

BRAIN DRAIN AND BRAIN GAIN:
EDUCATIONAL SEGREGATION IN THE UNITED STATES

by

THURSTON DOMINA

A dissertation submitted to the Graduate Faculty in Sociology in partial
fulfillment of the requirements for the degree of Doctor of Philosophy, The City
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Abstract

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The post-industrialization of the American economy, combined with the expansion of American higher education, has created a new form of residential segregation. This dissertation demonstrates that the United States became increasingly segregated by educational attainment during the second half of the Twentieth Century, even as racial and economic segregation declined. In this period, college graduates became increasingly clustered in a handful of communities; and within these human capital hubs, the highly educated became less likely to live in the same neighborhoods as the less highly educated.

Today, more than half of America's college graduates live in just 10% of its counties. At the other end of the educational spectrum, college graduates are underrepresented relative to the national average in more than 85% of American counties. My analyses demonstrate that selective patterns of internal migration are driving the educational polarization of the American landscape. A combination of economic

incentives and natural and cultural amenities lure large numbers of college graduates into communities where the concentration of college graduates is already pronounced.

The consequences of educational segregation are wide-ranging. The spatial concentration of college graduates stimulates innovation and local economic growth, creating new economic inequalities between places. In many of the nation's nonmetropolitan areas, the outmigration of highly educated youths is leading to an overall population decline. Human capital concentration has spill-over effects for children's education, bringing educational opportunities to children who grow up in human capital hubs (regardless of their own parents' educations), and limiting opportunities to children raised in brain drain areas. Finally, I demonstrate that educational segregation is a major factor behind the geographic polarization of American political culture. As educational segregation levels have risen, the county-level concentration of college graduates has become an increasingly salient predictor of voting patterns. The result is the distinct red and blue map of the 2004 presidential election: George W. Bush and John F. Kerry split the college graduate vote evenly in 2004, but Kerry won healthy majorities in human capital hubs and Bush's electoral base centered in brain drain counties.

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Embarrassing as it is to admit, underneath the segregation indices and the multivariate analyses, this dissertation is basically autobiographical. As I finish this project, I feel exceedingly grateful to the many people who have helped me on my journey from Madison County, Nebraska (where just 8% of adults have a BA degree or higher) to Manhattan (where more than half do).

Thanks are due to my family. To my grandparents, who even as they watch the communities in which they live slowly become ghost towns, never stop being proud of the grandchildren who left them behind. To my mother, who always keeps me posted on the latest news in the heartland. To my little brother, whose tales of small town elementary school remind me of my own childhood. Thanks are also due to the Katz family, who took me in as one of their own nearly 12 years ago and are always there to cheer me on.

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I had been living in New York for a few years before a chance meeting with David Lavin got me thinking about studying sociology at CUNY. At the time, I knew very little about the discipline or the department. But David struck me as a person who was doing important work, and it occurred to me that I would do well to follow his example. It turns out that my impression of David was right; and couldn't have picked a better role model. I have enjoyed working with him over the last several years, and I thank him for the help and friendship that he has offered along the way.

Julia Wrigley was the first faculty member that I met after enrolling at CUNY, and I have continued to learn from her ever since. I am grateful to Julia for more than five years worth of levelheaded advice and tough questions.

Just a few months into my time at the Graduate Center, Paul Attewell approached me with a job offer that would shape my graduate career. Paul and David were researching the long-term consequences of higher education access programs, like CUNY's open admissions; and they offered me a position as a research assistant. I accepted the job, and made myself a fixture in Paul's office. Everybody knows that graduate student labor is supposed to be underpaid and alienated; but somehow Paul and David never got that message. Most of what I know about sociological research, I learned in that job, and I am thankful to Paul and David for the opportunity. I enjoyed all of my five years working with Paul, David, and my fellow research assistant, Tania Levey.

As the years have gone by, I have accumulated many additional debts to Paul, who worked with me step by step through some of my first sociological papers, helped me

develop the raw ideas behind this dissertation into sociologically relevant and answerable questions, and is always willing to chew over an intellectual or analytical problem. Nobody has influenced me as a sociologist more than Paul; and nobody has taken a greater interest in my professional development. It would be hard to exaggerate my gratitude.

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Introduction

Over the course of the last several decades, the United States experienced an unprecedented educational expansion. Between 1940 and 2000, the share of U.S. adults with a Bachelor's degree or higher increased by more than five times, to more than 24 percent. The proportion of Americans with high school diplomas increased three-fold during the same period, and in 2000 more than four-fifths of American adults had completed high school (Bauman and Graf 2003). This college boom shows no sign of abating. According to the 2004 Current Population Survey, more than 27 percent of American adults now have a BA degree or higher. Census Bureau projections based on current college enrollment rates suggest that this number will keep growing for a least another generation (Cheeseman Day and Bauman 2000).

For a broad slice of the American population, going to college has become an important transition point between childhood and adulthood. Nearly 60 percent of young adults between 25 and 29 years old have at least some college (Condition of Education 2005). Among the children of the affluent in particular, college enrollment has become nearly universal – more than 95 percent of high school graduates from families in the top quartile in SES go directly to college after graduating high school (Karen and Dougherty 2005).

The expansion of American higher education has not gone unnoticed by social scientists, and the consequences of the American college boom have been widely debated. Social scientists tend to think of education as a sorting machine, placing people into their positions in a stratified American society (Kerckoff 1995). The central debate surrounding the expansion of higher education involves its

consequences for inequality. Have recent recalibrations of the educational sorting machine fundamentally changed the structure of inequality in American life?

Generations of research have repeatedly shown that college attendance changes students' lives. Pascarella and Terenzini's (1991, 2005) comprehensive literature reviews summarize hundreds of studies that demonstrate that college changes students in many important ways: College stimulates intellectual and psychosocial growth, shapes career trajectories, and influences how students relate to their communities and families. Notably, college attendance and completion clearly improve students' economic prospects. Card (1999) reviews the economic literature on the causal effect of educational attainment on wages, finding that the positive effects associated with educational attainment are robust to multiple estimation strategies.

But the fact that higher education affects those who are exposed to it does not necessarily mean that the expansion of higher education has reduced inequality in America. Despite the dramatic expansion of educational opportunity over the last several decades in the United States, the association between social origins and educational attainment has remained virtually constant over time. Even though substantial differences exist between country's higher education access policies, rates of intergenerational mobility vary little from one industrialized country to another (Shavit and Blossfeld 1993). Collins (1979) argues that findings like these point to the limits of education's effectiveness in reducing inequality. According to Collins, the expansion leads to credential inflation, rather than large-scale opportunities for advancement. Rosenbaum (2003) updates this argument, arguing that poor and

minority students would be better served by vocational training than by college access, since their poor high school backgrounds set them up for college failure.

