reasonable framework, it is impossible to discuss each state's unique political environment and approach to generating policies related to developing a more educated citizenry. Therefore, examples are drawn from a focus group with selected state policymakers, who provided some of the more "generally accepted" best-practices and policies around the country.

Two major themes run throughout this study. The first is the notion that educational capital is important and beneficial to both societies and individuals. The literature on human capital supports this. But some detractors may argue that our society needs an ample amount of under-educated individuals to work the menial jobs that are still present in our economy, and that a college education is still largely a private good that is only deserving of relatively few. Other detractors may argue that, with increasing educational attainment, the demand-side of our economy is subject to "credentialing"; e.g. where the same jobs that previously required a high school diploma now require a college degree because there is a more highly educated pool of applicants to choose from. The historical income data shown in Figure 3, however, do not support this argument. Median annual earnings for college graduates have grown at substantially higher rates than those for a just high school diploma; indicating that a college degree is more

important now than ever before. The second theme is that policy matters. While it is often difficult to establish direct relationships between state policy and state prosperity, there are ways to establish better practice, legislate, and align state resources more effectively to improve the educational attainment (and lives) of state residents. The pure “market-driven” concept of higher education, based solely on the forces of supply and demand, does not fit neatly into this theoretical framework. Most state policymakers strive to improve the education levels of their residents regardless of the state’s economic demand for an educated citizenry; because they recognize many of the other factors associated with an educated citizenry (discussed above). Given the on-going lack of understanding in this country about which comes first – an educated citizenry or economic prosperity, it seems best to err on the side of over-educating; especially since there are so many other factors associated with higher levels of education, such as better health, fewer incidences of crime, more civic engagement, etc. Even if economic prosperity is the principal goal, it is much easier to build an economy on the back of an educated population than an under-educated one.

Relevance of this Study

When assessing educational capital, state policymakers tend to focus largely on basic demographic characteristics of the population and the performance of individual colleges and universities. Only occasionally do they treat how well the residents of their states are entering and advancing through postsecondary education, the impact of in- and out-migration, and the labor market and economic conditions that influence these phenomena. A comprehensive study combining the impact of degree production and the migration of college-educated residents at the state-level has not yet been conducted.

Since state policymakers are largely responsible for the success of their public systems of higher education, it is important that they understand the factors that influence the accumulation of educational capital in their states.

The analytical framework used in this study is unique – the statistical procedure used and supplemental information provided by experienced state higher education policymakers. Hierarchical Linear Modeling (HLM) is a relatively new statistical technique in the social sciences and has not been applied to the variables used in this study. As pointed out in the literature review, personal characteristics that predict interstate migration have been tested. To some degree, these proven relationships will be replicated in this study. However, using HLM, this study tests the relationships among the variables at both the person and state levels. The ability to identify predictors of interstate migration at these two levels provides useful information to the higher education and economic development communities. The focus group with state higher education officials adds valuable information to this study; information that is used to bridge the quantitative findings to better policy and practice.

This study has a great deal of policy relevance. It is intended to provide scholarship of application in addition to that of discovery. In order to make sound policy decisions regarding the development of educational capital, policymakers should begin with the types of data and information provided in this study. Without a more complete understanding of the impact of state economic and employment conditions, and migration patterns of educational residents, on the ability of states to raise levels of educational capital, policymakers are more likely to identify higher education institutions as the sole mechanism in their state for raising educational capital. This study clearly points out that

this is a very limited picture and in some states it may lead to entirely misguided policy decisions.

Finally, this study is supplemented by great deal of direct experience. I have worked with state-level higher education policymakers in many states throughout the U.S. for more than 15 years, focusing almost exclusively on the development of better policies and practice regarding the production and accumulation of educational capital.

CHAPTER 2

METHODOLOGY

The literature review demonstrates the need for a better understanding of the development of educational capital at the state level. In response, this study examines (1) the degree production capacity of states' systems of higher education, (2) the impact of migration on states' educational capital, (3) the personal and state-level characteristics that influence migration of college-educated residents, (4) the most useful policy options for states to increase educational capital, and (5) the characteristics of some key state-level policies designed to increase educational capital that have actually been implemented in certain states. Much of the quantitative portion of the study is conducted using data from the Integrated Postsecondary Education Data System (IPEDS) from the National Center for Education Statistics (NCES), and the U.S. Census Bureau's Public Use Microdata Samples – the 1% U.S. sample from the 2005-07 annual American Community Survey and the 5% sample from the 2000 decennial census. In addition, focus group interviews with state higher education policymakers were conducted to address topics 1 and 2 above.

Research Questions

The following research questions will guide this study:

1. Which states in the U.S. are producing relatively large numbers of college graduates and which benefit (or not) from the production of other states by importing large numbers of college graduates?

2. What are the predictors of interstate migration of college graduates at the person and state levels?
3. What are the most useful policy options for states to increase educational capital?
4. What are the characteristics of some key state-level policies already implemented in certain states in the U.S.?

A variety of analyses were conducted to address the above research questions.

Descriptive analyses were conducted in order to answer question one above. An inferential statistical analysis (multi-level statistical modeling) was conducted to answer question two. A focus group with state higher education policymakers was conducted to help answer questions three and four.

1. Descriptive Analyses for the Production and Migration of Educational Capital

In order to better understand the state-level context regarding postsecondary degree production and the interstate migration of college-educated residents (research question 1 above), a variety of descriptive analyses were conducted. Below are descriptions of each of the analyses – along with sources for the data.

State-Level College Degree Production

The following measures are provided in order to gauge college degree production in each of the 50 states. They represent the mix of degrees awarded in each state (by level), the proportions awarded by public and private postsecondary institutions, and the volume of degrees produced in each state relative to the population in need.

- State annual degree production by degree-level – associates, bachelor's, master's, professional, doctorate (NCES, IPEDS 2007-08 Completions Survey)

- Annual degrees awarded by control and sector – public, private non-profit, and private for-profit institutions (NCES, IPEDS 2007-08 Completions Survey)
- Undergraduate degrees (associate and bachelor's) awarded per 1,000 residents aged 22 to 64 with no college degree – a measure of how well state systems of postsecondary education are awarded degrees relative to the population in need (NCES, IPEDS 2007-08 Completions Survey; American Community Survey (ACS) 2008 Public Use Microdata Sample)

Interstate Migration

The following measures are provided in order to capture recent interstate migration patterns of college-educated adults.

- Average annual interstate migration rates of college-educated 22 to 64 year olds – net migration of 22 to 64 year olds with college degrees per 1,000 22 to 64 year olds from 2005 to 2007 (ACS 2005-07 Public Use Microdata Sample)
- Recent annual interstate migration rates of college-educated residents (above) compared to 1995 to 2000 (U.S. Census Bureau's 2000 Decennial Census, Public Use Microdata Sample)
- Average annual interstate migration rates of college-educated 22 to 64 year olds by degree-level from 2005 to 2007 (ACS 2005-07 Public Use Microdata Sample)
- Average annual interstate migration rates by type of occupation – (1) management and professional occupations, (2) sales, service, and office occupations, and (3) agriculture, construction, production, and transportation occupations (ACS 2005-07 Public Use Microdata Sample)

Crosscutting Descriptive Analyses

The following analyses combine state-level production of college degrees and interstate migration of college educated residents. These were conducted in order to gain a better understanding of how well state systems of postsecondary education produce college graduates relative to their ability to import them from out-of-state, and the impact on the overall educational attainment of the state.

- The relationship between (1) undergraduate degree production relative to the population in need, (2) interstate migration rates of college-educated residents, and (3) the percent of adults with college degrees
- Reliance of net migration – annual net migration of college educated residents as a percent of annual college degree production (NCES, IPEDS 2007-08 Completions Survey; ACS 2005-07 Public Use Microdata Sample)

Data Sources

The primary data sources used for the descriptive analyses are (1) the National Center for Education Statistic's Integrated Postsecondary Education Data System (IPEDS), Completion Survey and (2) the U.S. Census Bureau's 2005-07 and 2008 American Community Surveys (ACS), Public Use Microdata Samples. The IPEDS Completion Survey is an annual survey of all Title IV degree-granting postsecondary education institutions in the U.S. It contains the number of credentials awarded by level (e.g. certificates, associates, bachelor's, master's, etc.) for every postsecondary institution, which are aggregated in this study to derive the total credentials awarded at the state level. The ACS data are collected and provided annually by the U.S. Census Bureau. They are derived from a sample of 3 million households (roughly 1 percent of the U.S. population), and the public use data are available at the person-level – with individual records de-identified to protect privacy. The Census Bureau also provides a three-year rolling average ACS public use file. It contains three times as many records (roughly 9 million), which is a more robust and desirable data source for analyses that utilize relatively small numbers of the records. Therefore, the three-year rolling average file for the years 2005 to 2007 was used to conduct the analyses on interstate migration of college-educated residents. An example of the statistical errors associated with the 2005-07 ACS data is shown in the following chapter.

2. Predictors of Interstate Migration of College-Educated Residents (Two-Level Hierarchical Linear Model)

Description

A two-level Hierarchical Linear Model (HLM2) is conducted to test individual and state-level predictors of interstate migration. In level 1, a multivariate logistic regression model is applied to test whether the log-odds of interstate migration at the person-level depend on certain demographic and employment characteristics. Level 2 tests effects of state-level characteristics on the level 1 coefficients. Level 2 is applied to test to what degree interstate migration depends on certain state-level characteristics – wages, the strength and growth of certain sectors of the employment base, and unemployment. Table 3 below displays the variables applied at each level of measurement.

Table 3. HLM2 Model Variables: Predictors of Interstate Migration of College-Educated Residents

Outcome Variable – Interstate Migration (move from one U.S. state or foreign country to another U.S. state from 1995 to 2000, 1= yes, 0=no)

Level 1 – Individual Predictors of Interstate Migration

Population Characteristics

1. Age
2. Male (1=yes, 0=no)
3. Black (1=yes, 0=no)
4. Asian (1=yes, 0=no)
5. Native American (1=yes, 0=no)
6. Hispanic (1=yes, 0=no)

Family Characteristics

7. Married (1=yes, 0=no)
8. Children (1=yes, 0=no)

Occupation Status

9. High Tech Occupation (1=yes, 0=no)
10. Business, Financial, Management Occupation (1=yes, 0=no)

Educational Attainment

11. Associates Degree (1=yes, 0=no)
12. Masters Degree (1=yes, 0=no)
13. Professional Degree (1=yes, 0=no)
14. Doctoral Degree (1=yes, 0=no)

Level 2 – State-Level Predictors of Interstate Migration

1. High Skilled Employment – proportion of state employment in high tech, management, and other professional occupations. These occupations represent the vast majority of those that typically require college degrees (Bureau of Labor Statistics). They include employment in computer science, engineering, architecture, management, finance, physical science, and many health occupations (categories provided by BLS).
 2. Change in High Skill Employment from 1990 to 2000 – the change in numbers of high skilled employment (as defined above) from 1990 to 2000 as a percent of the overall number of employed workers in 2000.
-

There are two questions asked by the Census Bureau that are used to create the outcome measure used for this study: (1) Did you live at the same residence in 1995? (yes, no) and (2) If not, in what state or country did you reside? Interstate migration is

calculated from the migration status, the current state of residence, and the previous state or country of residence.

Interstate Migration = “1” or “0”: “1 if changed state of residence in last five years” and “0 otherwise”.

The variables for level 1 of the HLM2 model were selected primarily to build on much of the research that has already been conducted. Several studies cited in the previous chapter confirm the effects of several of these individual characteristics on residential migration. The individuals are more likely move across state lines are expected to have the following characteristics: be younger, White or Asian, male, unmarried, with no children, employed in high-skilled occupations, and have advanced degrees.

The variables for level 2 are chosen to test the effect of state-level labor market and employment characteristics on interstate migration. States that provide more employment opportunities in areas that typically require a college degree are more attractive college-educated movers. Originally, a variable for average wages earned was included to examine the hypothesis that college-educated adults are more likely to migrate to states that provide higher wages. However, this variable was highly correlated with the presence of high-skilled occupations in the state (0.85); and had to be excluded from the model because of problems with collinearity and model fit. Below are the specific hypotheses associated with each of the variables in levels 1 and 2.

Hypotheses

The hypotheses are that higher rates of interstate migration will be associated at level 1 with being:

- White
- Asian
- Male
- Younger
- Unmarried
- With no Children
- More educated (associate less, doctoral more)
- Employed in high tech occupations
- Employed in business, management, financial occupations

A “contextual effect” (Raudenbush and Byrk, 2002) is hypothesized at level 2 such that high in-migration rates of college-educated residents (at the state-level) are associated with:

- Higher proportions of employment in high-skilled occupations
- Larger percentage change in employment in high-skilled occupations

The hypotheses posed for the level 1 predictors are derived largely from the previous research cited in this study – with the addition of those regarding high tech and business/finance/management occupations. Those for the level 2 predictors are simply drawn from the expectation that the state-level conditions of high-skilled employment opportunities have an effect on the in-migration of college-educated residents.

Data Source and Trimming

The U.S. Census Bureau’s 2000 Decennial Census Public Use Microdata Sample (PUMS) was the data source used for the HLM2. This data file is based on the Bureau’s long form administered to roughly seven percent of the U.S. population. The long form contains many of the questions associated with educational attainment, employment, income, etc. The PUMS file contains de-identified records for each of the long form

respondents. However some of the records in the PUMS file are discarded by the Bureau for identity purposes, yielding a sample of five percent of the U.S. population. The 2000 PUMS file contains a total of 14,081,466 records. For this analysis, the PUMS file was trimmed substantially in order to isolate records that adhere to this analytical framework.

The following records were included from the PUMS file.

- Since this study focuses only on the interstate migration of college-educated residents, it includes only those residents with associate degrees or higher (including bachelors, masters, professional, and doctorate).
- Only residents aged 64 and younger are included – excluding those at or above the typical age of retirement. These records were selected because the study focuses largely on types of employment at both the individual and state levels, and economic conditions at the state level. There are likely forces external to the focus of this study that influence the movement of retirement-aged adults – e.g. weather, location of family, etc.
- For the same reason noted above, only residents who are participating in the labor force are included – excluding those who are not in the labor force and have no wage earnings.
- Residents from the District of Columbia were not included because this study focuses on state-level characteristics and DC does not have the political structure that other states have. In addition, DC is a particularly transient area for college-educated residents – sensitive to the elected political leadership at both the presidential and legislative levels. Many young college-educated adults migrate to D.C. for short-term employment opportunities.

After trimming the file to include only those residents who are college-educated, less than 65 years old, participate in the labor force, and not residing in DC, there were a total of 1,968,847 records contained in the data file used for the HLM2 model – still a sizable number of records for an analysis of this type.

The five percent PUMS sample file from the U.S. Census Bureau is the best (and most recent) file that can be used for this analysis. Since 2005, the Bureau has

administered its American Community Survey (ACS) to three million households annually – compared to 14 million administered for the 2000 Decennial Census long form. Each survey contains very similar questions regarding demographics, migration, education, and employment. Even though the ACS data are more current (as recent as 2008), there are a number of reasons they were not used in this analysis.

- Trimming the ACS file to include only the records described above would have yielded relatively small numbers for many of the least-populated states – resulting in standard errors (and 90 percent confidence intervals) that are quite large. This is particularly true as the data are disaggregated by racial/ethnic populations, gender, education level, and type of occupation.
- The migration question on the ACS is different from the one used in the Decennial Census survey. It asks whether the respondent has moved within the past year – as opposed to the five-year time-frame used in the 2000 survey. This results in even fewer respondents that change residences which compounds the problems associated with standard errors and confidence intervals discussed above.
- In addition to the statistical issues associated with the sample size of the ACS, the U.S. economy has been in recession that past several years. The patterns of mobility in general are likely influenced by the struggling job markets and real estate conditions in many states. The 2000 data were chosen in part because they reflect more typical conditions (perhaps erring some on the “boom” side) – where mobility was not restrained by lack of employment opportunity and declining housing values.

Weighting

For each of its PUMS files, the Census Bureau provides a weight for each person record. The weights are designed to adjust each record based on what the Bureau knows about the population at large. For example, they know, based on the full Decennial Census Population Count also conducted in 2000, whether individuals in certain geographic areas are under or overrepresented in the smaller long form sample. Since the PUMS sample represents five percent of the U.S. population, the average person weight

is roughly 20. Those who are over-sampled have a person weight that is less than 20, while those who are under-sampled have one that is more than 20. By weighting the file with the person weights, the analysis is more representative of the U.S. population (and the state populations). These weights were applied in level 1 of the HLM model.

Model Specifications

The HLM model is fitted and executed using HLM6 SSI Scientific Software International (developed in 2004). Since the outcome variable is binary (interstate migration, yes=1, no=0), a Bernoulli HLM2 Model was specified using the overall equation in Table 4 below:

Table 4. HLM2 Overall Model Equation

Level-1 Model

$$\text{Prob}(Y=1|B) = P$$

$$\log\left[\frac{P}{1-P}\right] = B_0 + B_1*(AGE) + B_2*(MALE) + B_3*(BLACK) + B_4*(ASIAN) + B_5*(NATIVE) + B_6*(HISPANIC) + B_7*(CHILDREN) + B_8*(MARRIED) + B_9*(TECH_OCC) + B_{10}*(BUSMAN_O) + B_{11}*(ASSOCIAT) + B_{12}*(MASTERS) + B_{13}*(PROFESSI) + B_{14}*(DOCTORAL)$$

Level-2 Model

$$B_0 = G_{00} + G_{01}*(HIGHSKILL) + G_{02}*(HS_CHNGE) + U_0$$

$$B_1 = G_{10}$$

$$B_2 = G_{20}$$

$$B_3 = G_{30}$$

$$B_4 = G_{40}$$

$$B_5 = G_{50}$$

$$B_6 = G_{60}$$

$$B_7 = G_{70}$$

$$B_8 = G_{80}$$

$$B_9 = G_{90}$$

$$B_{10} = G_{100}$$

$$B_{11} = G_{110}$$

$$B_{12} = G_{120}$$

$$B_{13} = G_{130}$$

$$B_{14} = G_{140}$$

Source: HLM6, SSIO Scientific Software International (Raudenbush, Bryk, Cheong, Congdon, Toit)

Tests for Random Effects and Model Fit

In addition to the overall application of the HLM model, two series of calculations were applied in order to provide supplementary information regarding the variability of the outcome variable and the overall model fit. A one-way analysis of variance (ANOVA) with random effects was used to provide information about the variability of interstate migration at each of the two levels in the model. It also produces information regarding the variability of interstate migration within states and between states. These statistics help to determine whether the application of an HLM to these data is a good approach.

Second, the HLM2 model was assessed for goodness of fit. A likelihood ratio test was used to compare the deviance statistic of the restricted model described above with a more general alternative; assessing model fit. This test produces a chi-square statistic that measures the difference in the number of unique variance and covariance components estimated in the two models. In this case, full HLM two-level model was compared to a model that only contains the level 1 variables; assessing whether the addition of the state employment conditions (high skill employment and change in high skill employment) contribute significantly to the explanation of the variance in interstate migration.

3. Policy Options for Increasing Educational Capital in States: Focus Group Interviews with State Higher Education Policymakers

This phase of the study addresses the policy environment in states; specifically, what are the potential policy options to raise levels of educational capital? Given shifting policy environments and partisan politics in states, it is rarely possible to implement large-scale state-level policies that address the development of educational capital. Where it is possible, the difficulty lies in the ability to sustain them over time – due largely to gubernatorial and legislative term limits. Yet, many state higher education policymakers have given these issues a great deal of thought in hopes of affecting statewide change. The insights provided by the focus group participants regarding potential policy options were helpful. A focus group with seven state higher education policymakers was conducted to obtain information about potential or existing state-level policies and strategies that impact the following:

- The production of college degrees
- The ability to retain the college graduates they produce and attract college graduates from other states and countries (economic conditions and employment opportunities)
- Higher education's role in economic development – and vice-versa
- The presence of high tech and knowledge-based employment (e.g. engineering, computer science, life science – medical, etc.)