In response to these arguments, defenders of educational expansion point out that poor, minority, and otherwise educationally disadvantaged students reap substantial benefits from the opportunity to attend college. They also can pass these advantages on to their children. Lavin and Hyllegard (1996) and Attewell and Lavin (forthcoming) demonstrate that the personal and intergenerational returns to college degrees are often greater for minority students and students with weak high school backgrounds than they are for more advantaged college students. This research contradicts the Collin's credential inflation hypothesis, demonstrating that the returns to education have grown over recent decades, even as the supply of highly educated workers has swollen.

This dissertation was conceived in the context of these debates, but it takes a different approach to accessing the implications of mass higher education. Its starting point is a largely unappreciated consequence of college access: In addition to changing *how* people live, higher education also influences *where* people live their lives. Social scientists have long known that college graduates are more likely to migrate than the less highly educated (c.f. Blau and Duncan 1967). I will demonstrate that the migration patterns of highly educated Americans lead them to cluster in a relatively small number of places. As a result, the expansion of American higher education has created a new form of spatial inequality in the United States – what I refer to as educational segregation. The dissertation charts this trend, and explores its wide-ranging implications for American social life.

This dissertation's first chapter documents recent trends in educational segregation, and examines their roots in the post-industrialization era of the American economy. Even as residential segregation between blacks and whites declined and segregation between the affluent and the poor remained largely unchanged, the American landscape became increasingly segregated by educational attainment. College graduates are increasingly clustered in a relatively small number of counties, and within those human capital hubs, they are increasingly clustered in a small number of neighborhoods.

In the second chapter I look closely at the locations that have large and growing concentrations of college graduates. I find that human capital clusters in communities where economic opportunities are plentiful and natural and cultural amenities abound. Over and above these factors, the migration patterns of the highly educated are path dependent. College graduates tend to congregate in places where the concentration of college graduates is already high. This chapter ends by demonstrating that relative affluence is not just a cause of human capital concentration, it is also an effect. When college graduates cluster in metropolitan areas, they stimulate productivity and innovation, leading to rapid improvement of local economic growth rates.

In the third chapter, I show that brain drain migrants – people who move from places where the concentration of human capital is low to places where the concentration is high – themselves benefit economically from their moves. Although migration is selective, and brain drain migration is particularly highly selective, my analyses suggest that the positive wage and income effects of brain drain migration

are independent of this self-selection. It is not clear whether income boosts associated with migration to a human capital hub actually improve the living conditions of brain drain migrants. The costs of living in human capital hubs are much higher, on average, than elsewhere in the United States; these expenses largely offset the economic advantages stemming from brain drain migration.

Nonmetropolitan areas in the United States have been particularly hard hit by rising educational segregation. In the dissertation's fourth chapter I chart the rising tide of nonmetropolitan outmigration. Over the last 15 years, the rate at which young college graduates left the nation's small towns and rural areas for the city increased dramatically. Today, more than 6% of nonmetropolitan college graduates relocate to metropolitan areas annually. In return, growing numbers of metropolitan high school graduates are moving to nonmetropolitan areas.

Chapter 5 examines the implications of educational segregation for children. Concentration of college graduates stimulates intellectual growth among children, just as it stimulates economic growth in the local economy. I find that children who live in counties with a high proportion of college graduates are more likely to enjoy educational success, regardless of their own parents' educational attainment. Earlier ecological effects research focused on the effects of neighborhood poverty or racial isolation on children's educational outcomes, theorizing that children were influenced by the peers and role models they encountered in the neighborhood. My findings suggest a different mechanism for contextual influence. I argue that human capital concentration improves children's educational attainment by improving the educational institutions to which they are exposed.

Finally, Chapter 6 explores the political implications of rising educational segregation. While George W. Bush and John F. Kerry split the college graduate vote evenly in the 2004 presidential election, Kerry won healthy majorities in the counties that experienced human capital growth during the 1990s, while Bush's electoral base was in brain drain counties. Multivariate analyses indicate that county-level educational composition has become an independent ecological predictor of individual voting behavior.

The overarching argument of this dissertation is that the implications of America's college boom reach far beyond the millions of people who have been directly exposed to higher education over the last several decades. College attendance shapes nearly every aspect of the lives of college goers, including playing an important role in determining where they live, work, raise their children, and vote. The expansion of American higher education has given rise to substantial brain drain and brain gain migration trends, which have fundamentally altered the nation's social geography.

The American educational landscape is increasingly polarized between a small number of cosmopolitan human capital hubs and vast stretches of America, where communities struggle to retain their young, highly educated residents. As the effects of the college boom spill out across the American landscape, these poles are moving further and further away from one another, educationally, economically, socially, and politically.

Chapter 1:

The Rise of Educational Segregation in the United States, 1940-2000

In 1940, approximately 5 percent of American adults had a college education, and college graduates were scattered relatively evenly across the United States. Whether urban or rural, every American community had a handful of doctors, lawyers, teachers, and college-educated business leaders. But few communities had a greater or lesser concentration of college graduates than any others.

Between 1940 and 2000, the United States experienced an unprecedented educational expansion. The proportion of Americans with high school diplomas increased three-fold in this period; the share of the U.S. population with a Bachelor's degree or higher increased by more than five times (Bauman and Graf 2003). According to the 2004 Current Population Survey, more than 27 percent of American adults now have a BA degree or higher. While every corner of the United States benefited from this educational expansion, some places attracted far more college graduates than others. A few cosmopolitan communities became magnets for the highly educated, while much of rural America and many of the nation's inner-cities lost their most highly skilled residents to an on-going brain drain. This chapter will demonstrate that the result has been a dramatic rise in educational segregation both within and among American communities.

Sociologists have long been interested in residential segregation, and a sizeable research literature has emerged documenting racial and economic segregation patterns. To date, the issue of educational segregation has been largely overlooked. In part, this is due to the voluntary nature of educational segregation. Racial segregation is viewed as a social problem in part because it is often forced on unwilling people. Researchers have documented a number of racially discriminatory practices in the real estate market, and argue that unequal treatment is central to the establishment and maintenance of racial residential segregation (*c.f.* Massey and Denton 1993). There is little reason to suspect, however, that such discriminatory practices underlie educational segregation. If high school graduates voluntarily cluster in different communities and neighborhoods than do college graduates, it is difficult to view the resulting educational segregation as a social problem of the same type as racial segregation.

Nonetheless, like racial segregation, educational segregation does have serious social consequences. Most notably, rising educational segregation appears to generate new inequalities in economic opportunity. Recent economic research suggests that the spatial concentration of human capital stimulates local economic development. This literature inverts classical theories of regional economic development, demonstrating that highly educated workers attract jobs (rather than jobs attracting highly educated workers), since the concentration of human capital stimulates innovation and improves productivity. An educated workforce attracts business and industry, not vice versa (Florida 2002; Glaeser 1994; Glaeser and Shapiro 2001).

In addition, workers who live in labor markets where the concentration of college graduates is high enjoy higher wages than equivalent workers in less highly-educated labor markets, even after controlling for their individual human capital and work experience (Rauch 1993). Thus, less educated workers benefit from higher wages if they live in places with a high proportion of college graduates. Conversely, college graduates living in areas that are poor in human capital earn less than their counterparts in places that are rich in human capital. In theoretical terms, this means that educational segregation has an independent ecological effect on social stratification, over and above its individual level effects.

Finally, since neighborhood resources play a significant role in influencing the educational prospects of children (Leventhal and Brooks-Gunn 2000; Brooks-Gunn, Duncan, Klebanov, and Sealand 1993), increased educational segregation implies an intensification of the reproduction of social and economic inequality across the generations.

There are two main theoretical explanations for rising educational segregation. First, despite the predictions of countless commentators, new communications technologies and the global capital networks that they have helped to create have *not* rendered place irrelevant and cities obsolete. Rather, as post-industrial urbanists such as Sassen (2000) and Castells (1989, 2000) make clear, these shifts have engendered new, nodal forms of spatial organization, in which production has become increasingly dispersed, but knowledge, management, and commerce have become more and more concentrated. Treatments of post-industrial urbanism differ in important respects – for example, the central historical force at work in Sassen’s

theory is international capital mobility, while Castells emphasizes changes in the technologies of production. Nonetheless, both agree that post-industrial economic development introduces a new logic of economic and social agglomeration, which, in turn, leads to increasing primacy for a handful of “global cities.”

According to post-industrialization theory, centralized command points have emerged even as production and exchange have globalized. These global cities have distinctive roles in the post-industrial economy: At these nodes, management is concentrated, the face-to-face interactions of the financial markets occur, and new technologies are developed. Since the economic functions that occur in global cities tend to draw heavily on professional and technical labor – while the production functions that are becoming increasingly dispersed are less human capital intensive – post-industrialization theory implies a sharp increase in the spatial concentration of human capital. Highly trained workers cluster in these new post-industrial centers to work in emerging fields such as telecommunications, international finance, and specialized services. In the meantime, the old industrial working class and others who work in less specialized fields are often banished to the periphery.

But global cities cannot run on specialized professional and technological labor alone. Sassen (2000) points out that these post-industrial nodes also require a large, relatively uneducated workforce. Working along side the global cities’ financial analysts, computer programmers, and corporate managers is an army of secretaries, building cleaners, and retail clerks. Post-industrialization theory suggests, therefore, that recent technological and economic developments have created new inequalities

within global cities. As blue-collar production moves out of these cosmopolitan nodes, the educational profile in global cities becomes increasingly bimodal.

Mitchell Moss (1987) demonstrates some of the implications of post-industrialization for urban geographies by examining the consequences of new information technologies on the spatial organization of American corporate life. According to Moss, functions that require face-to-face contact typically remain concentrated in downtown business districts, but “back-office” tasks such as data processing are increasingly being dispersed to cheaper suburban locations. The implications of this pattern for educational segregation are clear – while the “front office” jobs that require high levels of human capital remain centralized, jobs that require less human capital are spreading out.

A second theory emphasizes the changing residential preferences of the highly educated. Survey research indicates that most Americans say they prefer to live in rural areas high in *natural amenities*, and scholars generally agree that residential preferences have driven the deconcentration of the American population over the last several decades (Frey 1987). However, residential preferences are not socially homogenous. Recent research suggests that plentiful *cultural amenities* and tolerant social attitudes increasingly draw college graduates into densely populated urban areas.

Lloyd and Clark speak of “the city as an entertainment machine,” arguing that quality of life factors have replaced economic factors in determining where people reside, and that these attractions draw human capital into metropolitan hubs (Lloyd and Clark 2002). By grafting measures of artistic offerings and other built amenities

onto census-level data, Clark and others have demonstrated that the quality of life factors that attract the highly educated are different from the factors that attract the less highly educated. These analyses suggest that college graduate populations tend to rise in communities with plentiful cultural attractions, while weather and natural amenities predict population growth among people whose formal education ended at high school (Clark 2003, Rogers 2004).

Florida (2002a, 2002b) describes a similar trend, in which the members of the “creative class” flock toward cosmopolitan communities that are rich in cultural amenities. However, Florida data suggests the mechanism that attracts highly educated workers to these places is ultimately economically rational. Florida’s analyses show that the most consistent indicator of human capital growth at the CMSA level is “diversity,” a construct that he operationalizes by measuring the proportion of households that are gay or lesbian. By Florida’s account, diversity attracts creative class members since it signals a labor market in which an ethos of cultural tolerance reigns and barriers to entry for human capital are low.

As this chapter will demonstrate, the net result of these economic and cultural shifts is a new pattern of metropolitan organization in which highly educated residents share the central city with workers from the service industries, while the working and lower-middle classes spread into suburban and exurban areas.

This chapter will test empirically the following three hypotheses regarding educational segregation, all of which are implied by post-industrialization theory:

H1. Post-industrialization leads college graduates to cluster in a few communities, while other communities experience brain drain. As a result, the first

hypothesis is that levels of educational segregation have risen *between communities* over time.

H2. Meanwhile, theories of post-industrialization suggest that central city populations have become increasingly bimodal as the middle class leaves for the periphery of urban areas. Thus the second hypothesis predicts that educational residential segregation *within communities* has also increased over time.

H3. Finally, these theories suggest that educational segregation will be most pronounced within the nodal cities most highly integrated into the post-industrial economy. Therefore, the third hypothesis suggests that levels of educational segregation should be particularly high in the places that have the highest proportion of college graduates.

This chapter expands our knowledge of educational residential segregation across time and space, by demonstrating that pronounced increases in educational segregation have occurred both *among* and *within* American communities during the course of the last half of the 20th Century. It provides updated estimates of recent racial and economic segregation trends, demonstrating that patterns in educational segregation are unrelated to racial and economic segregation trends. In the process, it builds an empirical validation and extension of post-industrial theory.

METHODS: MEASURING SEGREGATION TRENDS

Massey and Denton (1988) argue segregation is a phenomenon with five conceptually distinct (although often empirically related) dimensions: evenness, exposure, concentration, centralization, and clustering. The analyses that follow focus

on the first two of these dimensions: *Evenness*, or the extent to which groups are underrepresented in some areas and overrepresented in others; and residential *exposure*, or the extent to which group members are isolated from the members of other groups.