The interviews were conducted with State Higher Education Executive Officers (SHEEOs) who lead coordinating or governing boards for state systems of public higher education. For example, the SHEEO in Kentucky is the president of the Kentucky Council on Postsecondary Education. They were chosen because, in most states, they play the most important role in the development of higher education policy. In addition, they routinely deal with many of the policy issues that are indirectly tied to higher education – those that also impact the development of educational capital. These include: adult education and literacy, workforce training, the linkages between K-12 and higher education, and economic development. Given the relatively small number of focus group participants, SHEEOs are the best candidates to provide information regarding policies and practices that cut across each of these important areas. SHEEOs from the following states participated in the focus group:

- Kentucky
- Indiana
- Louisiana
- Connecticut
- South Dakota
- Nebraska
- Oregon

These SHEEOs were selected in consultation with the president of their membership organization located in Boulder, Colorado – the State Higher Education Executive Officers. They were selected because they represent a diversity of states; some more educated than others, some more reliant on in-state degree production, and others the beneficiaries of importing educated residents from out-of-state. Also, each participant had a great deal of experience in their field; some having served as SHEEOs in other states as well. SHEEOs from two other states (Georgia and Ohio) were invited but did not participate. The participants represent states from the Northeast, Midwest, South, and West. Each has labored in unique policy environments and in states that face very different challenges with respect to both the production of college degrees and the migration patterns of the college-educated residents. The participants offered their time (an hour and a half) at one of their annual meetings in the summer of 2006. I transcribed the meeting, which was not tape recorded. The interview questions and research protocol was approved by the University of Louisville’s Human Subjects Protection Program Office (<http://research.louisville.edu/UHSC/UHSC.htm>).

The first three states listed above (Kentucky, Indiana, and Louisiana) have recently implemented notable state-level policies designed to increase educational capital. In 1997, higher education stakeholders in Kentucky began to implement the Postsecondary Education Reform Act, which was designed in large part to meet national averages in college-going, completion, research and development, and the educational attainment of the adult population by 2020. In addition, Kentucky has experienced the merger and rapid expansion of its public community and technical college systems – designed to provide greater access to postsecondary education and develop more

effective linkages between postsecondary education, workforce, and economic development. Similar policies have been enacted in Indiana and Louisiana, where legislation has driven the expansion of public two-year systems of community and technical colleges for the same general purpose of improving the states' levels of educational attainment and developing a more highly skilled workforce. These efforts as well as their overall strategic plans are well documented on their SHEEO websites located at: <http://www.in.gov/che/>, <http://cpe.ky.gov/>, <http://www.regents.state.la.us/>. The strategic plans in Indiana and Kentucky are discussed in more detail in the final chapter.

The specific questions asked in the focus group are provided in the interview guide in Appendix 2. The following topics were addressed in the conversation with the state higher education leaders:

- How policy is typically formulated in states – to remedy past trends, to address current problems or challenges, and/or to respond to anticipated future trends.
- Descriptions of existing or potential state-level policies designed to address the issue of postsecondary degree production – geared to individual students or institutions, targeted to specific types of degrees.
- The overall success of policies designed to increase degree production – how success is defined, the barriers to implementation and success, and how existing policies should be improved.
- Descriptions of existing or potential policies that impact the retention or attraction of college-educated residents – the state's control (policy levers) over economic conditions that would help to retain or attract educational capital, and the role of higher education in economic development.

Given the limited time available to address each of these topics and the specific questions listed in Appendix 2, some were covered in much more detail than others.

Chapter 4 contains a description of the findings that resulted from the focus group. The findings are supplemented with some literature from the field and the personal experiences I bring to each of the topics, having worked with higher education policymakers in many states throughout the U.S.

CHAPTER 3

QUANTITATIVE FINDINGS: THE PRODUCTION AND MIGRATION OF EDUCATIONAL CAPITAL

This chapter presents a detailed summary of the findings associated with a variety of analyses for the state-level production of college degrees and the interstate migration of educational capital: a set of descriptive analyses that provide state-level context and performance and a Hierarchical Linear Model (HLM) that tests for individual and state-level factors that affect interstate migration.

Descriptive Analyses: Comparative State-Level Data on the Production and Migration of Educational Capital

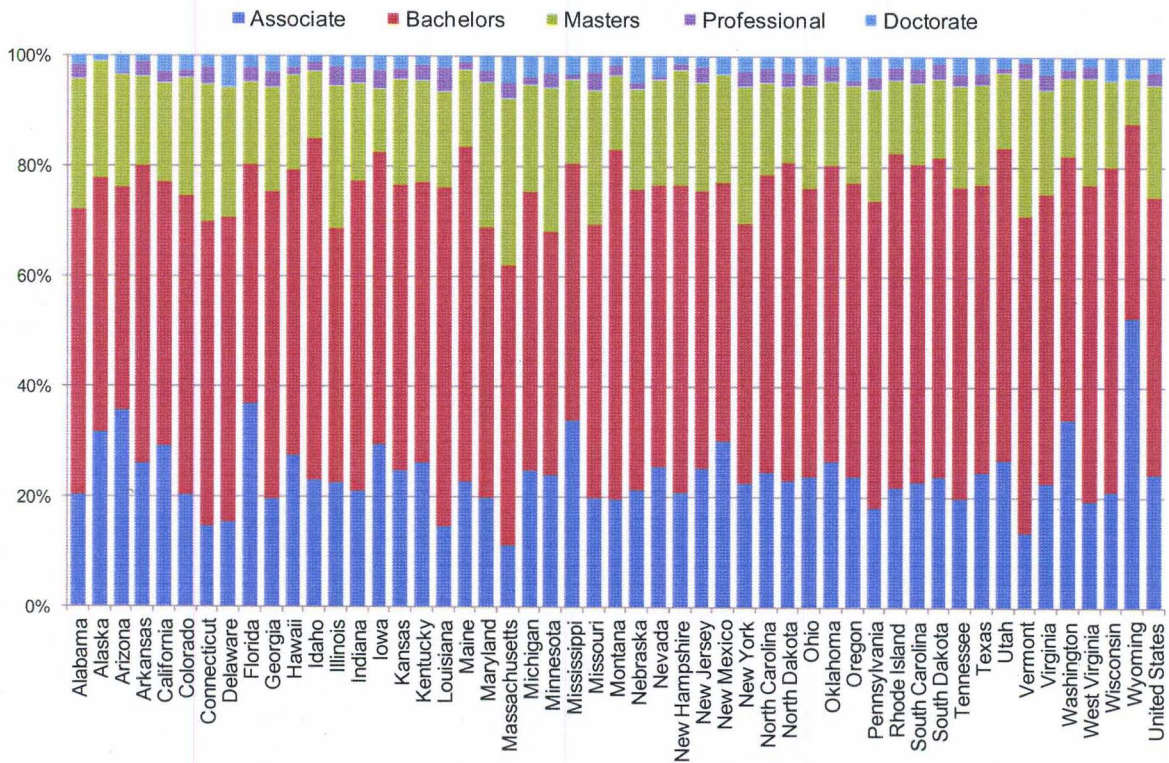
Production of Educational Capital

As one might expect, the volume of college degree production varies dramatically from state-to-state. In the 2007-08 academic year, the postsecondary institutions in Alaska (public and private) awarded 2,529 undergraduate degrees and 721 graduate and professional degrees – the fewest total number of degrees produced by any state. On the other hand, the system of postsecondary education in California awarded 255,662 undergraduate degrees and 76,377 graduate and professional degrees – the most of any state (National Center for Education Statistics). But the absolute number of degrees produced by a state indicates little more than the number and size of institutions in it. It is certainly not a good barometer for how well a state system of postsecondary education

(the collection of all the institutions in it) produces degrees relative to the population in need; it is a numerator without a denominator.

State systems of postsecondary education also vary in the mix of degrees they produce. Figure 8 below displays the proportion of college degrees produced by level and state – ranging from associate to doctoral degrees.

Figure 8. State Degree Production by Level (2007-08)



Source: NCES, IPEDS Completions Survey (2007-08)

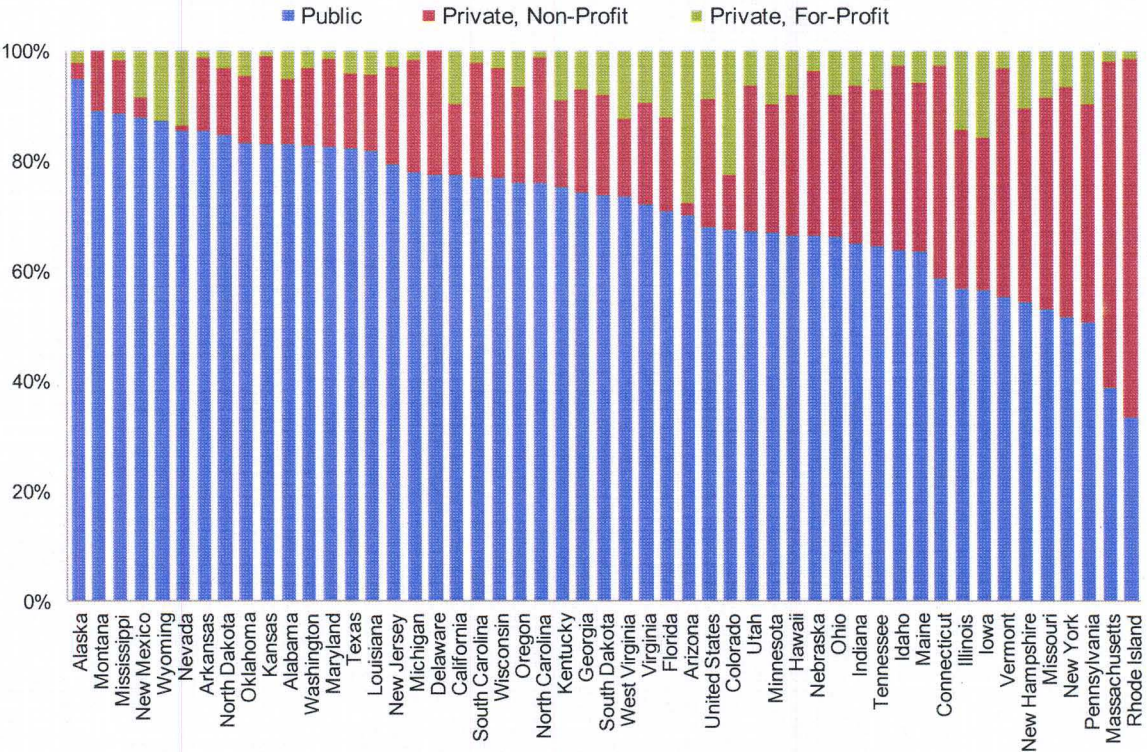
Colleges and universities in Wyoming, Florida, Arizona, Washington, and Mississippi produce the largest proportions of associate degrees relative to overall degree production. Those in Massachusetts, Vermont, Louisiana, Connecticut, and Delaware produce the fewest associate degrees. The postsecondary systems in Montana, Idaho, Louisiana, Rhode Island, and Maine produce the largest proportions bachelor’s degrees, and those in Wyoming, Arizona, Florida, Minnesota, and Alaska produce the smallest

proportions. Graduate and professional degree production – as a proportion of overall degree production – is largest in Massachusetts, Minnesota, Illinois, Maryland, and Missouri, and smallest in Wyoming, Idaho, Utah, Maine, and Montana.

This study focuses primarily on the production of associates and bachelor's degrees for a variety of reasons. First, the measure of educational attainment used throughout the study—and, indeed, throughout the world—is the “percentage of adults with college degrees”. While graduate and professional degrees are important, the vast majority of students must earn bachelor's degrees prior to earning a graduate or professional degree. Therefore, moving more students from bachelor's to master's degree-holders (for example) has no bearing on the overall measure of educational attainment typically used. Second, in many states, the graduate-level function of many postsecondary institutions does not receive the same public pressure to serve in-state residents. They often compete nationally and internationally for students which yields a highly mobile pool of graduates who are more likely to return to their previous state or country of residence, or migrate to different state altogether. Finally, there is a general sense among the higher education policy community that real progress toward improving educational attainment hinges on improving rates of participation and success at the undergraduate level – where the failure to do so yields more direct consequences for individuals and the state: employment that earns less than a living wage, higher rates of incarceration, poorer health, etc. For many of these correlates of educational attainment, the most substantial disparities lie between high school and undergraduate degree attainment, not bachelor's and graduate degree attainment.

Because this study focuses on the role of public policy in the production of college degrees, it is important to understand how state systems of postsecondary education differ with respect to the magnitude of degree production by private colleges and universities. States certainly benefit from the degree production of private institutions but – in states where private institutions are more prominent – state policymakers have less influence on the overall enterprise. Figure 9 displays the annual degree production by state for public, private non-profit, and private for-profit institutions.

Figure 9. Annual Undergraduate Degrees Awarded by Type of Institution (2007-08)



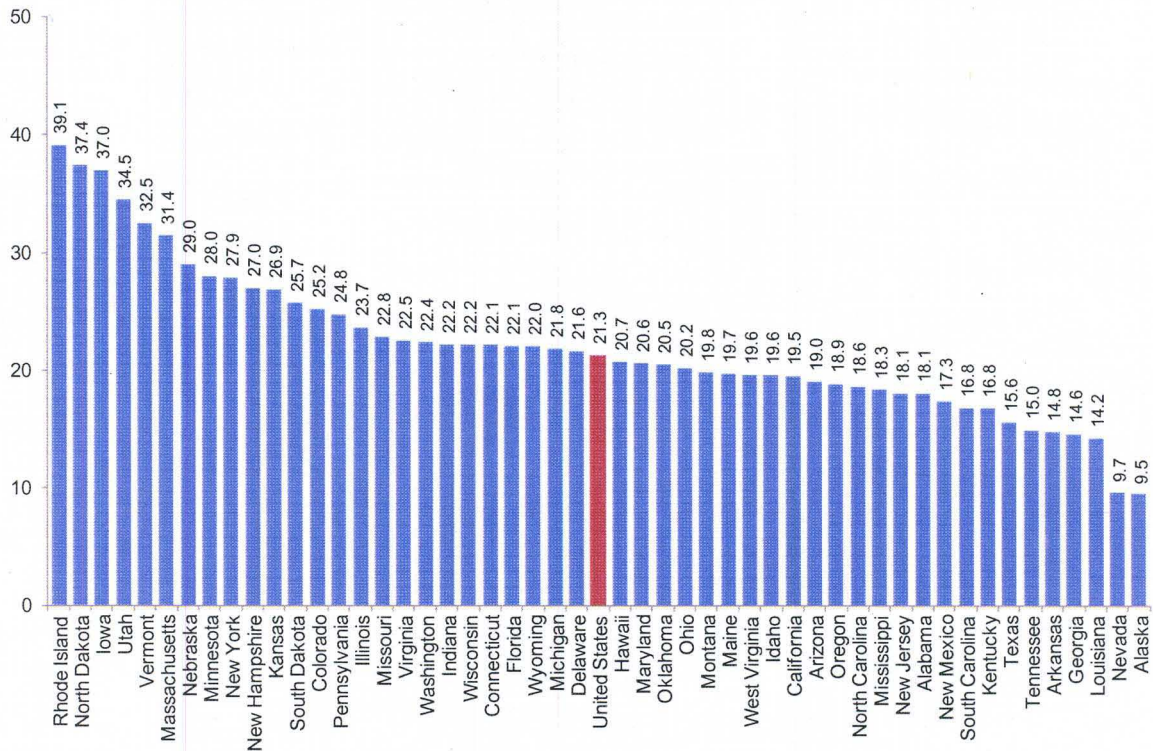
Source: NCES, IPEDS Completions Survey (2007-08)

Some states rely almost solely on public institutions for their degree production – e.g. Alaska, Montana, Mississippi, New Mexico, and Wyoming – where public policy has more control over the state’s higher education enterprise. Others rely heavily on the private sector: Rhode Island, Massachusetts, Pennsylvania, New York, and Missouri. It

is important to note, however, that even with the prominent presence of the private sector in the Northeast; the majority of state residents attend in-state public colleges and universities. For example, more than 80 percent of all first-time entering students who reside in Rhode Island and Connecticut attend in-state public colleges and universities, and nearly 70 percent of Massachusetts residents attend in-state public sector institutions (NCES, IPEDS 2007 Residency and Migration Survey). Therefore, the private institutions in many of these states draw much of their enrollment from out-of-state, which is not surprising given the national and international scopes of private non-profit institutions such as Harvard, Yale, and Brown. The for-profit sector plays a prominent role in states such as Arizona, Colorado, Nevada, and Wyoming. Some states with systems of postsecondary institutions that import large numbers of students, in-turn, experience a net loss of college graduates – a phenomenon discussed in more detail later in this chapter.

More important than the volume of degrees produced in each state, and the types of institutions that produce them, is the level of production relative to the population in need of college degrees. Some state systems of postsecondary education produce substantially more degrees per 1,000 adult residents with no college degree than others (Figure 10). This measure is calculated as the number of degrees produced per 1,000 residents aged 22 to 64 without a college degree (those in need of a college degree).

Figure 10. Undergraduate Degrees (Associate and Bachelor's) Awarded per 1,000 Residents Aged 22 to 64 with No College Degree (2007-08)



Sources: NCES, IPEDS Completion Survey 2007-08; U.S. Census Bureau, 2008 American Community Survey (Public Use Microdata Sample)

Among the most productive states are Rhode Island, North Dakota, Iowa, Utah, and Vermont. Of these states, Rhode Island, Utah, and Iowa award substantial numbers of degrees to non-resident students. In the fall of 2006, Rhode Island was a net importer of 6,383 first-time freshmen; Iowa was a net importer of 8,420, and Utah 4,317 (www.higheredinfo.org). The data on the migration of college-educated residents that follows will bear some evidence whether these states (and other states that are net importers of students) experience overall net losses of college graduates as a result of the exodus of non-resident college graduates. Alaska, Nevada, and many of the southern states (Louisiana, Georgia, Arkansas, Tennessee, Texas, Kentucky, and South Carolina) produce the smallest number of degrees relative to the population in need. Many of these

states rank poorly, in part, because they have such large numbers of residents without college degrees – the denominator in the equation (see Figure 4 in Chapter 1).

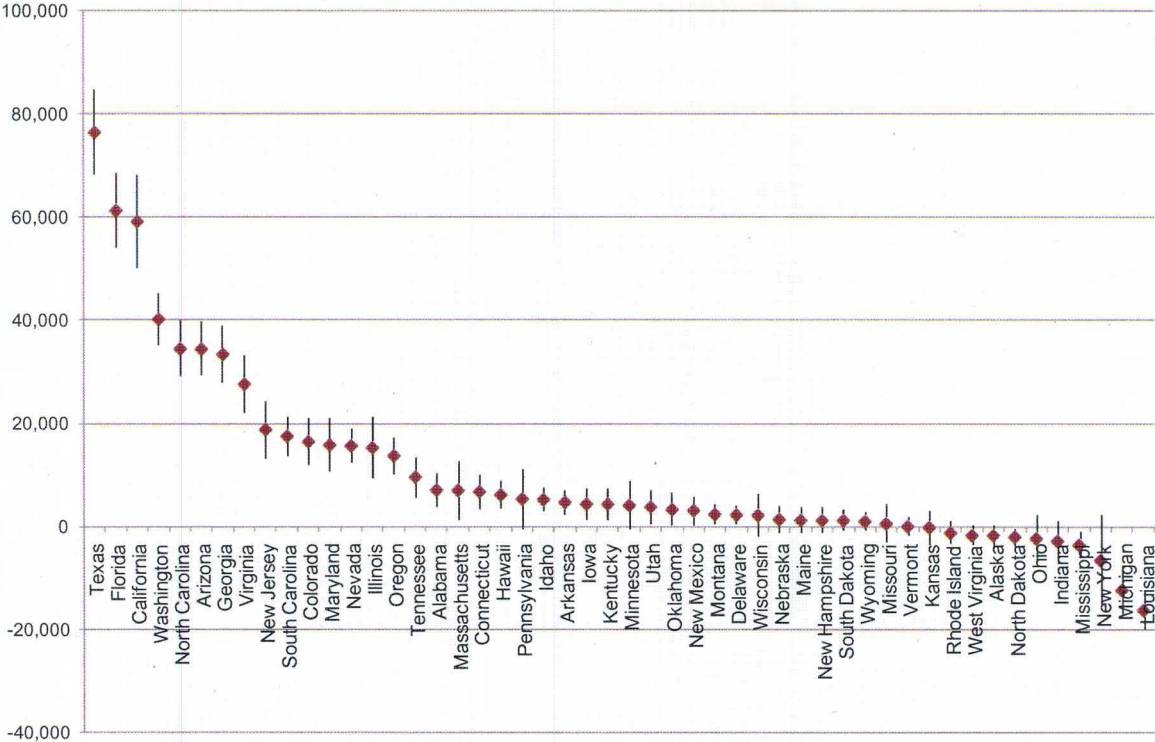
Because of interstate mobility, the measure for degree production above is insufficient (by itself) for explaining how states accumulate educational capital. In addition, it is important to examine the alternative way in which states can acquire (or lose) educational capital – by measuring the in- and out-migration of college-educated residents. States that (over time) produce large numbers of degrees relative to the population in need, while also importing large numbers of college degree holders from out-of-state, are usually the major beneficiaries of a highly educated populace – and vice-versa. The following section provides a great deal of comparative state-level information regarding patterns of interstate migration among college-educated residents.

Migration of Educational Capital

Some states benefit tremendously from importing a substantial portion of their educated citizenry from outside the state, while others experience net losses. It is not a “zero sum game” across the fifty states, however, because of the in-migration of educated individuals from outside the U.S. This is evident in Figure 11, which displays the average annual net-migration of residents with college degrees from 2005 to 2007. The calculation is simply the number of college-educated residents aged 22 to 64 who moved into each state minus the number who moved out of each state. Age 22 is selected as the cutoff in this analysis in order to account for young adults that migrate in and out of states shortly after graduating from college; a phenomenon that is important to capture. Since the ACS is a sample survey (of roughly 3 million U.S. households, 1 percent of the

U.S. population), there are statistical errors associated with these data. The diamonds on the chart represent the estimates and the vertical lines are the standard error bands that represent the 90 percent confidence intervals. For each of the states, there is a 90 percent degree of confidence that the true population parameter lies within the sample-based band shown below.

Figure 11. Average Annual Net Migration of 22 to 64 Year Olds with College Degrees – and 90 Percent Confidence Intervals (from 2005 to 2007)



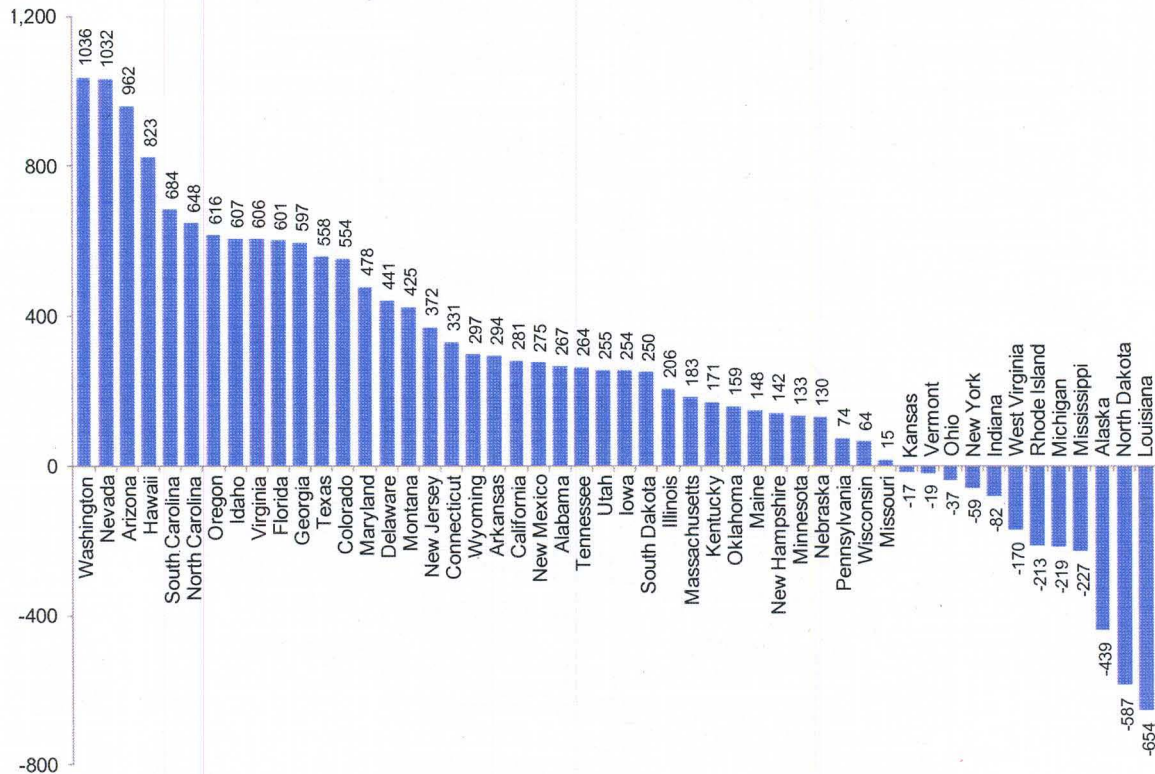
Source: U.S. Census Bureau, American Community Survey (2005-07 Public Use Microdata Sample)

The majority of states, during this two-year period, were net importers of college-educated residents. Texas, Florida, California, Washington, and North Carolina experienced the highest volume of net in-migration. In turn, Louisiana, Michigan, New York, Mississippi, Indiana, and Ohio experienced the highest volume of net out-migration. Although for New York, Indiana, and Ohio, the 90 percent confidence intervals intersect the line that distinguishes between a state being a net importer or

exporter – indicating that there is not a high degree of confidence in identifying these states as net exporters. This issue holds true for several other states (e.g. Rhode Island, Kansas, Missouri, New Hampshire, Maine, Nebraska, Wisconsin, Oklahoma, and Minnesota). This pattern is by and large limited to the states that are closest to the axis that delineates net import or export. The migration data from the 2000 decennial census are much less problematic with respect to statistical error because the sample size is nearly five times as large (with more than 14 million households surveyed). But the data from the ACS are used here in order to present the most recent patterns of interstate migration – along with the most recent data for degree production. For these descriptive data on degree production and interstate migration, a sacrifice was made for using data that are much more current; although they contain more statistical error because of the smaller sample size. Comparisons between the data collected by the 2000 decennial census and those collected by the ACS are discussed in the previous chapter. In addition, a state-level comparison of interstate migration patterns of college-educated residents from the 2000 decennial census and the 2005-07 ACS is provided later in this chapter.

As with degree production, the volume of activity related to interstate migration has varying impact on states depending on the size of the population in each state – in this case, the total number of 22 to 64 year olds in each of the states. Figure 12 displays the net migration of 22 to 64 year olds with college degrees per 100,000 22 to 64 year olds; in order to compensate for the differences in state populations.

Figure 12. Migration Rates: Average Annual Net Migration of 22 to 64 Year Olds with College Degrees per 100,000 22 to 64 Year Olds (from 2005 to 2007)



Source: U.S. Census Bureau, American Community Survey (2005-07 Public Use Microdata Sample)

After the data are normalized to the population in each state, Washington, Nevada, Arizona, Hawaii, South Carolina, and North Carolina were the largest net importers of college-educated residents from 2005 to 2007. Louisiana, North Dakota, Alaska, Mississippi, and Michigan were the largest net exporters of educational capital⁷. However, Louisiana experienced a net loss of college graduates in the late 1990s as well.

As discussed earlier, some states benefit on the “production side” by importing relatively large numbers of students from out-of-state. Rhode Island, Indiana, New York, and Vermont are large importers of students but experience an overall net loss of college-

⁷ It is important to note that the impact of Hurricane Katrina (in 2004) likely played a role in the patterns of out-migration in Louisiana over this time period.

educated residents. The migration data available in the Census files are not linked in any way to the colleges in which students earn their degrees, but the patterns suggest that at least a portion of the relatively large numbers of students that originate from out of state are migrating out of these states upon graduation. That is, it appears that these states are not able to hang on to many of the nonresidents they educate.

Table 5 provides a comparison of the annual net migration rates of college-educated residents from 1995 to 2000 and from 2005 to 2007. Given the changes in the economic and housing conditions in the U.S. from the late 1990s to the mid 2000s, one might expect some change in the patterns of interstate migration over this time period. But the patterns for many of the states are fairly consistent. In fact, nearly all states that were net-importers of educational capital from 1995 to 2000 experienced similar patterns from 2005 to 2007. Examples include Arizona, Colorado, Florida, Georgia, Maryland, Nevada, North and South Carolina, Texas, Virginia, and Washington. Michigan, the one exception, was a slight importer in the late 1990s and an exporter from 2005-07 – which may reflect the more dramatic economic downturn that Michigan experienced over this time period relative to many other states.

Table 5. Annual Net Migration of College-Educated 22 to 64 Year Olds per 100,000 22 to 64 Year Olds (1995 to 2000 and 2005 to 2007)

State	Difference	2005-2007	1995 to 2000
Alabama	275	267	-9
Alaska	-288	-439	-151
Arizona	166	962	796
Arkansas	203	294	91
California	-103	281	384
Colorado	-243	554	797
Connecticut	181	331	150
Delaware	191	441	250
Florida	-56	601	658
Georgia	-23	597	620
Hawaii	843	823	-19
Idaho	344	607	263
Illinois	149	206	57
Indiana	5	-82	-87
Iowa	605	254	-350
Kansas	21	-17	-39
Kentucky	125	171	46
Louisiana	-443	-654	-211
Maine	-4	148	152
Maryland	69	478	409
Massachusetts	-98	183	281
Michigan	-267	-219	49
Minnesota	-121	133	254
Mississippi	-171	-227	-55
Missouri	-41	15	56
Montana	589	425	-164
Nebraska	303	130	-173
Nevada	30	1032	1002
New Hampshire	-159	142	301
New Jersey	63	372	308
New Mexico	256	275	19
New York	-13	-59	-46
North Carolina	147	648	501
North Dakota	169	-587	-756
Ohio	0	-37	-38
Oklahoma	246	159	-87
Oregon	116	616	501
Pennsylvania	189	74	-115
Rhode Island	-176	-213	-37
South Carolina	382	684	301
South Dakota	586	250	-335
Tennessee	11	264	253
Texas	200	558	358
Utah	334	255	-79
Vermont	6	-19	-25
Virginia	176	606	431
Washington	510	1036	526
West Virginia	31	-170	-201
Wisconsin	116	64	-51
Wyoming	574	297	-277

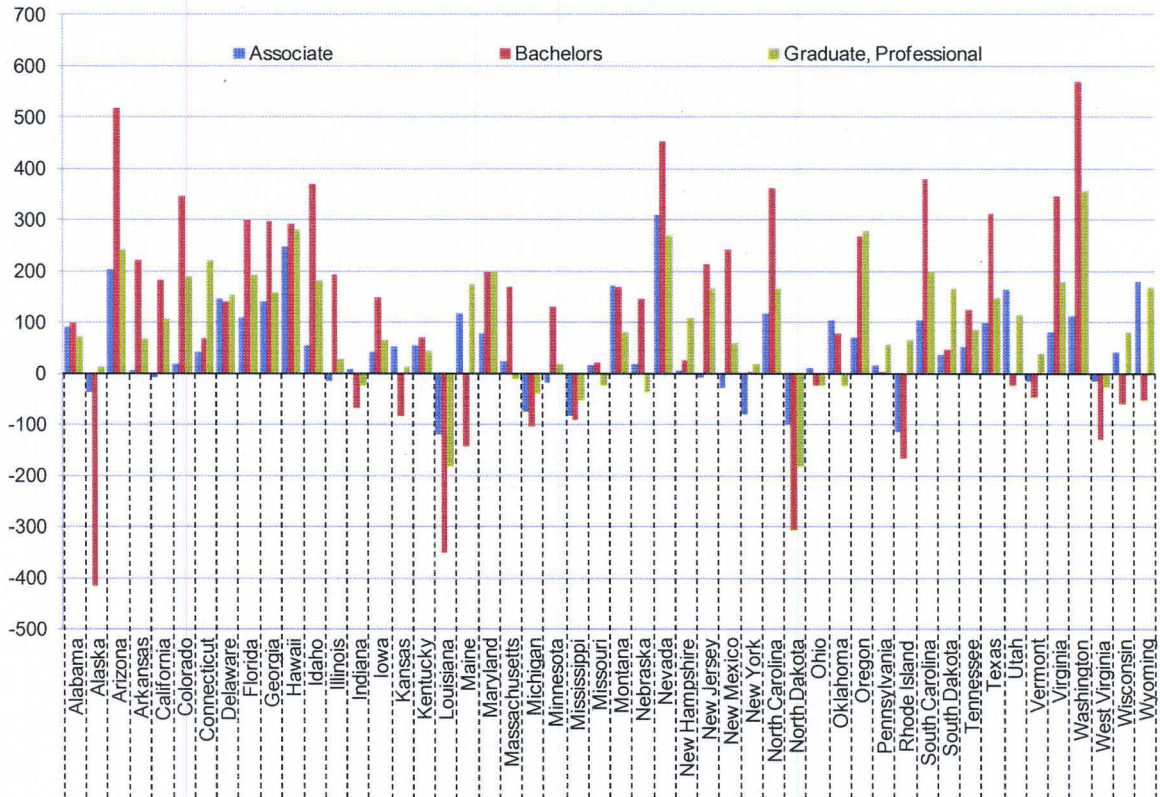
Sources: U.S. Census Bureau: American Community Survey (2005-07 Public Use Microdata Sample) and 2000 Decennial Census (Public Use Microdata Sample)

On the flip-side, Alaska, Indiana, Louisiana, Mississippi, North Dakota, Rhode Island, and West Virginia experienced net losses of educational capital from 1995-00 and from 2005-07. The states that seem to have made a recovery (from a net exporter to a net importer) over this time period include several in the Midwest (Iowa, Montana, Nebraska, and South Dakota), and a few of the smaller Western states (Hawaii, Utah, and Wyoming). The most dramatic positive changes occurred in Hawaii, Iowa, Montana, South Dakota, and Washington. Only more analyses over time (into the future) would determine whether these changes reflect real trends toward importing more college-educated residents.

Figure 13 displays the net migration rates of college educated residents (shown in Figure 12 above) disaggregated by degree-level. Though beyond the primary focus of this study, these data reflect to some degree the nuances in (1) the over production of certain types of degrees in some states relative to economic demand for them, and (2) the sectors of state economies that are of the greatest strength and in the greatest demand (e.g. those demanding more associate degree-holders vs. bachelor's degree-holders). By and large, states that are the largest importers do so with residents at all degree levels (e.g. Arizona, Georgia, Florida, Nevada, and Washington). Conversely, the same is true of a few of the states that are the largest exporters (Louisiana, North Dakota, and West Virginia). Rhode Island, Indiana, and Vermont – large net importers of non-resident students into four-year colleges and universities – experienced the largest net loss among residents with bachelor's degrees. On the other hand, Indiana was a slight importer of associate degree-holders and Rhode Island and Vermont imported residents with graduate and professional degrees. Nearly all of the net imports in Minnesota were bachelor's degree-holders while

the majority of those who migrated into Connecticut held graduate and professional degrees. In Utah, all of its net migration occurred at the low- and high-ends of educational attainment (among associate and graduate/professional degree-holders).

Figure 13. Migration Rates by Degree-Level: Net Migration of 22 to 64 Year Olds with College Degrees per 1,000 22 to 64 Year Olds (Average Annual from 2005-2007)



Source: U.S. Census Bureau, 2005-07 American Community Survey (Public Use Microdata Sample)

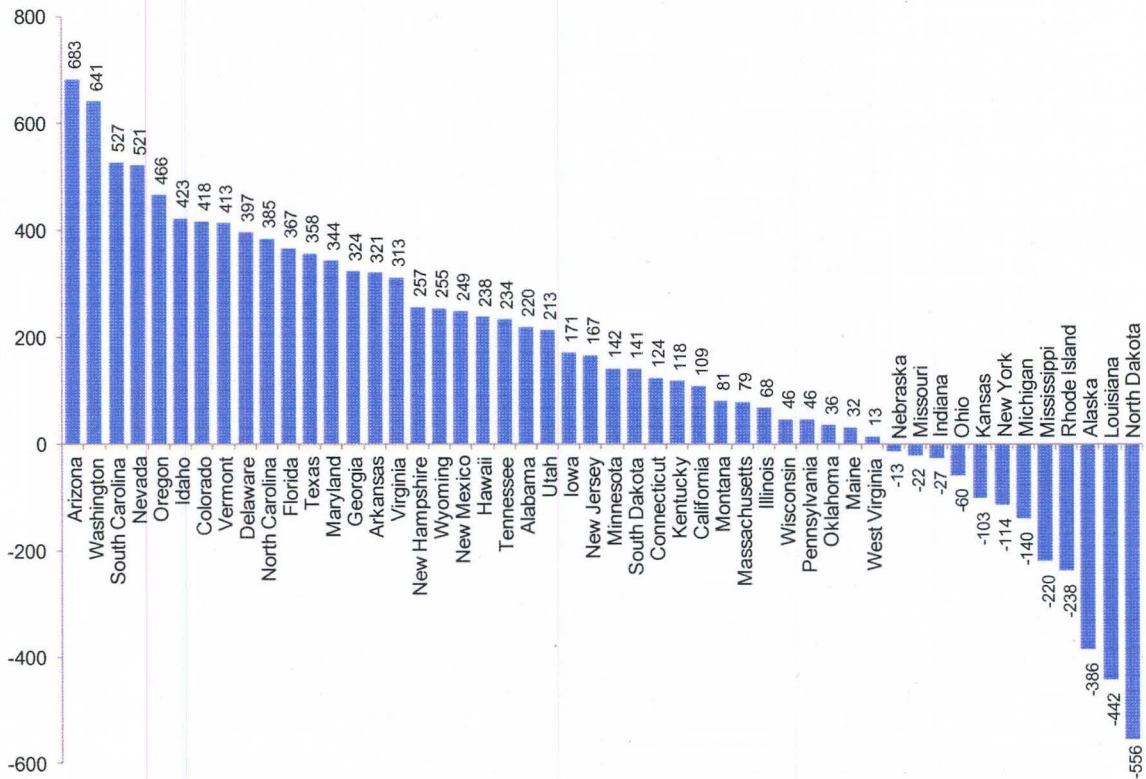
Tracking these data over time would certainly help to shed more light on the mismatch between supply and demand by degree-level in the various states. In 2007, the Indiana Commission for Higher Education adopted “Reaching Higher: Strategic Directions for Higher Education in Indiana” as its plan for the future of higher education. Based largely on the migration patterns of college-educated residents in the Indiana, the plan acknowledges the state’s propensity to over produce bachelor’s degrees, while under-producing associate degrees. Many bachelor’s degree-holders are leaving the state,

while the state relies on importing residents with associate degrees. As a result, the plan calls for limited enrollment growth in the four-year universities and a major expansion of the community college and technical college system⁸.