Duncan and Duncan's (1955) index of dissimilarity (D) is used to measure the evenness with which members of different racial, economic, and educational groups are distributed spatially across the United States. The index of dissimilarity measures the proportion of minority members who would have to move to a new area of residence to achieve an even distribution across all areas. In this case, the index of dissimilarity between high school graduates and college graduates is calculated for all of the counties in the United States. This index varies from 0 to 1 and represents the proportion of college graduates who would have to relocate to another county in order to spread all college graduates equally across the nation. Mathematically, this measure is defined as:

$$D_{xy} = .5 * \sum | (x_i/X) - (y_i/Y) |$$

If measuring county-level residential dissimilarity between college graduates and high school graduates, x_i is the number of college graduates in county i and X is the number of college graduates nation-wide; y_i is the number of high school graduates in the county and Y is the number of high school graduates nationwide.

The index of dissimilarity is insensitive to the relative size of majority and minority groups. Segregation often increases as minority populations rise – for example, although Northern cities had small African-American populations earlier in

their histories, pronounced racial segregation did not emerge in those cities until black populations began to swell in the Great Migration of the mid-20th Century (Massey and Denton 1993). But segregation is not logically dependent on population size. If all the African-Americans in 19th Century Chicago lived in the same few blocks, they would have been highly segregated even though their numbers were few. The index of dissimilarity is therefore a uniquely useful measure since it allows a conceptual distinction between segregation and population size. This will be important in the context of educational segregation, since the proportion of the population with a college degree has increased over time.

By contrast, the second dimension of residential segregation that this chapter will consider, isolation, is dependent on relative size of minority and majority groups. Isolation can be understood as the degree of potential contact between members of two groups. In a society composed of two groups of approximately the same size, the degree of residential isolation between the two groups is likely to be lower than in a society in which one group is very small and the second is very large. This chapter uses the index of isolation which was introduced to contemporary sociologists by Lieberson (1980; 1981; Lieberson and Carter 1982a, 1982b) to measure exposure. Massey and Denton describe this index as an attempt to measure “the extent to which minority members are exposed only to one another” (1988, p. 288). Isolation is defined as:

$$I_{xy} = \frac{1}{n} \sum_{i=1}^n [x_i/X][x_i/t_i]$$

where x_i equals the number of members in a minority group; t_i equals the total population of geographical unit i ; and X represents the number of members in the entire universe (whether a country or a metropolitan area). This index ranges from 0 to 1, with high values indicating a high degree of residential isolation. When the index of isolation equals 1, the probability that a randomly selected minority group will live in an area occupied exclusively by group members is extremely high; the isolation index equals 0 when that probability is extremely low. Unlike the earlier index of dissimilarity, this isolation index *is* affected by the size of one group versus another.

Tables 1 through 5 present recent historical trends in educational, racial, and economic segregation and isolation using these indices. Throughout this section, data from the decennial U.S. Census Summary Tape File-3 have been utilized. These data are aggregated from the Census's long form questionnaire, which is administered to approximately one-sixth of U.S. households. The universe for these educational indices includes all U.S. residents who are 25 years of age or older. These indices measure residential segregation between college graduates and high school graduates.¹ This operationalization focuses attention on the two modal educational categories in the American population. Where data allows, I also report indices of

¹ Between the 1990 and 2000 Census rounds, the survey instrument measuring educational attainment changed. Prior to 2000, educational attainment was measured as respondents highest grade completed; in 2000, the Census began to collect respondents' highest degree completed. As a result, college graduates are defined as adults who have completed 16 or more years of formal schooling and high school graduates are defined as respondents who completed 12 years of formal schooling in the 1940, 1970, 1980, and 1990 Census rounds. In the 2000 survey round, college graduates are defined as adults who earned a BA degree or higher in the 2000 Census round and high school graduates are defined as respondents who completed their formal education with a high school diploma or equivalent and never enrolled in college.

educational segregation between high school graduates and advanced degree holders. Alternate specifications of educational segregation, including operationalizations that include high school dropouts in the analysis, yield substantively similar results but are not reported here.

For the purposes of this chapter, racial segregation is defined as segregation between African-Americans and non-Hispanic whites. Segregation patterns for members of other races are not analyzed here. Finally, this chapter considers two forms of economic segregation: In the first, the residential patterns of households with earnings below the poverty line are compared with those of households whose earnings are above the poverty line. The second, meanwhile, considers the residential segregation of the affluent by computing segregation indices for families whose household income is greater than four times the poverty level for a family of four, compared to less affluent families. In 1980, this definition of affluence includes all families with a household income greater than \$35,000; in 1990, the cut-off is at \$55,000; and in 2000, all families with a household income greater than \$75,000 are considered affluent. This definition replicates the definition of affluence utilized in Massey and Eggers (1990, 1993).

My analyses take place at several levels of aggregation, examining segregation between regions, metropolitan areas, counties, and census tracts. At the outset, I examine recent trends in the spatial concentration of college graduates, showing that the gaps between America's most and least highly educated census divisions and metropolitan areas have broadened over the last 30 years. A more systematic analysis of between-county and within-county segregation trends confirms

that the American landscape is becoming increasingly segregated by educational attainment.

I first consider between-county segregation trends, using the county as the geographic unit of analysis, and then consider segregation trends within counties, using the census tract as the geographic unit of analysis. For each county in the United States I compute indices of segregation between census tracts. It should be noted that the county is a higher level of aggregation than is typically used in the literature on residential segregation, where analysts usually focus on the more finely-grained census tract level. There is good reason for this emphasis on tract-level segregation: Counties are political units that vary in population size from fewer than one hundred people to several million. Furthermore, county boundaries may bear little resemblance to people's experience of social space. By contrast, each census tract is home to between 1,500 and 8,000 persons, and census tracts are designed to correspond to recognizable boundaries, such as streets, roads, highways, rivers, canals, and railroads (U.S. Bureau of the Census 1994).

Nonetheless, both county-level and tract-level segregation trends merit investigation. Massey and Hajnal (1995) and Massey and Fischer (2003) compare historical trends in racial and economic segregation at the level of the region and the county with more finely grained tract-level segregation trends. Massey and Hajnal (1995) demonstrate that racial segregation declined at the macro-level (between regions and counties) between 1900 and 1970, but that these declines were largely offset by rising segregation at the micro-level (within regions and counties). While Massey and Fischer (2003) acknowledge that economic segregation is much less

pronounced than racial segregation, they also suggest economic segregation followed a similar pattern between 1970 and 2000.

Segregation trends at the county-level point to large-scale migration and residential patterns that census tract segregation analyses can not detect. In particular, county-level segregation indices measure inter-metropolitan and core/periphery polarization.