The level of demand for highly educated residents is often a function of the strength of state economies. Using the larger sample from the 2000 Decennial Census, the Hierarchical Linear Model conducted in this study (discussed below) tests the effects of the proportions of state employment in high tech and other professional occupations on the interstate migration of college-educated residents. Since the 2005-07 ACS sample is substantially smaller and more subject to statistical error, only the migration rates of 22 to 64 year olds employed in all management and professional occupations are reported for 2005-07 (Figure 14). This broad occupational category contains nearly all of the occupations that typically require a college degree. It includes those employed in management, business and financial, computer and mathematical, architecture and engineering, sciences, social service, legal, education and training, and healthcare occupations (occupational codes 11 to 31 on the Standard Occupational Classification provided by the Bureau of Labor Statistics)

⁸ Indiana's strategic plan for higher education is discussed in more detail in the final chapter.

Figure 14. Annual Net Migration Rates of Residents Employed in Management and Professional Occupations (2005-07)



Source: U.S. Census Bureau, 2005-07 American Community Survey (Public Use Microdata Sample)

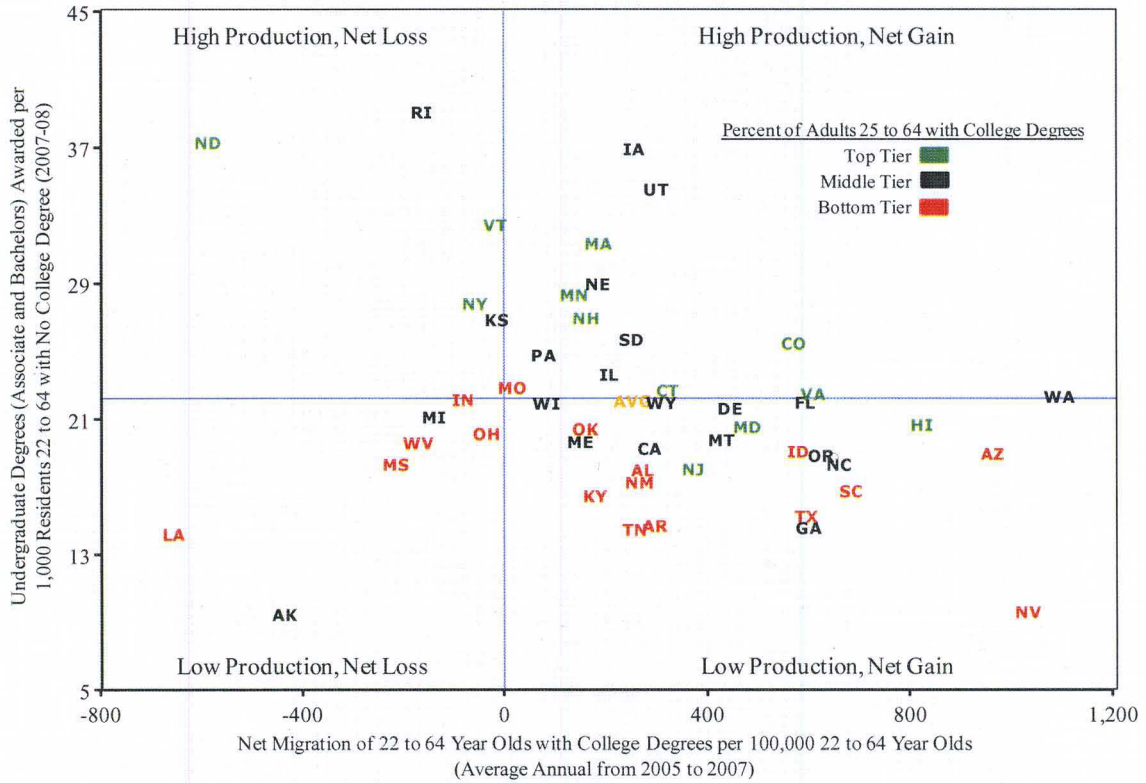
The migration patterns of residents employed in high skilled occupations are similar to those of college-educated residents (shown earlier in Figure 12). By and large, states that are relatively large net importers of college-educated residents are also large net importers of employees in management and professional occupations – and vice-versa. The relationship between state employment conditions and the interstate migration of college-educated residents is explored in more detail below.

Production and Migration of Educational Capital

As noted earlier, the combination of degree production and migration explains a great deal about the accumulation of education capital in states – much more than either

metric in isolation. Figure 15 displays the relationship between degree production, migration rates of college-educated residents, and the overall educational attainment of states (a combination of the data displayed in figures Figure 10, Figure 12, and Figure 4). Relative to other states, states in the top left quadrant are high producers of college graduates and net exporters of college-educated residents. North Dakota, the most extreme example, is one of the leading producers while experiencing one of the largest rates of exodus among college-educated residents. States in the top right quadrant are above average producers of college graduates and also benefit from importing educational capital from outside the state – the most desirable place to be on the chart. Four of the five most educated states in the U.S. are in the top right quadrant – Massachusetts, New Hampshire, Colorado, and Minnesota (see Figure 4). It is interesting to note that – with the slight exception of Missouri – there are no states with relatively low levels of educational attainment (in the bottom third of states) in either of these two quadrants. High levels of degree production appear to benefit these states regardless of migration patterns.

Figure 15. The Relationship between Degree Production, Migration, and Educational Attainment (2008)



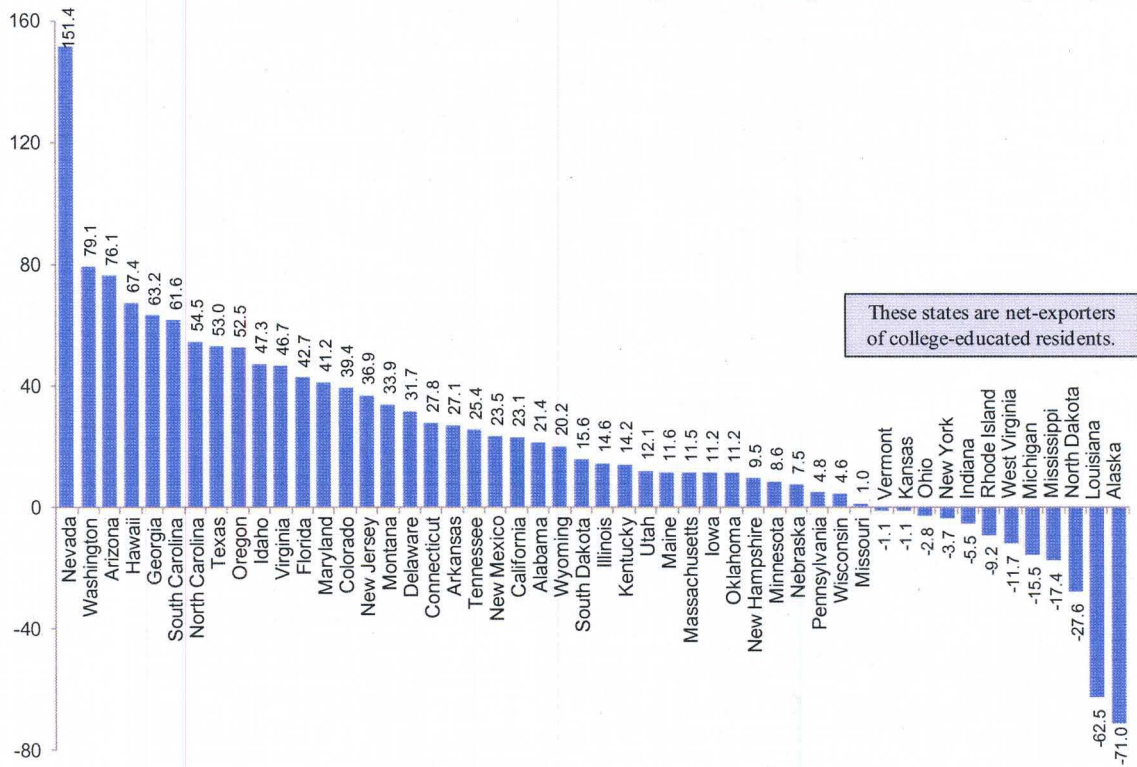
Source: NCES, IPEDS Completion Survey 2007-08; U.S. Census Bureau, 2005-07 American Community Survey (Public Use Microdata Sample)

The bottom right quadrant contains states that are relatively low producers of college graduates but the beneficiaries of in-migration. Nevada and Arizona are outliers – states that experience a great deal of in-migration but produce relatively few college graduates relative to the population. Many of the southeastern states are also in this quadrant. The ability to import educational capital alone does not lead to a highly educated citizenry in many of these states. The majority of states ranked in the bottom third of educational attainment have the ability to import college-educated residents but their low levels of degree production continue to yield undereducated populations. The least desirable quadrant on the chart is the bottom left – containing states that are relatively poor producers of college graduates in addition to experiencing net losses.

Consequently, three of the five least educated states in the U.S. exhibit these characteristics – West Virginia, Louisiana, and Mississippi.

As seen above, the accumulation of educational capital in states varies dramatically across the two primary sources – production and migration. Some states rely heavily on importing educated residents while others rely heavily on degree production. Figure 16 displays the annual net migration of college-educated residents as a percent of the annual undergraduate degree production. These data indicate that the annual net gain in numbers of college-educated residents in Nevada exceeded the number of college graduates produced annually by more than 50 percent. Washington, Arizona, Hawaii, Georgia, South and North Carolina, Texas, and Oregon are also very reliant on importing for their overall accumulation of educational capital – all experiencing a net gain of college residents that exceeds half of what each state produces. With relatively small net annual gains in educational capital through migration, Missouri, Wisconsin, Pennsylvania, Nebraska, and Minnesota rely heavily on the degree production of their colleges and universities for the education levels of their populations. Those that are net-exporters of educational capital (from Vermont to Alaska on Figure 16) have the highest dependence on in-state degree production – where the production of college graduates must make up the ground lost by exportation.

Figure 16. Reliance on Migration: Annual Net Migration of College Educated Residents as a Percent of Annual Undergraduate Degree Production (2008)



Source: NCES, IPEDS Completion Survey 2007-08; U.S. Census Bureau, 2005-07 American Community Survey (Public Use Microdata Sample)

States vary dramatically in both the levels in which they produce college degrees and the rates of interstate migration of college-educated residents they experience. Specific policy strategies designed to address each of these phenomenon at the state level are discussed in the previous chapter. The following section in this chapter addresses some of the individual and state-level characteristics that impact the interstate migration of educated residents.

Hierarchical Linear Model – The Effects of Personal and State-Level Characteristics on Interstate Migration of College-Educated Residents

The following sections represent the findings from a two-level hierarchical linear model, designed to test individual and state-level predictors of interstate migration. The data source and overall model specifications were reviewed in Chapter 2. Discussed below are the descriptive statistics associated with each of the variables in the HLM model, a preliminary analysis that applies a one-way analysis of variance (ANOVA) with random effects to test for the variability of interstate migration at each of the model's two levels, an examination of the overall "fit" of the model, and the results of the model.

Descriptive Statistics: Variables in the HLM Model

The basic descriptive statistics for the individual and state level variables included in the model are displayed in Table 6 below. The sample for level one (after trimming the data file as described in Chapter 2) contains 1,968,847 individual records. Level two contains 50 records; one for each of the 50 U.S. states. Fifteen percent of the sampled college-educated residents migrated across states between the years 1995 to 2000, which is the outcome variable used in the model. Among the independent variables, the average age is 41, just over half (51 percent) are males, 81 percent are White, seven percent Black, six percent Asian, five percent Hispanic, and less than one percent Native American. Nearly half (48 percent) have children and two-thirds are married. Seven percent work in high tech occupations and 22 percent work in business/financial/management occupations. Twenty-three percent have associate degrees, 51 percent have bachelor's degrees, 19 percent have master's degrees, five percent have professional degrees, and three percent have doctoral degrees. The standard

deviations and data ranges are also displayed. Since most of the variables used in level 1 are binary dummy variables, the minimum values are 0 and maximum values are 1. For example, White = 1 and non-White = 0. The variables in Table 6 that have an asterisk are used as reference variables in the model; i.e. they are not included in the analysis. The result is that “effects” of the included variables are interpreted as contrasts to the excluded category.

The person weight is a variable provided by the U.S. Census Bureau and is used to weight each person record in the data file. This weight is applied to each record in order to adjust the sample to better represent the population at large. It is not an outcome or predictor variable in the HLM model. In this case the average person weight is 21.2⁹.

For level 2, the average proportion of state employment in high skill occupations is 15 percent. The percentage employed in high skill occupations ranges from 10 to 21 percent across the 50 states. The average percent change in states high skill employment from 1990 to 2000 is 2.6 percent, ranging from a decline of 0.4 percent to an increase of 6.3 percent across states. This variable is calculated as the numerical change in high skill employment from 1990 to 2000 as a proportion of all occupations in 2000 (see Chapter 2).

⁹ See Chapter 2 for a more detailed discussion of the person weights.

Table 6. Descriptive Statistics of the HLM Model Variables

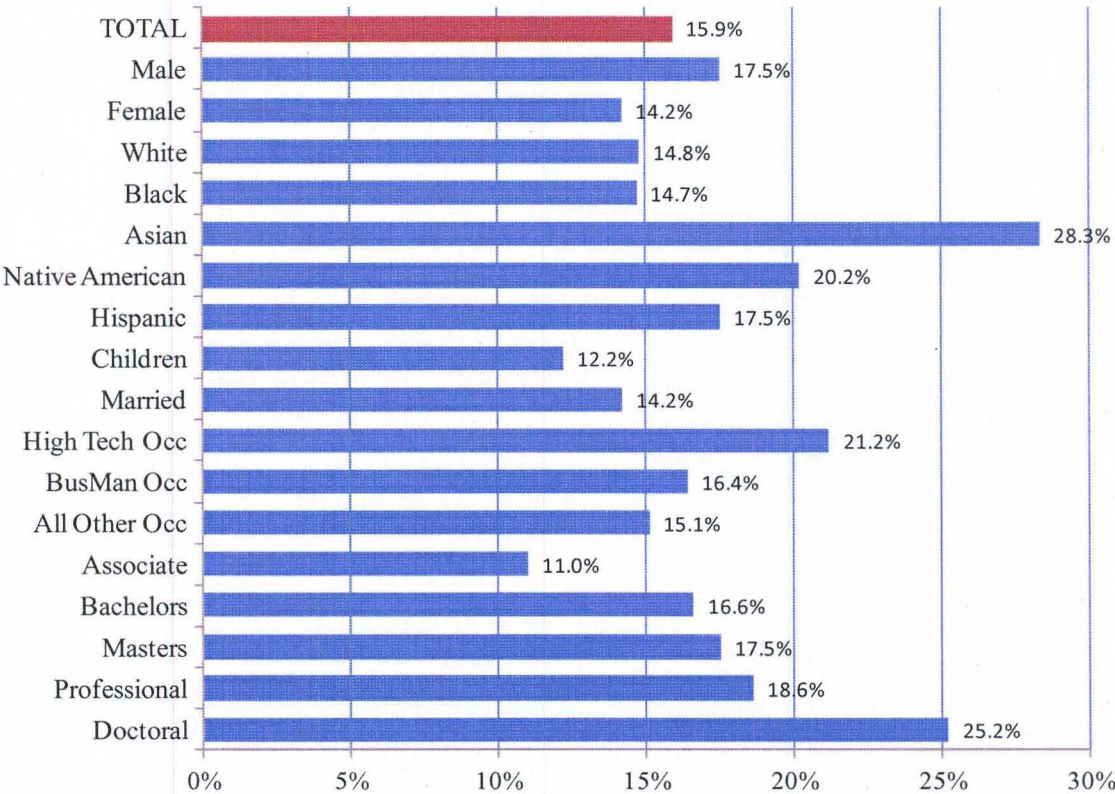
<u>Level 1 (N = 1,968,847)</u>	<u>Mean</u>	<u>Std. Dev.</u>	<u>Minimum</u>	<u>Maximum</u>
Migrate (Outcome Var)	0.15	0.36	0.00	1.00
Age	40.55	10.51	18.00	64.00
Male	0.51	0.50	0.00	1.00
White*	0.81	0.39	0.00	1.00
Black	0.07	0.25	0.00	1.00
Asian	0.06	0.23	0.00	1.00
Native American	0.00	0.07	0.00	1.00
Hispanic	0.05	0.21	0.00	1.00
Children	0.48	0.50	0.00	1.00
Married	0.66	0.47	0.00	1.00
High Tech Occ	0.07	0.26	0.00	1.00
BusMan Occ	0.22	0.41	0.00	1.00
All Other Occ*	0.71	0.46	0.00	1.00
Associate	0.23	0.42	0.00	1.00
Bachelors*	0.51	0.50	0.00	1.00
Masters	0.19	0.39	0.00	1.00
Professional	0.05	0.23	0.00	1.00
Doctoral	0.03	0.17	0.00	1.00
Person Weight	21.22	9.79	2.00	228.00
<u>Level 2 (N = 50)</u>	<u>Mean</u>	<u>Std. Dev.</u>	<u>Minimum</u>	<u>Maximum</u>
High-Skill Occ	14.57	2.64	10.01	20.56
Change in High Skill Occ	2.59	1.38	-0.39	6.32

*Used as reference variables in the HLM model

Before the individual characteristics in level one are actually tested for their impact on interstate migration using the HLM model, it is useful to see how interstate migration varies among each of these predictor variables. Figure 17 below displays the proportion of college-aged residents who migrated across state lines disaggregated by each of the individual characteristics applied in the model. These results reflect the instances of interstate migration after the person weights are applied to each record in the data set – adjusting the sample to be more representative of the population at large. Among all the employed college-educated residents in the U.S., 16 percent migrated from

one state to another between 1995 and 2000. Those who migrated are six years younger on average than those who did not. Males migrated at a higher rate than females. Asians and Native Americans migrated more than any other racial/ethnic populations. Those married and with children migrated less than those who were not married and or had children. Those employed in high tech and other professional occupations migrated more than those employed in other occupations. The proportion of college-educated residents who migrate increases at every level of educational attainment. In this case, these simple findings for the variables used in level one of the HLM model foreshadow the results generated from the more sophisticated HLM model.

Figure 17. Percent of College-Educated Residents Who Moved from State to State Between 1995 to 2000 – by Individual Characteristics



Source: U.S. Census Bureau, 2000 Decennial Census Public Use Microdata Sample

One-Way ANOVA with Random Effects

Raudenbush and Bryk (2002) recommend the following set of analyses as a preliminary step in a hierarchical data analysis. They are designed to produce a point estimate and confidence interval for the grand mean of the outcome variable, and provide information about the outcome variability at each of the two levels of the model. In the case of this model, since it uses a binary dependent variable, grand mean must be converted to an average probability. Based on these calculations, the HLM procedure should be reconsidered if:

1. The 95 percent confidence interval of the estimated probability of interstate migration of a “typical” college-educated resident has a wide range; indicating that the variables in the equation are not producing an overall estimate of interstate migration that has a high degree of statistical confidence. Much of the variance in interstate migration is explained by random effects in the model.
2. There is not much variation among states (level 2 of the HLM) in the probability their college-educated residents made interstate moves from 1995 to 2000; indicating that the level 2 predictors (state-level employment conditions) do not vary enough to add predictive value to the model.
3. The addition of the level 2 predictors explains a small proportion of the overall variance explained by the model; indicating that a small percentage of the variance in interstate migration of college-educated residents is explained by state-level employment conditions.

Table 7 displays the results of the one-way ANOVA model.

Table 7. Results of the One-Way ANOVA Model

Fixed Effect	Coefficient	Standard Error		
Average Probability of Interstate Migration of a “Typical” College-Educated Resident	0.150	0.049		
Random Effect	Variance Component	Degrees of Freedom	Chi Square	P Value
Probability of Interstate Migration of a “Typical” College-Educated Resident	0.097	47	20193.03	0.000
Level 1 Effect	0.999			

The following calculations are made to address 1-3 above, using a variety of combinations of numbers provided in Table 7. The fixed effect coefficient (0.15) and the standard error (0.049) are produced from an HLM model that is estimated with all the predictor variables (at levels 1 and 2) centered to the grand mean of the outcome variable. However, the overall results described later in this chapter are derived from an uncentered HLM model. With a binary dependent variable, models that use centering – either around the grand mean or within each of the predictor variables – are very difficult to interpret and are generally not recommended (Raudenbush and Bryk, 2002). The formula below is used to derive the average probability coefficient. The probability of interstate migration of a typical college-educated resident is 15%.

The calculation below is used to derive the 95 percent confidence interval of average probability coefficient (Raudenbush and Bryk, 2002). There is a high degree of statistical confidence that the average probability of interstate migration among college-educated residents ranges from 14.5 to 15.4 percent. This small range indicates that the outcome variable of interstate migration is not influenced much by random effects within the model.

$$\begin{aligned} & \text{Probability Coefficient} \pm 1.96 (\text{Std. Error}) \\ & 0.150 \pm 1.96 (0.049) = (0.145, 0.154) \end{aligned}$$

The following formula (Raudenbush and Bryk, 2002) is used to gauge the magnitude of variation among states in the probability their college-educated residents made interstate moves from 1995 to 2000. This outcome is positive, indicating (with a

95 percent degree of confidence) a substantial range in the proportion of interstate migrants among the 50 states.

$$\text{Probability Coefficient} \pm 1.96(\text{Variance Component of Probability Coefficient})^{1/2}$$
$$0.150 \pm 1.96(0.097)^{1/2} = (0.055, 0.244)$$

Finally an interclass correlation is calculated, which represents the proportion of variance in interstate migration between states. Nine percent of the overall model variance is explained between states.

$$\text{Variance Component of Probability Coefficient} / (\text{Variance Component of Probability Coefficient} + \text{Variance Component of the Level 1 Effect})$$
$$0.097 / (0.097 + 0.999) = 0.885$$

The results of the ANOVA calculations above suggest that there is a high degree of confidence that the outcome variable is not influenced by random effects, and that there is sufficient variation in interstate migration among states and between states.

Model Fit: Comparing the Fully Estimated Model to an Alternative Model

HLM provides an option to conduct a multi-parameter test for variance-covariance components of the model. It is a likelihood-ratio test that compares the deviance statistic of a restricted model with an alternative one (Raudenbush and Bryk, 2002). In this case, the fully specified model is compared to a model that just contains the level 1 variables; this assesses whether the addition of the state characteristics adds significant explanatory power to the model. This comparison model is chosen primarily because the application of a more simple logistic regression analysis to the level one predictors yielded results that indicate very strong statistical relationships between many

of these individual characteristics and interstate migration. The initial concern is whether the two state-level measures add substantial value to the probability already explained by the individual characteristics.

First, the deviance statistic for the current model is generated by using a “Laplace” estimation, a model option provided in the HLM6 software. The deviance statistic and number of estimated parameters are displayed in Table 8. With a fairly large chi-square and a p-value of less than 0.01, the results indicate that the models are significantly different, and that the addition of the level 2 measures for high-skill occupations contributes to the explanation of variation in interstate migration.

Table 8. Model Deviance Statistic and Comparison Test

<u>Statistics for Current Covariance Components Model</u>
Deviance statistic = 5127030.699
Number of estimated parameters = 18
<u>Model Comparison Test</u>
Chi-square statistic = 177.347
Degrees of freedom = 1
P-value = 0.000000

Finally, the reliability estimate for the random level-1 coefficient is very high (0.995). This is a measure of the proportion of the variance in the ordinary least squares (OLS) level-1 estimates that consists of parameter variance. In this case, the “reliability estimate can be interpreted as the amount of systematic variance in the parameter across groups; i.e. the amount of variance that is available to be modeled by between group variables” (Hofmann, 1997). A lower value (closer to 0) would indicate a large amount of variance between group variables that could not be modeled.

Results of HLM Two-Level Bernoulli Model

Table 9 displays the results of the HLM2 Bernoulli model. For each of the level 1 and 2 predictor variables, it displays the expected log odds (coefficients), standard errors, t ratios, degrees of freedom, probability values, odds ratios, and 95 percent confidence intervals.

Table 9. Results of the HLM Model: Final Estimation of Fixed Effects

Random Effect		Standard Deviation	Variance Component	df	Chi-square	P-value		
INTRCPT1, level-1,	U0	0.31119	0.09684	47	20193.028	0.000		
	R	0.99889	0.99778					

Fixed Effect	Coefficient	Standard Error	T-ratio	Approx d.f.	P-value	Odds Ratio	Confidence
For INTRCPT1, B0							
INTRCPT2, G00	0.346	0.222	1.560	47	0.125	1.414	(0.906, 2.208)
HIGHSKILL G01	0.001	0.014	0.097	47	0.924	1.001	(0.974, 1.030)
HS_CHNGE G02	0.119	0.043	2.738	47	0.009	1.126	(1.032, 1.229)
For AGE slope, B1							
INTRCPT2, G10	-0.062	0.002	-27.033	1968830	0.000	0.940	(0.935, 0.944)
For MALE slope, B2							
INTRCPT2, G20	0.284	0.009	30.844	1968830	0.000	1.329	(1.305, 1.353)
For BLACK slope, B3							
INTRCPT2, G30	-0.003	0.044	-0.076	1968830	0.940	0.997	(0.915, 1.086)
For ASIAN slope, B4							
INTRCPT2, G40	0.734	0.147	4.994	1968830	0.000	2.083	(1.562, 2.778)
For NATIVE slope, B5							
INTRCPT2, G50	0.397	0.135	2.936	1968830	0.004	1.487	(1.141, 1.938)
For HISPANIC slope, B6							
INTRCPT2, G60	0.081	0.139	0.581	1968830	0.561	1.084	(0.825, 1.425)
For CHILDREN slope, B7							
INTRCPT2, G70	-0.373	0.018	-21.043	1968830	0.000	0.688	(0.665, 0.713)
For MARRIED slope, B8							
INTRCPT2, G80	0.067	0.016	4.257	1968830	0.000	1.069	(1.037, 1.102)
For TECH_OCC slope, B9							
INTRCPT2, G90	0.163	0.019	8.602	1968830	0.000	1.177	(1.134, 1.222)
For BUSMAN_O slope, B10							
INTRCPT2, G100	0.123	0.010	11.821	1968830	0.000	1.131	(1.108, 1.154)
For ASSOCIAT slope, B11							
INTRCPT2, G110	-0.420	0.037	-10.848	1968830	0.000	0.657	(0.609, 0.709)
For MASTERS slope, B12							
INTRCPT2, G120	0.375	0.026	14.669	1968830	0.000	1.455	(1.384, 1.529)
For PROFESSI slope, B13							
INTRCPT2, G130	0.413	0.031	13.248	1968830	0.000	1.512	(1.422, 1.607)
For DOCTORAL slope, B14							
INTRCPT2, G140	0.964	0.049	19.634	1968830	0.000	2.621	(2.381, 2.886)

Level I Results

The first step in the model was to measure the effects of individual characteristics on the log odds of interstate migration. Holding constant all other predictors in the model, the log odds for migration were lower for college-educated adults with children, and with associate degrees. The log odds were higher for adults who are married, males, Asians and Native Americans, those employed in high tech and business/financial/management occupations, and those with degrees higher than bachelors (masters, professional, and doctorate). The log odds were not significantly different for Blacks and Hispanics (relative to Whites); and for those who are married. The age of college-educated residents was the only continuous variable. The negative coefficient (statistically significant at the 0.01 level) indicates that the younger the college-educated resident, the more likely he or she is to move to another state. The predictors that were statistically significant are expressed in the p-values of less than 0.05 (highlighted in the gray cells in Table 9).

The odds ratios and confidence intervals indicate that college-educated:

- Males are 33 percent more likely to migrate from one state to another than females (with 95 percent interval of 31 to 35 percent more likely to migrate).
- Asians are 108 percent more likely to migrate than Whites (with a 95 percent confidence interval of 56 to 278 percent more likely to migrate).
- Native Americans are 49 percent more likely to migrate than Whites (with a 95 percent confidence interval of 14 to 94 percent more likely to migrate).
- Individuals with at least one child are 31 percent less likely to migrate than those without children (with a 95 percent confidence interval of 29 to 33 percent less likely to migrate).
- Individuals who are married are 7 percent more likely to migrate than those who are not (with a 95 percent confidence interval of 4 to 10 percent more likely to migrate).
- Individuals who are employed in high tech occupations are 18 percent more likely to migrate than those in non-technical and non-business/financial/management

occupations (with a 95 percent confidence interval of 13 to 22 percent more likely to migrate).

- Individuals who are employed in business/financial/management occupations are 13 percent more likely to migrate than those in non-business/financial/management occupations and non-technical (with a 95 percent confidence interval of 11 to 15 percent more likely to migrate).
- Individuals with associate degrees are 34 percent less likely to migrate than those with bachelor's degrees (with a 95 percent confidence interval of 29 to 39 percent less likely to migrate).
- Individuals with master's degrees are 45 percent more likely to migrate than those with bachelor's degrees (with a 95 percent confidence interval of 38 to 53 percent more likely to migrate).
- Individuals with professional degrees are 51 percent more likely to migrate than those with bachelor's degrees (with a 95 percent confidence interval of 42 to 61 percent more likely to migrate).
- Individuals with doctoral degrees are the most mobile - 162 percent more likely to migrate than those with bachelor's degrees (with a 95 percent confidence interval of 138 to 189 percent more likely to migrate).

Level 2 Results

The next step was to consider the effects of the two state-level characteristics on the log odds of interstate migration. The proportion of state employment in high-skill occupations was not a significant predictor of the log odds of interstate migration. However, the change in high-skill employment from 1990 to 2000 had a significant effect on the log odds of interstate migration. For each additional one percentage point increase in the change in high-skill employment, there is a 0.13 percent increase in the log odds of interstate migration. In this case, states that have experienced larger growth in high-skill employment were more likely to have college-educated residents who migrated in from out-of-state. This finding is not surprising because it reflects the impact of increased demand to fill jobs that typically require a college credential; where the growth in high-

skilled employment occupations outpaced the ability of the state systems of higher education to produce the graduates needed.

Retaining or Rejecting the Hypotheses

The hypotheses at level 1 were that higher rates of interstate migration among college-educated residents are associated with being: White and Asian, male, younger, unmarried, with no children, more educated (associate less, doctoral more), and employed high tech occupations, employed in business, management, financial occupations. The HLM analyses found that younger adults, Asians, males, those without children, those employed in high tech and business/financial/management occupations, and those with higher levels of degrees were all more likely than their counterparts to migrate from one state to another (when holding all other variables in the model constant). These hypotheses were confirmed, and therefore can be retained. However, Whites were not more likely to migrate than Blacks and Hispanics; and Native Americans and married residents were more likely to migrate than their counterparts (statistically significant, but in the opposite direction as hypothesized). Therefore, these hypotheses are rejected.

The hypotheses at level 2 were that higher rates of in-migration among college-educated residents are associated with states that have higher proportions of employment in high-skilled occupations, and larger changes in the proportion of employment in high-skilled occupations. Only states with higher rates of growth in high-skill occupations were positively associated with interstate migration of college-educated residents – confirming the first hypothesis. The hypothesis that states with higher proportions of

high skill employment attract more college-educated residents from out-of-state is rejected.

CHAPTER 4

QUALITATIVE FINDINGS: POLICY AND PRACTICES THAT IMPACT THE PRODUCTION AND MIGRATION OF EDUCATIONAL CAPITAL

This chapter contains the findings gathered from a focus group of state higher education policymakers, supplemented with some literature from the field and personal experience, regarding policy and practices that impact the accumulation of educational capital in states. It focuses on the expertise and direct experiences of the focus group participants, and their desires if the policy environment in their states were accommodating.

The focus group with higher education leaders from seven states was conducted primarily to gain more insight into the potential policy options available at the state level regarding the production and migration of educational capital. Each of these individuals served in leadership roles in their states with respect to the development and implementation of policy designed to improve the public system of colleges and universities, the production of college graduates, and engagement in the types of economic activities that may serve to help the state retain the graduates they produce and even attract more college-educated residents from out-of-state. For each of the participants, one of the primary responsibilities of their job is to foster policies and practices that increase the levels of educational capital in their state.

The following findings represent their responses to questions in three general areas: the formulation of state policy in higher education, policies for increasing college degree production, and policies that impact the interstate migration of educational capital. Some additional resources are added to fortify their statements. The contributions of the focus group participants provide the framework, and the primary policy issues and solutions that impact the ability of states to accumulate educational capital. A great deal of elaboration of the policies they recommended is difficult to contain within the framework of this study because nearly all are topics that already contain a vast amount of literature and research, and have many volumes of publications devoted to them.

The Formulation of Higher Education Policy

This section contains the responses and suggestions from the focus group participants regarding how policy is typically formulated in states – to remedy past trends, to address current problems or challenges, and/or to respond to anticipated future trends. The participants suggested that the formulation of state higher education policy is impacted by a variety of underlying conditions, and is subject to a fairly defined set of realities. The underlying conditions that must be addressed (or overcome) are cultural complacency, the reactive (as opposed to proactive) nature of legislative activity, and the tendency of many policymakers to legislate by anecdote instead of adopting evidence-based approaches. The unavoidable realities in the higher education political process are the fiscal environment and the necessity to capitalize on the “one chance” opportunities.

Several of the states represented by the participants are ranked well below the U.S. average in the percentage of adults with college degrees. Despite the increasing

evidence that – now more than ever – well-paying jobs require a postsecondary credential, there remains a lag between the historical experiences among many of these states’ residents and the value they place on a college education. As a result, there is a “cultural complacency” among much of the general public and certain legislators that can sometimes yield the sentiment that “not everyone needs a college degree”. This is particularly true in regions of states that have a historical dependence on production and agriculture based economies, where high school attainment once led to secure gainful employment. While this cultural barrier certainly does not cut across the entire political process in higher education, it creeps into it from time to time – particularly from certain legislators and in tough economic times when higher education competes with other important public programs for state resources (e.g. K-12 education, corrections, Medicaid, transportation, etc.).

While not limited to higher education policy, several of the focus group participants asserted that the legislative process in many states also tends to be “reactive rather than proactive”. Very few states effectively adopt a sustainable vision for the future of higher education in their political process. The policy process tends to focus largely on the immediate needs expressed by individual institutions of postsecondary education, rather than the long-term needs of the state and the residents they serve. It often gets mired in the desires of institutions to expand their capital infrastructure and programmatic missions, and the fiscal resources needed to accommodate these expansions – causing stakeholders to lose sight of an overall public agenda and how the system of postsecondary institutions can work collectively to better meet the needs of state residents and long-term state goals. In order to develop a policy framework that

effectively focuses on the future of higher education, state leaders must work diligently to build consensus around a few key goals for the state higher education enterprise – goals that are ultimately adopted by members of all political parties and prominent business and community leaders across the state. A few states have effectively implemented and maintained public agendas for higher education that have served to drive proactive and longer-term policy. These will be discussed in chapter five.

In many states, it is difficult to build and sustain the “culture of evidence” needed to offset the personal ties legislators have with their own experiences in higher education (or those of a family member) and the ties they have with an institution located in their district. The focus group participants felt that policy is often formulated (at least initially) based on personal experiences and the particular needs of the institutions legislators represent. Related to the issue described above, a public agenda is needed that transcends the isolated experiences among policymakers – one that puts the entire system of postsecondary education into a larger context, is driven by a well-defined set of goals, and contains a transparent set of measures used for gauging success. In the presence of an agreed-upon strategic framework for higher education and well-documented results, anecdotes and personal experiences have much less influence on the process.

The focus group participants indicated that the formulation of higher education policy is constrained by fiscal realities. In many states, public higher education is often viewed as the “largest discretionary budget item”. There is a great deal of public pressure to at least maintain support for K-12 education and corrections; politicians are usually very reluctant to risk the labels of being unsupportive of childhood education or “soft on crime”. Many states are locked into rapidly growing Medicaid expenditures. Once these

large budget items are resolved, public higher education fills the largest remainder of the budget “pie”. Therefore, the state revenues available to the higher education enterprise often drive the policy context. In recent years, constrained budget situations in many states have left higher education policymakers with fewer options. Rather than investing in strategies that might improve the higher education enterprise, policymakers are locked into strategies that utilize existing (or declining) funds more effectively. In this environment, where the “stick” approach is more readily available than the “carrot” one, policymakers must be very selective in the policies they chose to address.

Finally, several of the focus group participants asserted that “one chance” opportunities are a reality in the higher education policy context. It is rare that the “stars align” in just the manner and at the time most preferred by policymakers. The most broad sweeping policy changes in higher education have occurred in states where higher education leaders managed to capture and align support from the Governor and key legislators, business and community leaders, and institutional presidents. As a policy leader in higher education at the state level, the ability to build these alliances and capitalize on them when they happen is a crucial part of the process. Some of the more successful state initiatives discussed in the final chapter were formulated during these rare “one chance” opportunities.

Policies for Increasing College Degree Production

This section contains the responses and suggestions from the focus group participants regarding descriptions of existing or potential state-level policies designed to address the issue of postsecondary degree production; geared to individual students or

institutions, targeted to specific types of degrees, and some of the barriers associated with implementation. Some additional information is added to provide more context to their responses.

The focus group participants recommended a variety of policy options for increasing degree production in states. Since the issue of degree completion has many facets, the potential options span the higher education enterprise and, in many cases, even lie outside of it. In many states, there are formal bodies of individuals, representing a variety of sectors (e.g. postsecondary education, K-12 Education, the business community, etc.), and are designated specifically to work on issues that span from preschool to college completion – typically named P-16 or P-20 councils. The primary roles of these councils are to inform and elevate policy conversations among key stakeholders, and guide the development of policy designed to improve student success. Among other things, they raise and address issues associated with how well K-12 education prepares students for college, college participation rates of state residents, and the retention and completion rates of college students. The concept of P-16 or P-20 evolved primarily from the understanding that issues that impact student success and college completion are multi-faceted, and effective policy can take on many forms at various stages in the education process.

There are a set of policy options at the state level associated with the preparation of students for college. These include mandating a core curriculum in high school, expanding options for students to take college-level courses in high school, and better alignment of student assessments in high school and the standards set by postsecondary institutions to be “college ready”.

Over the past decade or two, states have begun to legislatively mandate additional math and science courses in high school as part of curriculum required for college entrance (primarily entrance into four-year colleges and universities). These efforts are driven largely from an extensive body of research in education that has shown that more rigorous coursework in high school leads to greater rates of success in college. Some states are also engaged in efforts to expand opportunities for high school students to take college-level courses. These efforts are designed to increase the levels of preparation for college, increase the likelihood that students will enroll in college, and reduce the time needed to graduate once they enter college. And in some states, there are funding mechanisms in place that reward the high school and the postsecondary institution for the course enrollment. Finally, there is general agreement among many policymakers that state assessments mandated in high school rarely correlate with success in college. There is a groundswell of expressed need in some states to better align learning assessments in high school with the standards set by colleges and universities to move directly into college-level work (particularly in mathematics, English, and reading). However, these policies are more difficult to implement statewide because of the widely varying entrance standards set across colleges and universities. While these policy options are certainly linked to college completion, they are less direct than the ones available within the higher education enterprise.