While county-level segregation measures point to inequalities between communities, segregation at the level of the census tract focuses on residential clustering within communities. Indices of segregation between census-tracts are calculated both nation-wide and within select metropolitan areas. Tract-level segregation indices are calculated for each county in the United States. The national within-county segregation figures reported in this chapter are the population-weighted means of these within-county segregation measures. Table 2 reports within-county segregation trends for metropolitan counties (the list of metropolitan counties utilized here includes only those counties that were in an MSA in 1970). Table 3 reports within-county segregation trends for counties that were not in an MSA in 1970.² Table 4 disaggregates the analysis of segregation within metropolitan counties by separately examining segregation trends between 1970 and 2000 in the 100 counties that had the highest concentration of college graduates in 2000 and in the 100

² Prior to 1980, the Census STF-3 file included census tract data only for metropolitan areas, so segregation indices within nonmetropolitan communities are not available for 1970.

counties that had the lowest concentration of college graduates at the same time. Finally, I consider census tract level segregation trends within 12 metropolitan areas.³

PREVIOUS SEGREGATION RESEARCH

A review of the residential segregation literature reveals a wealth of scholarship on racial and economic segregation. But very little scholarly attention has been dedicated to understanding segregation between college graduates and non-graduates.

Racial segregation, in particular, has long been a major focus for sociological research. Much research emphasizes the persistence of racial segregation, demonstrating that African Americans continue to live in isolated neighborhoods, and noting that upwardly mobile black families are less likely to move into affluent neighborhoods than upwardly mobile families from other ethnic groups (Massey and Denton 1987, 1993; Logan, Alba, McNulty, and Fisher 1996; Harris 1999). Nevertheless, the available historical evidence, including the evidence presented in this chapter, suggests that American efforts to dismantle racial segregation may be working: After increasing dramatically during the first half of the 20th Century, especially in Northern cities, black/white racial segregation began to slowly decline in the 1960s or 1970s and has continued to decline through 2000 (Lieberson 1980;

³ In each of these analyses, the definitions for census tracts that are utilized come from the decade in which the data are collected. As a result, these units can change from decade to decade, as census tracts shift to reflect changing population distributions.

Massey and Denton 1989, 1993; Farley and Frey 1994; Fischer, Stockmayer, Stiles, and Hout 2004; Logan, Stults, and Farley 2004; Wilkes and Iceland 2004).⁴

Compared to the racial segregation literature, the sociological literature on economic segregation is fairly new. Indeed, most of the work on the spatial concentration of affluence and poverty has occurred in the last decade. In a provocative presidential address delivered to the Population Association of America, Massey (1996) argued that urbanization and rising income inequality were combining to create an “age of extremes,” in which the poor are increasingly spatially isolated from the affluent. Massey warned that this “fundamental change in the geographic structure of inequality” would increase the exposure of the poor to crime, disease, violence and family disruption.

Massey’s address has been influential, and the idea that economic segregation is rising appears frequently in recent sociological literature. For example, Sampson, Morenoff, and Gannon-Rowley (2002, p. 449) note in passing and without citing evidence that, “the ecological concentration of poverty appears to have increased significantly during recent decades, as has the concentration of affluence at the upper end of the income scale.” Dreier, Mollenkopf, and Swanstrom (2001) expanded Massey’s argument, maintaining that America is becoming increasingly segregated by class, and that this segregation has far-reaching negative social, political, and health consequences (see also Swanstrom, Mollenkopf, and Dreier 2002).

The available empirical evidence documenting rising economic segregation in the United States suggests that the scale of recent increases in economic segregation

⁴ Note, however, that even as black/white racial segregation declines, Logan *et al.* 2004 suggest that Hispanics and Asians may be becoming increasingly residentially segregated.

is modest. Drawing on work of Jargowsky (1996) and Massey and Eggers (1993), Massey demonstrates that economic segregation in the United States' 10 largest metropolitan areas rose between 1970 and 1990. According to Massey, the residential dissimilarity of the poor and the non-poor rose from .37 in 1970 to .41 in 1990; and the dissimilarity index for the poor and the affluent rose from .49 to .56 in the same period.

In his comments on Massey's "Age of Extremes," Farley (1996) notes that despite Massey's dire predictions, the actual shifts that Massey reports are small in magnitude. Farley adds that trends toward greater economic integration in smaller metropolitan areas may largely offset the economic segregation that Massey observed in the largest American cities. Furthermore, analyses of economic segregation that include 2000 Census data suggests that the economic boom of the 1990s largely wiped out the increases in economic segregation that occurred during the 1970s and 1980s (Jargowsky and Kim 2005; Massey and Fischer 2003). Recent work by Fischer, et al. (2004) lends further support to the contention that national levels of economic segregation have remained relatively constant for several decades. The authors investigate residential segregation trends in metropolitan America at multiple levels of aggregation, finding that economic segregation levels have changed very little between 1960 and 2000.

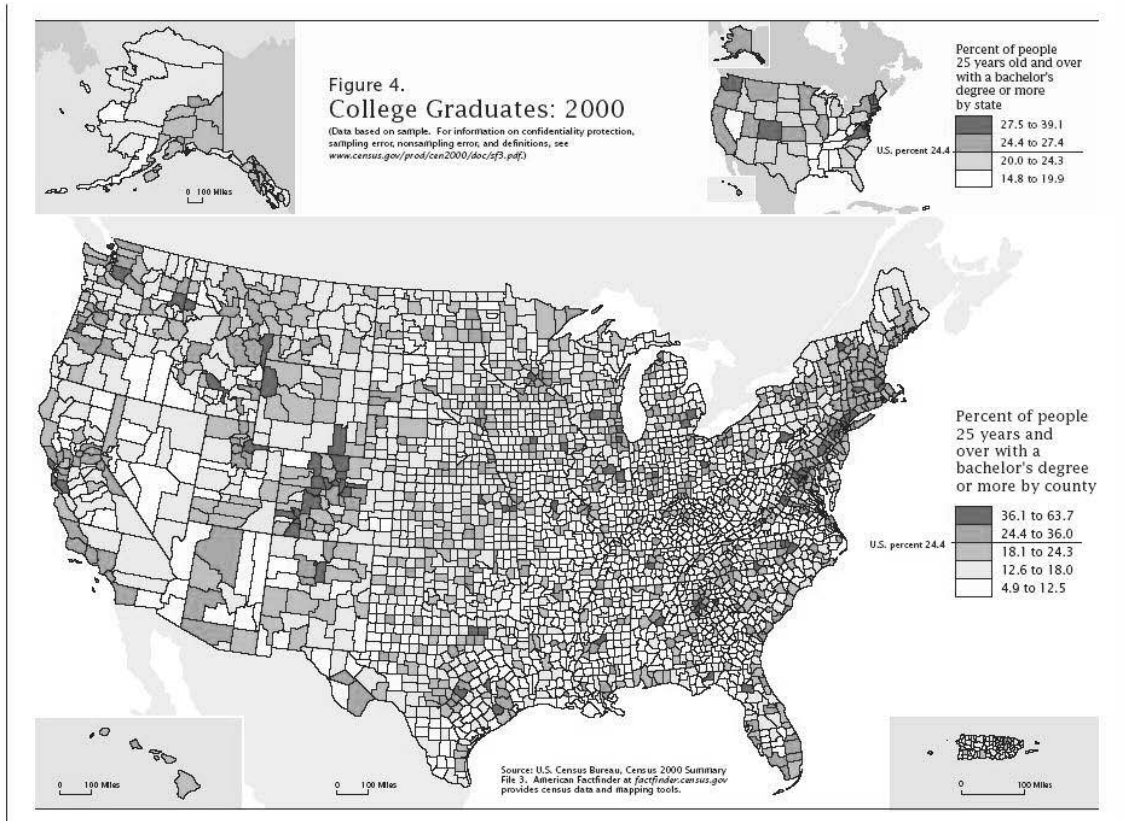
Until now, the topic of educational segregation has been largely overlooked. The only existing empirical analysis of American educational segregation that I have been able to locate is Sims' (1998) examination of 1980-1990 segregation trends in Chicago, Los Angeles, Miami, New York, and San Francisco. In the process of

examining black suburbanization, Sims finds that “extreme” educational segregation between college graduates and high school dropouts deepened during the 1980s.

FINDINGS: AMERICA’S UNEQUAL EDUCATIONAL GEOGRAPHY

Figure 1.1 provides a snapshot of American educational segregation in 2000. This map, created by Kurt J. Bauman and Nikki L. Graf for the U.S. Census Bureau (2003), shows the proportion of county residents who have completed a bachelor’s degree or higher in each of the United States’ 3,141 counties. It points to a highly uneven geographical distribution of college graduates. Large swaths of the country

Figure 1.1: Percent of people 25 years and over with a bachelor's degree or more by county.



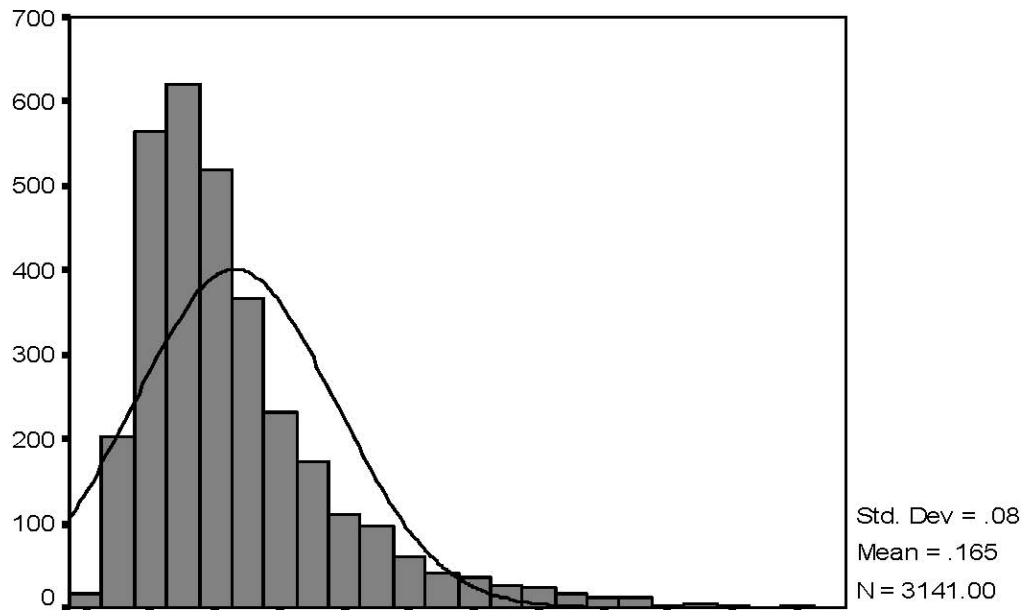
Source: U.S. Census Bureau, *Educational Attainment: 2000*.

have very low concentrations of college graduates, particularly in the South and the Southwest. On the other hand, several counties – including large metropolitan areas in the Midwest and on the East and West Coasts, plus high-amenity areas in the Mountain West, and a sprinkling of college communities across the country – have pronounced concentrations of college graduates.

Figure 1.2 further demonstrates the spatial segregation of American college graduates. This histogram charts the distribution of American counties by the proportion of their population with a Bachelor's degree or higher, revealing a pronounced rightward skew in this distribution. As Figure 2 makes clear, the vast majority of U.S. counties have low concentrations of college graduates. In approximately one-third of U.S. counties, less than 12 percent of the adult population has a college degree. In these counties, the college-educated population is smaller than half the size it would be if college graduates were scattered evenly across the American landscape.

At the other end of the educational spectrum, there are a relatively small number of counties in which college graduates cluster in disproportionate numbers. These places tend to be relatively populous. More than 40 percent of the U.S. population lives in the 350 counties in which college graduates are overrepresented compared to the national average. In only 12 U.S. counties, more than half of the population has a BA or higher, including the Virginia and Maryland counties that border the District of Columbia, Colorado's Boulder County, the North Carolina research triangle's Orange County, and Northern California's Marin County.

Figure 1.2: Distribution of U.S. counties by proportion of adults with a Bachelor's degree or higher.