The focus group participants recommended a number of policy options for college completion that are directed specifically to the higher education enterprise. Some are directed to students and others to colleges and universities. The most notable student-centered policies are state financial aid, tuition policy, and incentives for students to

attend full-time. State financial aid programs should effectively target students who would not attend college without it. Several states have sizable merit-based (as opposed to need-based) financial aid programs that provide substantial resources to college students from middle- and high-income families (e.g. Florida, Georgia, Kentucky, Tennessee, and Louisiana). While several of these merit-based programs have need-based components embedded within them, they still allocate scarce state resources to sizable numbers of students who would attend college without it, at the expense of limiting access to those of lesser means.

In most states, policymakers have regulatory control over tuition and fees. Along with the state financial aid programs, tuition policy is a crucial part of providing and maintaining access to postsecondary education. In addition to the necessity to keep college affordable, there are ways to develop tuition and fee structures that incentivize both enrollment and persistence to completion in higher education. There are some isolated examples of states systems of higher education (e.g. Illinois) and institutions that have guaranteed a single tuition rate to first-time students for a defined number of years – assuring students as they enter college that tuition will not increase as long as they graduate within the allotted time. Several states also set tuition rates that cap at a certain number of credit hours – e.g. there is no additional cost to students who take more than 15 credit hours a semester. Finally, tuition policy can be utilized to build in incentives for students to enroll full-time (as opposed to part-time) by charging less for credits above a certain threshold. These types of policies can serve to help maintain student enrollment, increase the intensity of their enrollment, and speed up their time to degree.

The focus group participants recommended several policies primarily designed to influence institutional behavior, as opposed to student behavior. Perhaps the most leverage comes from finance policy – how the institutions are funded by the state and whether the funding mechanism incentivizes improvements in completion rates and/or the number of college degrees awarded by institutions. In most states, the funding formula for public colleges and universities (and the amount of funds appropriated to them) is driven almost exclusively by the number of students enrolled. “Institutions are rewarded for providing access but not for awarding degrees”. There is a considerable movement among state higher education policymakers across the country to figure out ways to allocated state funds in ways that reward institutions for completions rather than enrollments. Potential policy options take on a variety of forms. During good fiscal times, several states (e.g. Kentucky, Oklahoma, and Tennessee) had incentive pools of state funds allocated exclusively for institutional improvements in retaining and graduation students. However, these funds were separate from the base funds allocated to institutions by the enrollment-driven formula and, therefore, when state budgets became constrained in the early 2000s they were the first to disappear. There is general agreement among most policymakers that in order to sustain a funding formula that rewards college completion over time, it must be effectively built into the base allocation to institutions.

The focus group participants unanimously agreed that the only way to ensure overall increases in college and maintain student access to higher education is to fund institutions on the absolute number of degrees they produce, rather than on the rates at which students graduate. If institutions were rewarded for improving the rates at which

they graduate students, they could simply become more selective in their admission process, cutting off access to more students. The overall number of college credentials awarded annually should drive the funding formula instead of the number of students enrolled. This is consistent with the notion of increasing educational capital, while graduation rates are not. Other options, in addition to the number of credentials awarded, include end-of-term enrollments and course completions. These are more subtle shifts from the traditional enrollment-driven formula – with a completion mechanism built in, but at the course- and term-levels rather than degree-level. Rewarding postsecondary institutions for producing graduates as opposed to enrolling students is increasingly viewed by policymakers as a potential policy option for increasing degree production in states – particularly among business leaders who are accustomed to the pressures to increase levels of output rather than input. In most states, business leaders play prominent roles on the boards of state systems of higher education and colleges and universities. When implementing a completions-based funding formula, safeguards need to be put in place to ensure that grade inflation and/or undeserved promotion does not creep into the process of educating college students; concerns often expressed by critics of completions-based funding formulas.

Other institution-focused policies advised by the focus group participants that impact degree completion include those related to ensuring that all residents have physical access to postsecondary education and that the transfer function between two- and four-year institutions works well. Access has a variety of meanings in postsecondary education. The necessity to provide geographic (or physical) access has diminished to some degree with the emergence of distance education courses and programs. College

courses and entire academic programs are offered through mediums such as the internet, and video and teleconferencing, and an array of hybrids. Large proprietary institutions such as the University of Phoenix, Kaplan University, and DeVry University have made substantial investments in distance education and serve thousands of students across the U.S. Two-thirds of all degree-granting postsecondary institutions now offer at least one distance education course (NCES 2008). Despite its continued growth, however, nearly 80 percent of all college coursework is still delivered in classrooms (Sloan Consortium, 2008) and a very small percentage of entire academic programs are offered through distance education. The fear among many traditional colleges and universities that the “all-distance” proprietary institutions would take over the market has subsided to a large degree with the increasing recognition that many students still desire a “high touch” component to their experience – at least at some point in the education process. Many educators are also realizing that there is a sizable segment of the student body – e.g. those requiring developmental education and those lacking advanced computer skills – who require a great deal of face-to-face interaction. Finally, the proprietary distance education institutions, and sometimes even the distance learning components within public postsecondary institutions, are typically more expensive to students, so price out many students drawn from low- to middle-income families. Therefore, geographic access to lower-priced public postsecondary institutions is still an important issue in many states.

Given the geographic locations of postsecondary institutions – and the mix of two- and four-year institutions – residents in certain regions of some states lack access to postsecondary institutions altogether or lack access to two- or four-year programs. For example, in Arizona, the three public four-year institutions (Arizona State University,

Northern Arizona University, and Arizona State University) are all located near the urban corridor stretching (north to south) from Flagstaff, to Phoenix, to Tempe. One of the most pressing policy issues facing Arizona is how to deliver public four-year degree programs to residents in remote cities such as Yuma, Douglas, and Thatcher. These cities have public two-year colleges that serve many place-bound students who are less able to transfer to institutions several hours away to complete four-year degrees. Conversely, in South Dakota (with the exception of its selective engineering-focused institution) the six public four-year institutions are all located in rural areas of the state while residents in the state's two largest cities (Sioux Falls and Rapid City) are geographically limited to a two-year college experience. The policy implications for ensuring and improving access are multi-faceted. Summarizing some of the comments provided by the focus group participants, the formulation of state policy designed to address access must include (but not be limited to) the following:

- A finance structure that provides incentives for four-year institutions to offer upper division coursework at remote locations. Institutions are not likely to devote faculty and resources unless there is financial incentive to do so.
- Clear guidelines regarding which institutions provide what types of programs. Some institutions are more equipped to offer programs in certain academic areas than others. They have the history, faculty, and resources to offer such programs.
- The provision of an array of academic programs that make the most sense for the region being served. Certain localities are in greater need of certain programs. For example, rural areas are often in high demand of bachelor's degrees in nursing and teaching because healthcare and education are usually the two largest employers in the area.
- A strategy that is cost-effective to the state and the students. For example, a major research institution offering the last two years of a bachelor's degree in early childhood education at the highest cost per student (in state funds) and at the highest rate of tuition and fees (per student) is the least cost-effective approach, particularly in a field in which the presence of a large research capacity will likely have little impact on instruction. Also important is the effective use of existing

resources – e.g. using the physical capacity at the community college rather than building (or utilizing) a separate campus for upper-division coursework.

Any strategy designed to increase degree production in states is short-sighted if it does not address the issues and the policy levers associated with providing access to postsecondary education. It is difficult to make substantial improvements in degree production at the state level while limiting access to large segments of the state's population.

Improving transfer and articulation between public two- and four-year institutions is another important policy area for increasing the production of college degrees.

Articulation agreements are agreements between postsecondary institutions that facilitate the transfer of college credits from one institution to another. More than two-thirds of all community college students anticipate earning bachelor's degree, but only 25 percent actually transfer to four-year institutions (AASCU 2005). And in some states, more than half of the undergraduate students are enrolled in public two-year institutions.

Articulation problems in many states sometimes stem from the misguided attitudes among faculty and administrators at four-year institutions about accepting credits from institutions other than their own (particularly from community colleges) and the mismanagement of course-taking among students in community colleges. The latter problem leads to the accumulation of credits that do not count toward the major students select after they transfer. The two main policy solutions are (1) clear statewide standards across all public institutions regarding the courses that transfer with credit and the blocks of courses that transfer within majors, and (2) better information provided to students and college advisors. "In states such as Florida and North Carolina, there are statewide

articulation agreements that cover all public community colleges and universities. In Colorado, there are articulation agreements that cover specific programs (e.g. nursing) across all public colleges. Aside from making it easier for transfer students, these statewide agreements help standardize higher education, thus improving quality across the system. In states such as Florida, Virginia, and Connecticut students are guaranteed acceptance to public four institutions once they graduate with an associate's degree from a community college with a minimum grade point average." (www.braintrack.com) In addition, several states have developed websites that provide detailed information to students regarding the transfer of credit across institutions. Two good examples include Alabama's STARS and California's ASSIST websites (located at <http://stars.troy.edu/stars/stars.htm> and <http://www.assist.org/web-assist/welcome.html>).

Policies that Impact the Interstate Migration of Educational Capital

This section contains the responses and suggestions provided by the focus group participants regarding descriptions of existing or potential policies that impact the retention or attraction of college-educated residents; the state's control (policy levers) over economic conditions that would help to retain or attract educational capital, and the role of higher education in economic development. Some additional information is provided in order to expand the descriptions of certain policy options.

The policy options available to higher education policymakers for the retention and attraction of college-educated residents are less bountiful, and more loosely connected to their primary mission of educating students. The general options suggested by the focus group participants are to expand the research capacity (and activity) in

public research universities, help create incentives for postsecondary institutions and faculty to become more entrepreneurial, foster more opportunities for students to engage in internships and work-study programs, and focus more effective policy on students who are the most likely to stay in the state after graduation – i.e. older “place bound” adults.

The research triangle in North Carolina involving joint activities by the University of North Carolina, North Carolina State University, and Duke University (created with substantial support from the state) and the renowned impact the University of Texas has had on the growth in high tech employment in Austin Texas, are the envy of many state policymakers. They have evolved into economic engines for the state, and have attracted many highly educated workers from abroad. If there were an easy formula to replicate these conditions, many state policymakers would have applied it by now. There is general acceptance among higher education policymakers that most sponsored university research activity helps to create a more vibrant economy which, in turn, creates more high-wage and high-skill jobs. University R&D expenditures are also key measures in both the State New Economy Index and Development Report Card for the State (reviewed in Chapter 1).

In 2007, university research and development (R&D) expenditures ranged from \$453 per capita in Maryland to \$74 per capita in Nevada (www.higheredinfo.org). The most competitive R&D funds are those made available from the National Science Foundation which is added to the research support provided by the state, local industries, or the institutions themselves. Maryland, Massachusetts, and Hawaii expend the most external R&D funds per capita and Oklahoma, Arkansas, and Florida expend the least.

North Dakota, Wyoming, and Nebraska invest the most in themselves, expending the most R&D funds from state, local, and institutional sources (www.higheredinfo.org).

But university R&D certainly is not a “magic bullet” for economic development and retaining attracting college-educated residents. Also among the states with the highest external research expenditures per capita are New Mexico, Vermont, and North Dakota. These are not states that are associated with high-tech economies or that retain and attract a great deal of educational capital (www.higheredinfo.org). In his article “The Under-Understood Nexus: Higher Education and Economic Development” the following statement regarding the economic impact of university research was recently made by Dennis Jones, president of the National Center for Higher Education Management Systems.

Unfortunately, the mere presence of a university, even a well-regarded research university, does not automatically translate into the kind of Silicon Valley success story that sponsors envision when such investments are made. The fact is, there are relatively few blockbuster success stories of this kind; and in most of them, the role of universities is seldom as directly causal as typically assumed and portrayed. (Dennis Jones, NCHEMS News 2007)

The conditions that exist in North Carolina, Austin Texas, and California’s Silicon Valley are difficult to replicate with sponsored university research alone; though most agree they would not have developed without it. Mr. Jones urges state policymakers to invest in research that spins off new companies and jobs, and is focused on the scholarship of application rather than the scholarship of discovery. He also speaks of the importance of supporting and tracking entrepreneurship in colleges and universities (Jones, 2007).

Faculty in most colleges and universities are rewarded for scholarship rather than application. In many states, there is a great need to devote public university and faculty resources to entrepreneurial activities that help to create more local employment opportunities and involve students in the creative process. Growing the needed talent from within is a safer strategy than trying to attract it from outside the state. “With this in mind, colleges and universities can train students in basic entrepreneurial skills, expose them to successful local entrepreneurs through internships and similar strategies, and create an environment in which interested students have access to the necessary support systems. Perhaps most important of all is creating an institution that is itself entrepreneurial and administrators and faculty alike are given reign – and are expected – to try new ideas and seek out-of-the-box ways to further the institution’s mission.” (Jones 2007)

At the very least, states should build measures associated with entrepreneurship and job creation into their statewide accountability frameworks, holding institutions publicly accountable for improving in related areas. Creating a culture of entrepreneurship within universities by rewarding related faculty behavior does not make sense for all academic programs. But it certainly makes sense for some including business, computer science and technology, or engineering. Strategies fostered at the state level, aimed to change institutional behavior, are the cornerstone of North Dakota’s statewide plan for higher education. These strategies, developed exclusively from the recognition that the state continually loses a substantial portion of its educational capital, are highlighted in the last chapter.

The focus group participants suggested that state policy should also promote and foster more internship and work study opportunities for students. These types of programs engage students in the state and local employment community and provide valuable experiences regarding the application of knowledge in the work place. Given these opportunities, students are more likely to remain employed in the state after they graduate. Greater success in this area requires not only the accommodation of these activities by colleges and universities, but also the active support of the business community. Community colleges are typically much better than four-year institutions in both providing these opportunities to students and building and sustaining relationships with local employers. State policymakers should utilize their connections to the education and business communities to create more supportive policies and practices designed to expand these opportunities. For example, employers who engage in internship and work study programs could receive tax breaks from the state; institutions could be rewarded in the funding formula for their levels of activity in these types of programs. And, like entrepreneurship, statewide and institutional measures for student engagement in these activities should accompany the system of accountability reporting.

Finally, the focus group participants asserted that certain segments of the population are more likely to stay in state after graduating. Most prominent among these are older working-aged adults, so state higher education policy should be more effectively targeted to these individuals. Most policy options are tied to the missions of community colleges and less selective four-year commuter campuses rather than to the missions of research universities. The findings associated with the relationship between individual characteristics and interstate migration support this notion. Older adults and

those earning associate degrees are less likely to move out-of-state than younger adults with bachelor's degrees and higher. Older adults are much less likely to complete college than younger adults. Data the National Center for Higher Education Management Systems recently collected from twelve states in the U.S. reveal that fewer than 20 percent of students who begin college after the age of 24 earn a college credential (certificate or degree) – compared to more than 60 percent of those who begin directly out of high school. Some of the strategies discussed above – particularly a state finance structure that rewards college completion instead of enrollment – would incentivize institutions to improve their service to older adults, and their success rates as a result.

More state grant aid for part-time attendance (not for just tuition) is also an option. Most states provide very little grant aid to students who attend part-time. Older adults who must juggle family and/or work responsibilities in addition to college often pay more for attending college, regardless of their financial standing. For these types of students, childcare and transportation costs are sometimes as critical as tuition. The provision of more financial assistance to older adults would improve their rates of participation and success. Expanding state student financial aid programs to incorporate more non-traditional adult learners is a difficult sell in many states because, under the current constrained budget conditions, it would require that funds be reallocated away from the younger students attending full-time.

Some of the most effective policies for improving the success rates of older adults are primarily at the institutional level; though they could be promoted and fostered at the state-level. These include more flexible class offerings (both times and sequencing); more creative delivery of instruction (combination of distance and face-to-face learning);

more clear, direct, and accelerated paths to completion; and more focus on high-value certificates (shorter-term credentials that are employer recognized and rewarded).

The focus group participants advised that remedial/developmental education is one of the biggest stumbling blocks for older adults who pursue college credentials. These are non-credit bearing courses (usually in math, English, and reading) that students must take if they lack the skills need to enroll in a college-level course. Many older adults require remediation because they have been out of school for a number of years. Given work and family responsibilities, older adults are more sensitive to the time requirements of earning a college degree than younger students. Therefore, having to enroll in one or multiple courses prior to earning college credit exacerbates their experience. Examples of statewide policy action designed to address developmental education include the Integrated Basic Education Skills Training (I-BEST) program in Washington and the statewide developmental course redesign in Tennessee. Implemented in 2004 by the Washington State Board of Community and Technical Colleges, the IBEST program integrates developmental and college-level coursework simultaneously; enabling students to make progress toward a credential without the delay associated with taking remedial coursework prior to enrolling credit-bearing courses¹⁰. With support from Lumina Foundation for Education, Tennessee is currently in the process of redesigning all remedial coursework offered in its state-supported community colleges. The redesign is aimed at standardizing the content and delivery of developmental education across the community colleges, and improving the rates at which students complete the required coursework and enter college-level courses.

¹⁰ More information on IBEST is available at <http://www.sbctc.edu>.

The final recommendation from the focus group participants is more a “good practice” than a policy, and cuts across each of the three areas described above. States should have effective systems of accountability in place to drive college completion agendas. They should include clear short- and long-term goals, contain well-defined measures of progress at both the state and institution levels, and have enough visibility among stakeholders and the general public to apply the public pressure needed to incentivize action among institutions. If possible, the key measures contained in the accountability systems should be embedded into the state’s funding formula for public higher education, where funds are allocated based on institutional progress toward meeting statewide goals. The accountability frameworks, and the measures contained within them, should drive policy debates in states; restricting them in large part to evidence-based discussions, as opposed to an anecdotal ones.

Higher education accountability takes on many forms in states – both in terms of the breadth of performance measures included and the vehicle by which it delivered. In some states, policymakers are more concerned with general outcomes such as retention and graduation rates, transfer rates of students from two- to four-year colleges, and degrees awarded. In others, accountability measures are applied at a more granular level, including measures disaggregated by race/ethnicity, academic field, etc. And in some states, accountability systems are almost solely focused on institutional performance; lacking broad statewide goals for the entire system of higher education. There are very visible state higher education accountability systems, promoted through elaborate websites and routine publications. Others are more subtle; taking the form of performance contracts with institutions, where progress is measured largely behind the

scenes away from the general public. Accountability systems for public higher education, in various forms, are present in nearly all states. But few adhere to the overarching framework or contain many of the features recommended by the focus group participants.

There are two phrases often heard the higher education policy community: “you get what you pay for” and “measure what matters”. It is no surprise that state finance and accountability cut across nearly all of the policies and practices recommended above. How states finance the behavior they want and how they hold the participating actors accountable for it are the lifeblood of effective state higher education policy. Developing and sustaining a “public agenda” for higher education is another notion that spans many of the policy recommendations above; where the overall policy framework is focused on increasing the education levels of state residents and the competitiveness of the state’s economy. The higher education institutions are collective partners in meeting these broad statewide goals and have defined roles to play, along with other sectors of education and agencies devoted to workforce and economic development. Without it, policy formulation falls back to meeting institutional needs. Under this approach, policymakers and the general public can only hope that actions by individual institutions will add up to something meaningful to the state and its residents.

CHAPTER 5

SUMMARY AND CONCLUSION

This study was conducted in order to address one of the most pressing issues in the United States; the need to increase the educational capital of our nation to remain competitive in the knowledge-based global economy. Many state policymakers are striving to do the same – acknowledging that higher levels of college attainment lead to a more productive workforce and a more vibrant economy. And most policy associated with the supply of college graduates occurs at the state level. In addition to the production of college graduates, many state policymakers understand that their state's ability to retain the graduates their colleges and universities produce, and attract college-educated residents from out-of-state are, are critical for raising the educational capital in the state. A variety of analyses were conducted in order to address these important issues.