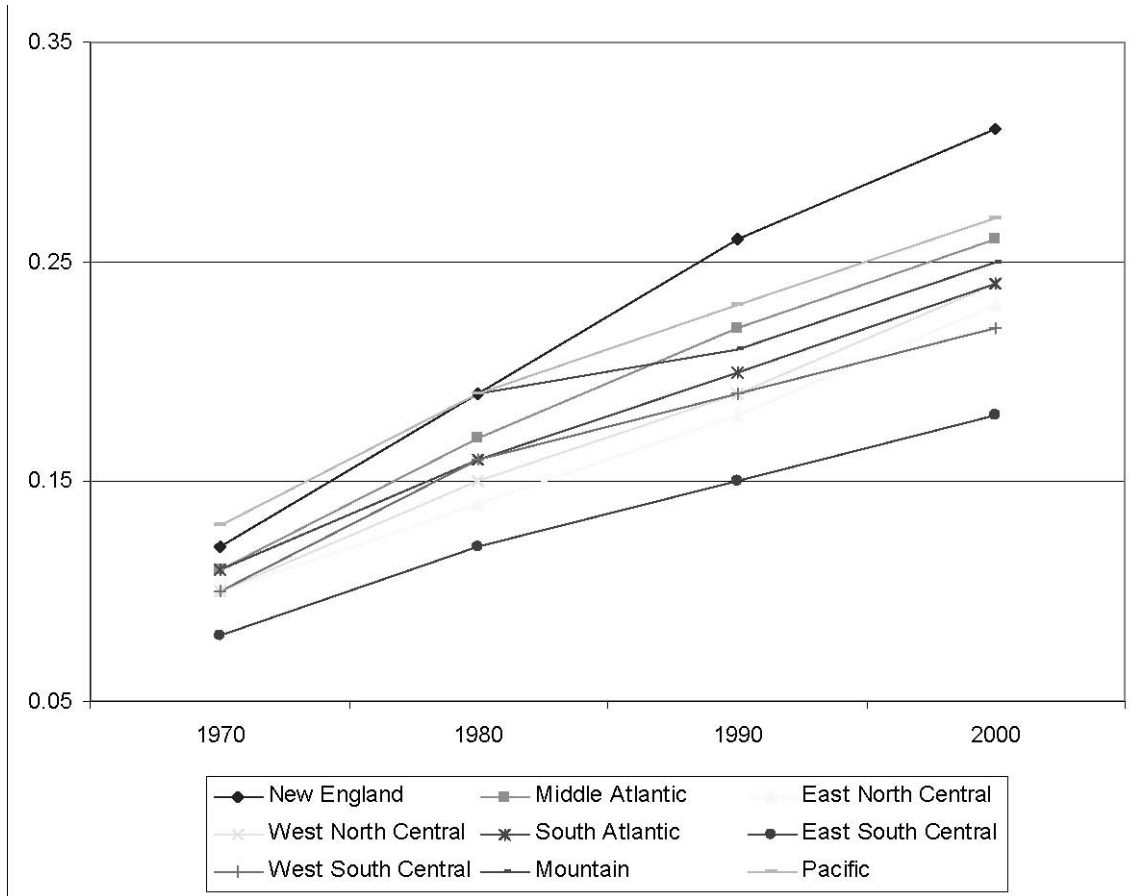
Source: U.S. Census SF-3, 2000.

This unequal geographic distribution of American college graduates is a new phenomenon. Figure 1.3 illustrates recent trends in educational segregation by demonstrating the increasing educational polarization that has occurred between American census divisions. Regional educational inequality has widened over time, even as every census division experienced absolute gains in the proportion of population with a college degree. In 1970, only 5 percentage points separated the most highly educated areas in the United States from the least highly educated regions. In the Mountain and Pacific census divisions, approximately 13 percent of the adult population had a college degree compared to the East South Central census division, where 8 percent of the adult population had a college degree. By 2000, the regional educational gap had more than doubled to 13 percentage points. In 2000,

New England was the most highly educated area in the United States and 31 percent of its adult population had a college degree. By comparison, only 18 percent of the residents of the East South Central census division had a bachelor's degree or higher. Put in relative terms, the gap between America's most and least highly educated regions widened slightly from 163% in 1970 to 172% in 2000. Mass higher education did not eliminate regional gaps in American educational attainment. On the contrary, Figure 1.3 demonstrates that regional educational gaps have widened since 1970, in absolute and in relative terms.

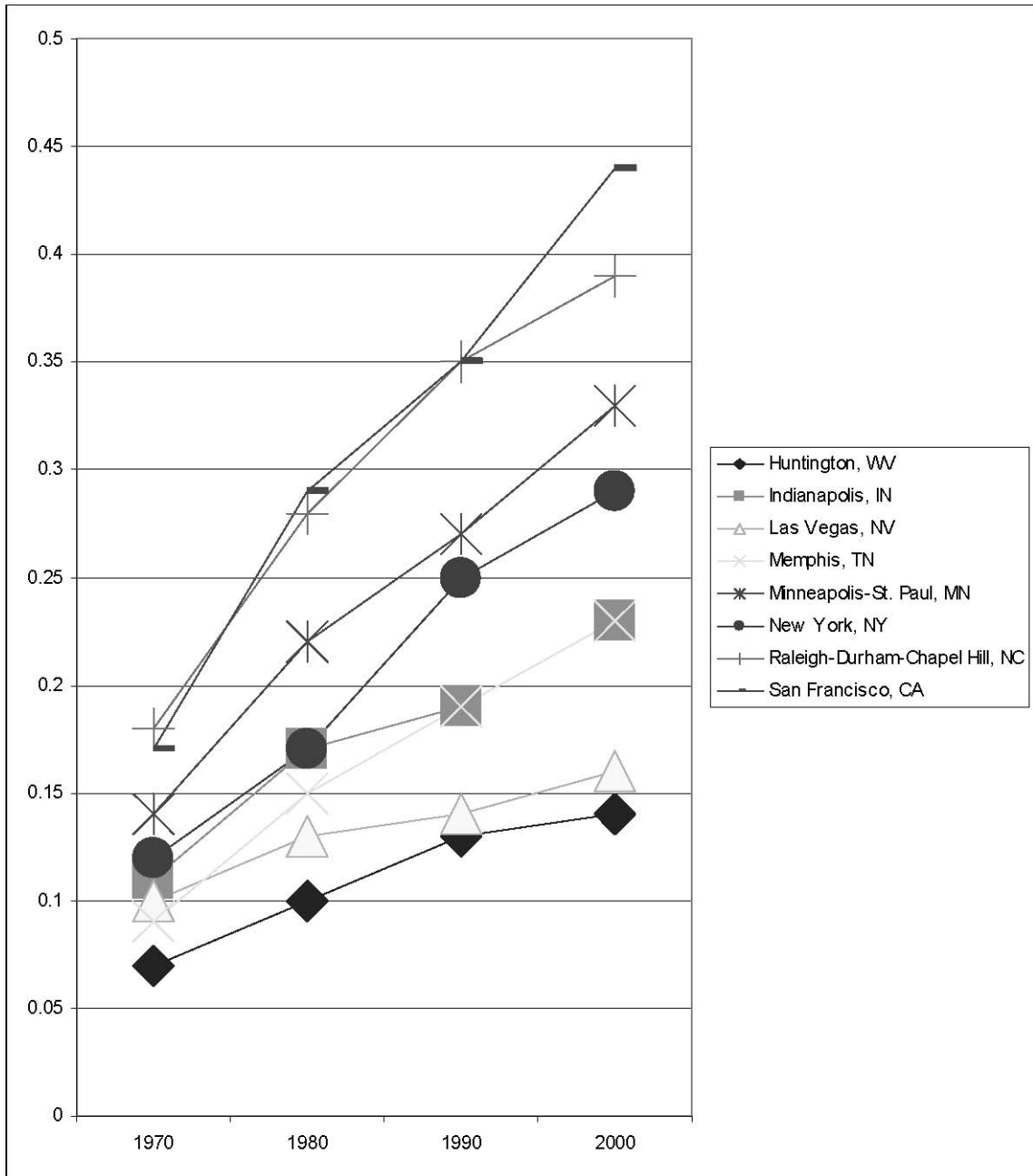
Figure 1.4 suggests that an even more pronounced polarization pattern is taking place among American metropolitan areas. This line graph represents recent trends in educational composition among a diverse sample of American MSAs. Metropolitan areas like San Francisco and Raleigh/Durham that had relatively large college graduate populations in 1970 experienced additional rapid growth in their graduate populations between 1970 and 2000. On the other hand, the college graduate growth rate was much smaller for metropolitan areas that had relatively small populations of college graduates in 1970 such as Las Vegas, NV and Huntington, WV. The net result is a deepening educational divide between the nation's most highly educated MSAs and its least highly educated MSAs. San Francisco's concentration of college graduates was not quite twice Las Vegas's in 1970; by 2000, San Francisco had nearly three times as many college graduates per capita than Las Vegas. The metropolitan areas represented in this line graph were selected to maximize geographical, size, and educational compositional variation. However, the