Descriptive analyses in Chapter 3 provide a great deal of state-level information which states in the U.S. are producing relatively large numbers of college graduates and which benefit (or not) from the production of other states by importing large numbers of college graduates. A Hierarchical Linear Model (HLM) was conducted to test for predictors of interstate migration of college graduates at the person and state levels; using the Public Use Microdata Sample from the 2000 Decennial Census. At the person level, the predictors included age, gender, race/ethnicity, marital status, with or without children, level of college education, and type of occupation (high tech and business,

financial, and management). The two state-level predictors were the percentage of all state employment in high-skilled (management and professional) occupations and the change in high-skilled occupations from 1990 to 2000. Finally, a focus group with seven state higher education policymakers was conducted in order to identify the most useful policy options available to states for increasing educational capital and some key state-level policies already implemented in certain states in the U.S. This chapter provides a summary of the HLM findings and descriptions of three well-regarded state initiatives to increase educational capital – relating both to many of the policy recommendations provided by the focus group participants. It also identifies the key strengths and limitations of this study, and some general conclusions.

Findings from the Hierarchical Linear Model (HLM) model suggested that certain college-educated individuals are more likely than others to migrate from one state to another. Asians, and to some degree Native Americans, were more mobile than Whites, Hispanics, and Blacks. Several of the previous studies that tested the effects of individual characteristics on interstate migration (discussed in Chapter 1) established a strong relationship between race/ethnicity and mobility. However, when the analysis was limited to college-educated individuals, the differences in mobility between Whites, Blacks, and Hispanics were not replicated. On the other hand, gender differences were replicated. Males were more likely to migrate than females; confirming the findings of the other studies reviewed in Chapter 1. While these findings are interesting, they do not translate well (if at all) to policy action. Other findings from the HLM model, however, do have policy implications.

Those with associate degrees were less likely to migrate than those with bachelor's degrees. The vast majority (68.4 percent) of all associate degrees in the U.S. are awarded at public two-year institutions (NCES, IPEDS Completion Survey 2006-07). These institutions are more likely than four-year colleges and universities to serve students who are place-bound for a variety of reasons: students are more likely to be older, married and/or have children, already participating in the workforce, and training in areas that prepare them for employment in the local economy (e.g. nursing and health tech, construction and mechanical trades, etc.). Conversely, those with graduate and professional degrees were more likely to migrate than those with bachelor's degrees. It is not surprising that doctoral degree holders were the most mobile. Doctoral programs tend to recruit largely from out-of-state, and the employment market for these individuals is comprised largely of other postsecondary institutions across the U.S. – i.e. teaching and research professions.

While all levels of education and training are important within state systems of postsecondary education, those at the associate and bachelor's levels are more likely to educate and train individuals for local and state employment. The expansion of state public community and technical college systems has occurred in several states in the past decade or two. Nearly 60 percent of all college students in California are enrolled in public two-year colleges. High growth states such as Arizona, Florida and Washington also have developed large community college systems. Since 2000, Kentucky and Louisiana have merged their community and technical college systems with documented intentions of expanding certificate and associate level opportunities for state residents and improving education and training for jobs within the state (Kentucky and Louisiana

Community and Technical College Systems). The same is true of the recent expansion of the Ivy Tech Community College in Indiana – with branch campuses located throughout the state. Given strained fiscal environments in many states, and the diminishing capacity to support higher education, state policymakers are increasingly recognizing that any substantial expansion of public higher education must mainly occur in community colleges, where the cost per student is much lower than at four-year institutions. While the notion of mobility is not typically part of the decision-making process, expanding the role of community and technical colleges in serving the state’s education needs is likely to produce more graduates that remain in the state upon completion. In addition, community and technical colleges are typically much more focused on supplying the types of graduates needed in local economies than four-year colleges and universities.

The findings associated with employment characteristics largely reflect the demand-side of state economies. Individuals who were employed in high tech and business, financial, and management occupations were more likely to migrate across state lines in order to find gainful employment. This was also reflected at the state level; states that experienced the most growth in these high-skilled occupations were more likely to be the recipients of high-skilled college-educated migrants. These findings suggest state policy action that lies largely outside the supply function: economic development as opposed to the production of college graduates. Creating state policy designed to increase the demand for college-educated residents, and defining the role of higher education in the process, is a more complicated process than focusing policy solely on supply. Increasingly, higher education policymakers are recognizing the importance of strategic policy that links the role of the higher education institutions to the state’s

economic development efforts. Pressure is placed on colleges and universities not only to improve retention and graduation rates of college students, but also to engage in more activity that leads to state and local economic development. Establishing this broader policy framework – one that addresses both the supply and demand of educational capital – requires a great deal of political will. Examples of three states that have succeeded are discussed below.

At the root of nearly all major state-led efforts to improve college degree production and the accumulation of educational capital are well-crafted strategic plans and alliances that serve to push the agenda. Highlighted below are examples of three well-regarded state strategic plans and initiatives designed to address the issues associated with the educational attainment of the state. All three were dependent upon the achievement of consensus among key state policymakers and business leaders about the long-term vision for the state, the key goals, and the roles of individual institutions in reaching them. Cutting across each of these initiatives are three major themes: the overall need to increase educational attainment in the state, the critical link between higher education and employers in the state, and the resulting competitiveness of the state's workforce and economy. These examples are drawn from Indiana, Kentucky, and North Dakota, with specific reference to policy and practices related to degree production and the accumulation of educational capital, by retaining college-educated residents and attracting them from out-of-state.

Good Practice: State Strategic Plans for Increasing Educational Capital

In the summer of 2007, the Indiana Commission for Higher Education set forth a bold plan to improve the state's system of higher education, entitled *Reaching Higher: Strategic Directions for Indiana*. The Commission is comprised of prominent business leaders in the state and representatives from the state's postsecondary education institutions. The plan's statement of vision for the system focuses on improving the access and quality of the undergraduate experience, providing a broad range of educational opportunities that are responsive to the state's need for an educated workforce and increased levels of human capital, and fostering flexibility for Indiana's colleges and universities to define and realize their unique missions and their individual roles in collectively meeting the statewide goals. It describes a number of imperatives for change that include: (1) Indiana's low ranking among states in personal income per capita and the need to produce more college graduates to accommodate the shift from a historical reliance on manufacturing to a high-skilled economy, (2) comparatively low rates of college participation among adults aged 25 and older, (3) the increase in the number of college degree-holders needed to attain a globally competitive workforce, (4) the rising costs of a college education and the impact on student participation and completion, (5) high rates of remediation required among recent high school graduates, due largely to the lack of adequate course-taking in high school, (6) unmet skill shortages in key areas such as nursing and teaching, and (7) below-average levels of competitive (external) research and development expenditures per capita.

More specific strategic directions needed to achieve the aspirations of Indiana are described in detail under categories of access, affordability, college preparation, student

success, and contributions to Indiana's economy. The latter two categories contain those that are most closely related to college completion and the role of the system in creating a more vibrant economy. Those related to college completion include the development and implementation of a comprehensive plan for improving minority and at-risk student success, improving overall college completion by implementing a performance-based funding formula for the state's higher education system, and ensuring quality through improved measurement of student learning outcomes. Those related to improving the state's economic conditions include (1) providing state funding incentives for universities to increase competitive research in science and engineering, (2) increasing the volume of transfer of intellectual property to the private sector, (3) improving collaboration among major research universities in order to increase the overall competitiveness for grant research funding, (4) establishing tax credits for employers to provide experiential learning (apprenticeship, co-op, and internship) opportunities and tuition reimbursement to employees, (5) exploring the potential for funding loan-forgiveness programs to students who graduate in critical workforce shortage areas and high-skilled areas such as science, engineering, computer technology and mathematics, and (6) exploring ways to support and fund more activity among postsecondary institutions in providing technical assistance and on-site delivery of programs to business and industry. With the exception of the strategic directions associated with improving success rates among minorities, improving measurement of student learning, and the establishment of loan forgiveness programs for graduates in high demand fields, all of the policy initiatives for improving student success promoted by Indiana's strategic plan were recommended by the focus group participants.

Indiana's strategic plan is notable within the context of this study because of its focus on the accumulation of educational capital. State leaders recognize the importance of an educated citizenry, and the plan's intense focus on higher education's role in economic development is largely a response to historical patterns of out-migration among college-educated residents¹¹.

Another state-wide strategic plan devoted to increasing educational capital is *Double the Numbers: Kentucky's Plan to Increase College Graduates*, developed in 2007 by the Kentucky Council on Postsecondary Education. Kentucky finds itself in a unique position among states because it has legislation that contains a defined goal for the level of educational attainment of its residents. In 1997, the General Assembly passed the *Kentucky Postsecondary Education Improvement Act* (House Bill 1) which calls for Kentucky to achieve the national average in educational attainment by 2020. Kentucky currently ranks 47th among states in the percentage of adults aged 25 to 64 with college degrees (see Figure 4). *Double the Numbers* is in large part a response to the legislatively mandated goal for the state. The plan draws on several empirical correlation-based arguments – at the individual and state levels – in order to make the case that increased degree production is important for the future of the state. Individual benefits include substantially higher earnings associated with college graduates, and higher rates of civic engagement (volunteerism and voting). The state benefits of a more educated populace include lower rates of incarceration, less spending on public assistance programs, lower rates of poverty, lower rates of unemployment, and a more competitive economy (as measured by the State New Economy Index). Unlike Indiana's plan, *Double the*

¹¹ The strategic plan and the “dashboard” of measures designed to measure progress are located at <http://www.in.gov/che/>.

Numbers focuses almost exclusively on baccalaureate degree production. Assuming current annual rates of baccalaureate production and net-migration from 2005 to 2020, the state will need an additional 211,000 bachelor's degree-holder to meet the national average by 2020. The findings from the HLM model suggest, however, that Kentucky should expand its focus to include graduates from two-year institutions; since they are the most likely to stay in state after graduation.

In order to close the gap, five “essential” strategies were identified: raise high school graduation rates, increase the number of GED graduates and their transition to college, increase first-time enrollment in community and technical colleges and their rates of transfer to four-year programs, increase the number of Kentuckians enrolling in and completing college, and attract more college-educated workers to the state and create new jobs for them. Specific strategies for improving college completion include (1) incentives for colleges and universities to increase degree production, (2) efforts to strengthen guidance and support for students at every stage of their academic careers, (3) expanded capacity to serve more students through alternative methods of course delivery (e.g. course redesign and distance education), (4) better coordinated outreach to communicate the importance of a college degree, and (5) more supportive financial aid programs to ensure that college is affordable to all residents. Those that call for improving the state's ability to attract educated workers from outside the state include greater efforts to attract more research dollars to Kentucky and assistance to entrepreneurs in commercializing research, increase the numbers of graduates in STEM fields (science, technology, engineering and mathematics), and to build stronger

relationships with economic development partners with the common goal of recruiting “new economy” jobs to the state.

Data presented in Chapter 3 indicate that Kentucky is not a major exporter of college-educated residents. In fact, the state benefits (to a small degree) from importing college graduates. But, as in Indiana, state higher education policymakers in Kentucky recognize that in-state degree production alone will not be sufficient to meet the state-wide educational attainment goals they have set for themselves. There must be a concerted effort by the system of higher education to play a prominent role in helping the state develop an economy that attracts more educational capital from outside the state.¹²

All of the “essential strategies” promoted by Kentucky’s “Double the Numbers” plan were generally recommended by the focus group participants. However, one of the shortcomings of the plan (in contrast to Indiana’s) is the lack of more specific strategies for meeting the statewide goals; i.e. policy options within each of the broad strategies. Kentucky’s plan could be improved by including many of the specific policy options provided by the focus group participants.

Unlike the other two states, North Dakota’s initiative is not a strategic plan succinctly laid out in a formal document. Instead it rests on the development of a unique leadership mechanism for state higher education policy and its well-documented focus on the connection between higher education and economic development. In 2000, the North Dakota Higher Education Roundtable was established to create a new compact that could generate and sustain a public agenda for higher education focused on creating a highly skilled workforce. The Roundtable is comprised of business leaders, educators,

¹² Kentucky’s strategic plan and its key indicators of progress are located at <http://cpe.ky.gov/>.

legislators, and community leaders drawn from throughout the state of North Dakota.

The creation and efforts of the roundtable in North Dakota inspired a detailed case study funded by the Ford Foundation, commissioned by the Western Interstate Commission for Higher Education, and authored by Jason E. Lane in 2008.

North Dakota ranks fairly well among states on many measures associated with educational attainment. It has very high rates of high school graduation and college participation. Its college graduation rates, however, are below average. Overall, the state produces a relatively high proportion of college graduates relative to the population in need (www.higheredinfo.org). But it is continually one of the largest net-exporters of college-educated residents, has one of the lowest-ranked economies (by the State New Economy Index), and has one of fastest declining populations of young college-aged adults. These statistics, and the recognition of them among state leaders, led to the creation of many of the policies set forth by the Higher Education Roundtable.

The most comprehensive collection of the policies and practices is located in *A North Dakota University System for the 21st Century: The Report of the Roundtable for the North Dakota Legislative Council Interim Committee on Higher Education* (May 2000). The goal of the Higher Education Roundtable was to “enhance the economic vitality of North Dakota and the quality of life of its citizens through a high quality, more responsive, equitable, flexible, accessible, entrepreneurial, and accountable University System.” More specifically, the Roundtable established six key “cornerstones” on which to build a university system for the future: Economic development connection, education excellence, flexible and responsive system, accessible system, funding and rewards, and sustaining the vision. A taskforce was assigned to each cornerstone to explore the topics

in depth and define for each one: the rationale, vision and expectations, major themes, expectations and recommendations, and accountability measures and related data for tracking progress.

What makes the work of the Roundtable so unique is its comprehensive approach to addressing both the supply and demand of college-educated residents in the state. Roundtable members recognized the importance of linking the missions of higher education and economic development. They set forth bold initiatives that include rewarding institutional faculty and administrators – through promotion, tenure, and salaries – for entrepreneurial activities (e.g. developing products that can be sold in the private market and business start-ups) as opposed to the traditional reward structure based largely on academic publication, better aligning the outcomes of academic programs with the expectations of employers in the state, and developing an overall state funding mechanism that rewards institutions for meeting the objectives of the state instead of merely basing funding on student enrollment. These are very difficult accomplishments for higher education policy.

Policies designed to change the way in which institutions reward faculty and administrators are difficult to implement at the state level. In order to indirectly support these types of activities, the North Dakota legislature changed the state's higher education funding formula. Prior to the work of the Roundtable, the state of North Dakota maintained tight line-item control of each institution's revenues and expenditures; the base budget (from state and tuition and fee revenues), revenues generated from other sources, and the salaries for faculty and administration. In order to provide the flexibility needed by institutions to behave in more entrepreneurial ways, the state switched it

formula to include a lump sum appropriation to the institutions – without the line-item control. In addition it lifted all restrictions on generating revenues by alternative means and the salary caps for faculty and administrators. Institutions could keep any additional revenues they generated as well as pay a premium for their star faculty and staff.

Many of the policies promoted by North Dakota's Higher Education Roundtable were recommended by the focus group participants – particularly those associated with the link between higher education and economic development. The report of the Roundtable provides detailed policy actions for each of the statewide goals.¹³

These initiatives provide good examples of state policy and planning efforts designed to explicitly to address overall levels of educational attainment and economic vitality of the state. There are several important commonalities that cut across the three: a public agenda, focus on educational attainment of state residents, the importance of the business community, the importance of higher education's role in helping the state develop an economy that retains and attracts college-educated residents, and the development of clear and measurable indicators of progress. First, each one establishes goals for the higher education enterprise that are focused on the needs of the residents and the overall economic vitality of the state – a *public* agenda rather than just a compilation of individual institutional agendas. The institutions thus become a means to a larger end. Second, in each of the three states, prominent business leaders were involved in the process, and employer needs (the demand-side) were an important consideration in the planning process. The alignment of educators and business leaders can make a powerful case in front of the legislature – increasing the likelihood of

¹³ More recent reports on the progress made by North Dakota since the inception of the Higher Education Roundtable can be accessed at: <http://www.ndus.edu/reports/default.asp?ID=355>.

meaningful policy implementation. All three state plans promote strategies designed to increase in-state demand for high-skilled workers. The findings from HLM model support the value of these efforts, if they are successful; confirming that states with growing employment opportunities in high-skill occupations are the largest recipients of college-educated residents from out-of-state. Finally, as noted throughout Chapter 4, the creation of measurable goals and outcomes is critical to the success of any long-term strategy. Each of these states put an accountability system in place to measure and ensure progress over time based on such measurable goals and outcomes.

Two important factors driving each of these three state initiatives – and many that have been successful in other states – are effective leadership and the development of a political environment in which higher education institutions effectively contribute to the long-term goals of the state to create a “system” view of public higher education. The “stars were aligned” as stated by one of the focus group participants in the previous chapter; and higher education policymakers took full advantage of these “one-chance” opportunities. While these initiatives remain active, it may be difficult to sustain them long enough to realize the success that is intended. There is hope in each of these states that these initiatives have gained enough traction to withstand gubernatorial and legislative changes, as well as the diminishing capacity of the state to increase state support for higher education.

Strengths and Limitations of this Study

This study is the first of its type to apply a Hierarchical Linear Model to individual and state characteristics of interstate migration. In addition to confirming many findings from similar studies, it provides a great deal of new information. Individuals in

the most highly-skilled occupations are more likely to migrate, and states that experience the most economic growth are the recipients of them. Its focus on college-educated residents – as opposed to the population as a whole – provides information that is more specifically tied to state-led efforts to increase educational capital.

The descriptive statistics in Chapter 3 provide a comprehensive picture of the accumulation of educational capital in states; the ability of their systems of higher education to produce college graduates and the benefit or loss they experience as a result of interstate migration. States strengths and weaknesses on each point to different policy implications; confirming the importance of both the supply and demand of college-educated residents in state-led efforts to increase educational capital.

The findings from the focus group with state higher education policymakers add a great deal of information about best state policies and practices associated with the accumulation of educational capital. Some are currently in action in states, while others remain promising but are largely on wish lists of state higher education policymakers.

As with any study, there are some shortcomings, and improvements that could be made if more research were done in this area. They include limitations in:

- The migration data in the American Community Survey
- The number of state-level characteristics in the HLM model
- Measurement of degree production and migration over time
- The ability to gauge the impact of the mobility of students
- The ability to gauge the long-term impact of effective state higher education policy

The smaller sample size of the American Community Survey, compared to the number of cases compiled through the long form of the Decennial Census, makes it difficult to conduct detailed statistical analyses like the HLM model estimated in this

study. While the national sample size of the ACS is 3 million households annually, the number of residents who actually move during the year of the survey collection is rather small. Therefore, when one controls for many factors such as state of residence, gender, race/ethnicity, age, education level, and type of occupation, standard errors become large and unacceptable. The ACS is used in this study for the descriptive analyses in order to provide more recent data on the migration patterns of college-educated residents by state, along with more recent data on college degree production; and because the descriptive data are not disaggregated by all the characteristics included in the HLM model. The HLM model presented here, therefore, utilizes data that are a decade old. Although one might argue that in this case (as is done in this study) the migration data from the 2000 Census just happen to be more reflective of times when U.S. residents were more free to migrate; before the economic downturns and housing crises recently experienced in many states throughout the U.S. that limited the ability to move.

Level two of the HLM model in this study includes only two state-level characteristics – the presence of high-skilled employment and the change in high-skilled employment over time. Wage earnings was also considered but was so highly correlated with high-skilled employment that it was excluded from the model. Other factors could have been included that might have added explanatory power to the model. Some are connected to state policy and some are not. Taxation policy might impact interstate migration. Several states that experience relatively high rates of in-migration of educational capital choose to impose no income tax, including Florida, Nevada, Tennessee, Texas, and Washington. These policies may exert a “pull” factor for college-educated individuals seeking employment on another state. Other potential pull factors

external to the policy environment might include climate, the presence of national and state parks, associated outdoor recreational opportunities such as beaches and mountains, and cultural climate including museums and the arts.

The analyses conducted in this study represent a “snapshot in time”. The accumulation of educational capital in states is the result of educating residents and receiving them through migration over decades of time. For example, the descriptive data in Chapter 3 (Table 5) show recent recovery in states such as Iowa and South Dakota that were major exporters of college-educated residents nearly a decade ago. Analyses over time would add a great deal of insight into the long-term impacts of college degree production and interstate migration; and their impact on the current levels of educational attainment.

When trying to determine the impact of degree production on states overall levels of educational attainment, there is no ability to assess the effect of importing relatively large numbers of college students. Data collected from the National Center for Education Statistics provide adequate information on the degree to which state systems of higher education import first-time college students. However, it is not possible to determine how many of these students stay in the state after graduation because there is no link to the college providing a given degree in the data collected by the U.S. Census Bureau. Therefore, in this analytical framework, states that are large net-importers of college students (e.g. Rhode Island, Utah, and Vermont) are given much more credit for their college degree production than is experienced in their populations at large; because many of the graduates of their colleges who come from out of state do not stay.

Finally, gauging the overall impact of any higher education policy is very difficult. This not a shortcoming of the study but general problem faced by higher education policy analysts. Many of the policies recommended throughout this study have not been “statistically” proven. They largely just seem like the right thing to do; based on the experiences of higher education policymakers who have toiled in this work for a great deal of time. For example no state has ever fully implemented a performance-based funding formula for public higher education driven by course completions instead of enrollments. Several states that have implemented relatively small components of a performance-based funding model have experienced gains in college completion (e.g. Kentucky in the early 2000s and more recently Oklahoma). Relatively small pilot projects, often funded by federal government and philanthropic organizations, have shown the success of a variety of early intervention programs designed to improve college participation and completion among at-risk students. These include federal programs such as Gear-Up and TRIO, and the Brides to Opportunity and Achieving the Dream programs funded by the Ford Foundation and the Lumina Foundation for Education. These programs, however, have not been brought to the scale needed to substantially improve levels of educational attainment. Gauging the impact of more broad-sweeping policies on overall college degree production is complicated by a variety of factors. Higher education is perhaps the most complex industry in the U.S. The knowledge and experiences that students bring with them and those that they gain in the process are the result of many interventions; experienced over time, throughout formal education and at home. This makes it very difficult to isolate the impact of any single policy.

Conclusion

The accumulation of educational capital at the state-level is the result of forces that are largely both internal and external to the levers available to state policymakers; i.e. the supply of college graduates and the economic conditions that retain and attract (or repel) college graduates. As seen in Figure 15, very few states achieve high levels of educational attainment with low levels of degree production, and vice-versa. However, beyond these extremes, the relationship between the state's degree production and the overall level of college attainment breaks down. Therefore, the measure of overall college attainment at the state-level is not a particularly good measure of productivity in states because the retention and attraction of college graduates is largely the result of external demand; the number of high-skill and high-paying jobs available to them in the state's employment market. The findings from the HLM model in Chapter 3 confirm this as well; states that have growing employment in high-skill occupations are the recipients of more college-educated residents. Therefore, the measure of overall educational attainment in states is partly held hostage to external constraints – the willingness of college-educated residents to stay in state when better employment opportunities are available to them in other states. This is particularly true of college graduates with the skills most highly valued in the new knowledge-based economy; those in high-tech, business, management, and financial occupations.

After years of assisting in the development of policy options for increasing educational capital in states, it is not all that uncommon to hear from some policymakers in certain states throughout the U.S.: “Why do we need to invest more (or as much as we do) into postsecondary education when we lose so many of our college graduates”. The

alternative in these states, though, is much worse. They could sacrifice efforts to educate adults at the college level and ensure an under-educated population; one that would continuously be ill-prepared for gainful employment, disadvantages the state's ability to attract business and industry to the state, and lacks the creativity, knowledge, and skills to create business and industry from within. In addition, as discussed in detail in Chapter 1, there are many other reasons to educate residents beyond high school: e.g. lower rates of crime, better health, and greater social and civic responsibility. Even if the state experiences a net loss of college-educated residents, the U.S. is better off as a result of its efforts to educate residents; and the lives of its residents are much improved. While state borders may contain many of the policies associated with higher education, they do not contain the benefits we – as a nation – receive as a result of educating residents beyond high school.

While many higher education policymakers are increasing their efforts to bridge policies associated with degree production and those with creating greater demand for college graduates, there is not much clear evidence regarding the lasting impact of these policies. Many of the policies recommended by the focus group participants are relatively new ideas, have rarely been fully implemented in states, or have not been in place long enough to gauge their long-term impact. The role of government in shaping the state's market forces (i.e. the demand for college-educated residents) is fairly limited. In fact, of all the measures associated with the two most widely accepted assessments of the strength of state economies (the Kauffman Foundation's State "New Economy Index" and the Corporation for Enterprise Development's "Development Report Card for the States" reviewed in Chapter 1), there are only a handful for which state government has

any policy levers. These include state investment in education (primarily at the K-12 level), investment in university research and development, production of degrees in science and engineering, creating and preserving a clean environment, ensuring quality healthcare, investment in small business, the state's physical infrastructure (urban mass transit, highways, bridges, etc.), and the state's technological infrastructure (broadband access, and technology in schools and state government). These activities are by and large associated with building the foundation for economic growth to occur. The vast majority measures in these two assessments are based on outcomes; the activities and conditions associated with strong economies.

The human capital theoretical framework that supports this study has been under development for more than a century. This framework contends that the more educated a society is the more productive and healthier it is. However, the relationships between a state's ability to produce college graduates, its overall level of educational attainment, and its economic conditions are not always linear and deterministic. In some polities, educating more residents has not necessarily lead to strong economic conditions. This is seen in states like North Dakota, South Dakota, and Iowa. These states produce a lot of college graduates relative to the population in need, but have relatively poor economic conditions. In others, strong economies have developed in spite of relatively average or poor levels of college degree production, relying on the ability to import college-educated residents. Examples include Washington, Colorado, Maryland, and New Jersey. Massachusetts, Minnesota, and New Hampshire produce a lot of college graduates relative to their populations, have highly educated populations, and strong economies. In still other states, the development of a more educated populace is a potential strategy for

economic development – a strategy that includes developing the educational capital necessary to grow business from within and attracting business and industry from outside the state. Such states include West Virginia, Louisiana, and Mississippi. The interstate migration of college-educated residents is the single factor that ties these state stories together. Without its presence in the analysis, confusion will always abound when trying to answer questions such as: How can a state produce so many college graduates and be so poorly educated? Or, how can a state have such strong economic conditions while producing so few college graduates?

Possessing a highly educated population and strong economic conditions are desires of nearly all state higher education policymakers. They want their colleges and universities to be more successful at serving and graduating students, meeting the state's workforce needs, and contributing to the state's economic growth. At the same time, they want the state to retain more of the graduates it produces and import even more college graduates from out-of-state. Each of these efforts requires a different strategy. And it is difficult, if not impossible, for a state to do all of them well. This study serves as a useful starting point for state higher education policymakers to identify their strengths and weaknesses, and whether they should focus more effort on the supply-side or demand-side of college attainment. Unlike the countries that have surpassed the U.S. in educational attainment in recent years (discussed in Chapter 1), the U.S. does not have a federal system of public higher education. The majority of policy levers in higher education are at the state level – where policymakers are often responsible for financing the enterprise, regulating tuition and fees, developing systems of accountability, setting strategic goals, and defining the roles and missions of institutions. In the end, if the U.S.

is to regain its prominence as the most educated country in the world, it will be the result of 50 different state strategies.

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Appendix 1

Measures Used In the State New Economy Index Kauffman Foundation (2008)

Knowledge Jobs

1. Information Technology Jobs: Employment in IT occupations and in non-IT industries as a share of total jobs
2. Managerial, Professional, and Technical Jobs: Managers, professionals, and technicians as a share of the total workforce
3. Workforce Education: A weighted measure of the educational attainment (advanced degrees, bachelor's degrees, associate's degrees, or some college coursework) of the workforce
4. Immigration of Knowledge Workers: The average educational attainment of recent migrants from abroad
5. U.S. Migration of Knowledge Workers: The average educational attainment of recent migrants from within the U.S.
6. Manufacturing Value-Added: Manufacturing value-added per production hour worked as a percentage of the national average
7. High-Wage Traded Services: The share of employment in traded service sectors in which the average wage is above the national median for traded services

Globalization

1. Export Focus of Manufacturing: Value of exports per manufacturing worker
2. Foreign Direct Investment: The percentage of each state's workforce employed by foreign companies

Economic Dynamism

1. "Gazelle" Jobs: Jobs in gazelle companies (companies with annual sales revenue that has grown 20 percent or more for four straight years) as a share of total employment
2. Job Churning: The number of new start-ups and business failures, combined, as a share of all establishments in each state
3. Fastest-Growing Firms: The number of Deloitte Technology Fast 500 and Inc. 500 firms as a share of total firms
4. Initial Public Offerings: A weighted measure of the value and number of initial public stock offerings of companies as a share of gross state product

5. Entrepreneurial Activity: The adjusted number of entrepreneurs starting new businesses
6. Inventor Patents: The number of independent inventor patents per 1,000 people

The Digital Economy

1. Online Population: Internet users as a share of the population
2. Internet Domain Names: The number of commercial Internet domain names (".com") per firm
3. Technology in Schools: A weighted measure of five factors measuring computer and Internet use in schools
4. E-Government: A measure of the utilization of digital technologies in state governments
5. Online Agriculture: A measure of the percentage of farmers with Internet access and who use computers for business
6. Broadband Telecommunications: A weighted measure of the adoption of residential broadband services and median download speed
7. Health IT: Total number of prescriptions routed electronically as a percentage of total number of prescriptions eligible for electronic routing

Innovation Capacity

1. High-Tech Jobs: Jobs in electronics manufacturing, software and computer-related services, telecommunications, and biomedical industries as a share of total employment
2. Scientists and Engineers: Civilian scientists and engineers as a percentage of the workforce
3. Patents: The number of patents issued to companies or individuals per 1,000 workers
4. Industry and Investment R&D: Industry-performed research and development as a percentage of total worker earnings
5. Non-Industry Investment in R&D: Non-industrial research and development as a percentage of GSP
6. Movement Toward a Green Economy: The change in energy consumption per capita and the change in renewable energy consumed as a percentage of total energy
7. Venture Capital: Venture capital invested as a share of worker earnings

Appendix 2

Focus Group Interview Guide

Description of the Study

As state policymakers draw clearer connections between the college-level attainment of their residents and the corresponding economic and social benefits, the need for more data and information regarding the production and migration of educational capital is critical. Our economy and the market forces associated with it are becoming increasingly advanced and reliant on knowledge-based skills. With fewer exceptions than ever before, it is critical for individuals to attain some form of education beyond high school in order to compete in the global economy and experience even a lower-middle class lifestyle. The purpose of this study – conducting analyses from a variety of reliable data sources – is to identify which states are winning or losing the competition to position themselves for the new economy. Which states in the U.S. are producing relatively large numbers of college graduates? Which states benefit from the production of other states by importing large numbers of college graduates? What are the economic and labor force conditions in states that attract or repel college graduates?

This study will examine (1) the production capacity of states' systems of higher education, (2) the impact of migration on states' educational capital, (3) the personal and state-level characteristics that influence migration of college-educated residents, (4) the most useful policy options for states to increase educational capital, and (5) the characteristics of a few key state-level policies designed to increase educational capital that are already implemented in certain states.

The following research questions will guide this study:

5. Which states in the U.S. are producing relatively large numbers of college graduates and which benefit (or not) from the production of other states by importing large numbers of college graduates?
6. What are the predictors of interstate migration of college graduates at the person and state levels?
7. What are the most useful policy options for states to increase educational capital?
8. What are the characteristics of some key state-level policies already implemented in certain states in the U.S.?

Interview Questions

How is policy typically formulated in your state? To remedy past trends? To address current problems/challenges? Or, in reaction to anticipated future trends? (please explain)

Generally, there are two ways to increase educational capital in states – increase the number of college degrees awarded to state residents and become a net-importer of college-educated residents from other states and countries. The next set of questions deal with these two phenomena – both at the heart of this research.

Degree Production

What policy options are available to address the issue of degree production, including ones that have been implemented in your state?

Please explain.

1. Are they geared to individual students or institutions?
2. Are they targeted to certain types and/or levels of degrees?
3. How is success defined? (e.g. performance measures used, benchmark comparisons)
4. Are you aware of other priorities that may impede success (or full implementation)?
5. Please discuss other potential barriers to implementation and success (e.g. political and/or cultural)
6. How would success be defined? (performance measures used, benchmark comparisons)

Migration

The ability to keep college graduates in-state and attract them from out-of-state is a more complicated phenomenon – having as much to do with economic conditions as anything else.

1. What are some of the policy options available for addressing the migration of college graduates, including ones implemented in your states? (please explain)
2. For those implemented in your states, can you describe the policy context in which they evolved?
3. How is success defined? (performance measures used, benchmark comparisons)
4. Have they met the definition of success? (Why or why not)
5. How might the policies be improved?
6. Please discuss the potential barriers to implementation and success (e.g. political and/or cultural)
7. How does (or could) higher education (the system of institutions) play a role in improving economic conditions? (e.g. research and development, spin-offs, patents, employer training, etc.)

8. What are some policy options for improving higher education's role in economic development?
9. Please discuss the potential barriers to implementation and success (e.g. political and/or cultural)
10. How would success be defined? (performance measures used, benchmark comparisons)
11. Is there a distinction in the roles that public and private higher education institutions as they pertain to in- and out-migration?

CURRICULUM VITAE

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Education

Current: Ph.D. University of Louisville, 2010
Major: Urban and Public Affairs
Areas of specialization: Research and Statistical Methodology, Policy Analysis and Program Evaluation.

M.A. University of Louisville, 1995
Major: Sociology
Areas of specialization: Research and Statistical Methodology, Policy Analysis and Program Evaluation.

B.S. University of Alabama at Birmingham, 1990
Major: Psychology
Minor: Sociology

Professional Experience

February 2002 to Present

National Center for Higher Education Management Systems (NCHEMS)

Senior Associate and Director of the National Information Center for Higher Education Policymaking and Analysis (<http://www.higheredinfo.org>). Design, data analysis, and maintenance of the NCHEMS National Information Center—an information infrastructure for higher education policymakers and analysts. Involvement in state-level projects applying research and policy analysis to link higher education with the most critical needs of states and their citizens. Design new measures for comparing state systems of higher education. Work with NCHEMS staff on a variety of state- and institution-level research and policy related projects. Present research findings and related higher education topics to a variety of audiences including higher education researchers and policy analysts, State Higher Education Executive Officers (SHEEOs) and their staffs, and other state policymakers (e.g. governors, legislators, and legislative staffs).

September 1995 to February 2002

Kentucky Council on Postsecondary Education—Frankfort, Kentucky

Senior Associate for Information and Research (September 2000 – February 2002).

Worked with higher education leaders, legislators, and other stakeholders to design performance indicators and measure progress toward goals in higher education.

Designed and conducted research studies for statewide higher education policy initiatives. Designed and executed statistical model for selecting benchmark institutions for public higher education institutions. Coordinated data collection and dissemination. Provided research/statistical assistance agency wide.

Associate Director for Information (September 1999 – September 2000). Designed and conducted research studies for statewide higher education policy initiatives. Designed and executed statistical model for selecting benchmark institutions for public higher education institutions. Coordinated data collection and dissemination. Coordinated High School Feedback project. Provided research/statistical assistance agency wide.

Assistant Director for Policy Studies (September 1995 – September 1999). Data analysis and reporting. Research and writing for the “Annual Accountability Report Series.” Coordinated High School Feedback project. Provided research/statistical assistance agency wide.

January 1999 to December 1999

University of Louisville

Instructor/Lecturer

- Research Applications (Kent School of Social Work)
- Social Statistics (Sociology)

August 1994 to September 1995

National Center for Family Literacy—Louisville, Kentucky

Research Associate. Evaluating the effectiveness of family literacy programs. Presentation of research findings. Survey design and implementation. Managing large data sets. Writing an evaluation manual for family literacy programs.

February 1994 to December 1994

Fifth Third Bank—Louisville, Kentucky

Research Analyst. Analyze lending activities. Demographic and geographic analyses to determine fair lending to minority and low income populations.

January 1993 to May 1994

University of Louisville, Sociology

Graduate Research Assistant. Assisted various professors in research, teaching, test construction and grading, data collection and analysis.

Professional Affiliations and Activities

Associate, National Center for Public Policy and Higher Education—One of ten higher education professionals chosen around the U.S. to assist the National Center in their research efforts and policy development. 2002

Kentucky Statewide ACT Representative. 2001

President of the Kentucky Association for Institutional Research (KAIR),
March 1999 – November 2000.

Research/Statistical Skills

Program Evaluation

Survey Design

Managing large data sets

Expertise with the following statistical procedures:

- Multivariate Regression
- Logistic Regression
- Factor Analysis
- Cluster Analysis
- Discriminate Analysis
- Multivariate Analysis of Variance
- Structural Equation Modeling
- Various other statistical techniques

Selected Papers and Publications

The Dreaded “P” Word: An Examination of Productivity in Public Postsecondary Education. Commissioned by the Delta Project on College Costs with support from the Lumina Foundation for Education. July 2009.

Colleges and Universities and their Stewardship of Place: A Guide for Developing Performance Measures for the Equity of Access and Student Success. Commissioned by the National Association of System Heads. National Center for Higher Education Management Systems, May 2009.

Beyond Social Justice: The Threat of Inequality to Workforce Development in the Western United States. Commissioned by the Western Interstate Commission for Higher Education (WICHE), with support from the Ford Foundation. National Center for Higher Education Management Systems, July 2008.

With Brian T. Prescott. “American Higher Education and the Nation’s Ability to Compete in the Global Economy”. *Change Magazine*. March/April 2007.

A New Look at the Institutional Component of Higher Education Finance: A Guide for Evaluating Performance Relative to Financial Resources. Supported by a Grant from the PEW Charitable Trusts. National Center for Higher Education Management Systems, 2006.

As America Becomes More Diverse: The Impact of State Higher Education Inequality. Supported by a Grant from the Lumina Foundation for Education. National Center for Higher Education Management Systems, 2005.

With Dennis Jones. *The Emerging Policy Triangle: Economic Development, Workforce Development, and Education.* Supported by a Grant from the Ford Foundation. National Center for Higher Education Management Systems, 2004.

With Joni Finney. "Affordability: Obtaining and Making Sense of Information About How Students, Families, and States Pay for Higher Education". *Change Magazine*. July/August 2004.

With Peter Ewell and Dennis Jones. *Conceptualizing and Researching the Educational Pipeline.* National Center for Higher Education Management Systems, 2003.

Spotlight on Postsecondary Education. Quarterly newsletter that highlights findings of policy studies related to higher education in Kentucky, published by the Kentucky Council on Postsecondary Education.

Co-Author, *Kentucky Higher Education System—Accountability Report Series (1995-1999).* Published annually by the Kentucky Council on Postsecondary Education.

Co-Author, "A Study of Remedial Education at Kentucky's Public Colleges and Universities", presented to the Council on Postsecondary Education in March 1998, and presented at the National Association for Institutional Research Conference in May 1998.

Co-Author, "An Analysis of Student Time and Credits to Degree," presented to the Council on Postsecondary Education, March 1997, and at the national Association for Institutional Research Conference, May 1997.

Co-Author, *Outcomes and Measures in Family Literacy Programs,* published by the National Center for Family Literacy under a grant from the U.S. Department of Education, copyright 1996.

Co-Author, "The Success of the Toyota Families For Learning Project," presented at the National Conference on Family Literacy, May 1995.

"A Factorial Ecology of Louisville, Kentucky and Birmingham, Alabama: Determining Variation in Ecological Structure," presented at the North Central Sociological Association meetings, April 1994.