Figure 1.3: Trends proportion of adults aged 25 and up with a Bachelor's degree or higher by census divisions, 1970-2000.



Source: U.S. Census SF-3, 1970-2000.

Figure 1.4: Trends in proportion of adults aged 25 and up with a Bachelor's degree or higher, selected U.S. metropolitan areas, 1970-2000.



Source: U.S. Census SF-3, 1970-2000.

polarization that they describe is representative of American metropolitan areas as a whole.

These maps and graphs are illustrative of a profound and deepening trend toward educational segregation in the United States. Using conventional segregation indices, the remainder of this chapter will systematically demonstrate that educational segregation is rising both between and within American communities. Furthermore, it will show that this trend is independent of other residential segregation patterns.

Between-county segregation trends

Table 1.1 examines the county-level trends in residential segregation by educational attainment, race, and economic status in the United States between 1940 and 2000.

The first panel in Table 1.1, which presents county-level indices of dissimilarity, indicates that educational segregation rose markedly throughout the 1940-2000 period, even as racial and economic segregation remained unchanged. Segregation between college graduates and high school graduates increased by more than 250 percent between 1940 and 1990, from $D=.09$ to $D=.23$. Between 1990 and 2000, county-level segregation between college graduates and high school graduates leveled out, increasing by only .01. By contrast, county-level segregation between African-Americans and whites declined slightly during the same period. Furthermore, economic segregation – whether measured as segregation between poor and non-poor households; or as segregation between affluent household and poverty households – remained fairly constant. While blacks and whites are still far more segregated according to the index of dissimilarity than college graduates and high school

Table 1.1: County level indices of residential segregation

	1940	1970	1980	1990	2000
Index of dissimilarity (D)					
(1=complete segregation; 0=complete integration)					
4+ years of college/High school graduate	.09	.16	.18	.23	.24
MA+/High school graduate	--	--	--	.24	.26
Black/white	.53	.47	.48	.47	.47
Below poverty/above poverty	--	.24	.19	.21	.21
2x poverty/all others	--	--	--	.20	.19
Below poverty/affluent (4x poverty)	--	--	.30	.32	.30
Index of isolation (P*)					
(1=complete isolation; 0=complete interaction)					
4 + years college	.05	.13	.19	.24	.28
MA+	--	--	--	.09	.11
Black	.28	.25	.26	.26	.26
Below poverty	--	.19	.15	.16	.14
Affluent	--	--	.20	.30	.22

Source: U.S.Census SF-3, 1940-2000.

graduates are, the historical trends suggest that county-level racial segregation is declining over time, while educational segregation is on the rise.

Also worth noting in the first panel in Table 1.1 is the data on segregation between advanced-degree holders and high school graduates. While only two data points are available for this analysis, 1990 and 2000 Census data suggest that segregation between advanced-degree holders and high school graduates is slightly more pronounced than segregation between BA holders and high school graduates.

This table's second panel presents trends in the index of isolation. This panel shows that residential isolation of college graduates has increased more than five-fold between 1940 and 2000. Like the indices of dissimilarity, the indices of racial and economic residential isolation point to little change over the course of this period. The increasing residential isolation of the highly educated is a function of two factors: The first is the rising educational attainment of the American population. As the proportion of the population with a college degree increases, so do the odds that college graduates live exclusively around other graduates. Second, however, the

rising isolation of college graduates points to the spatial clustering of human capital. As educational inequalities between places increase, college graduates become more and more likely to live near other college graduates.

The segregation trends described in Table 1.1 suggest that highly educated people are increasingly unlikely to live in the same counties as less educated people. As access to higher education spread in the United States during the late 20th Century, so did educational segregation by county. If current trends continue, the county-level educational segregation depicted in the map in Figure 1 will only intensify in the future.

Within-county segregation trends

Tables 1.2, 1.3, and 1.4 examine national trends in educational, racial, and economic segregation within counties, using the more finely-grained census tract (or, in the case of some nonmetropolitan areas, block-numbering area) as the level of analysis. Table 1.2 looks at trends in residential segregation between census tracts in metropolitan areas and Table 1.3 examines trends in residential segregation between census tracts in nonmetropolitan counties. Since reliable census tract data are not available prior to 1970, these tables are restricted to the 1970-2000 period, rather than the longer 1940-2000 period covered in Table 1. Among nonmetropolitan areas, data quality continued to improve even during the course of this abbreviated time period. Census tract or block-number area coverage only expanded to include all nonmetropolitan U.S. counties in 1990 (U.S. Bureau of the Census 1994).⁵

⁵ Census Department metropolitan statistical area (MSA) definitions are used throughout this chapter to distinguish between metropolitan and nonmetropolitan areas. These county-level definitions are updated with each decennial Census. They define any county that contains an agglomeration of 50,000 or more residents, as well as highly interconnected adjacent counties, as metropolitan areas.

Table 1.2: Census tract level indices of residential segregation (1970 metropolitan areas only)

	1970	1980	1990	2000
Index of dissimilarity (D)				
(1=complete segregation; 0=complete integration)				
4 + years college/High school graduate	.21	.30	.33	.34
MA+/High school graduate	--	--	--	.39
Black/white	.76	.67	.60	.56
Below poverty/above poverty	.32	.33	.35	.34
Below poverty/affluent (4x poverty)	--	.51	.52	.51
Index of isolation (P*)				
(1=complete isolation; 0=complete interaction)				
4 + years college	.19	.26	.31	.36
MA+	--	--	--	.16
Black	.48	.44	.38	.33
Below poverty	.19	.18	.20	.18
Affluent	--	.07	.11	.11

Source: U.S.Census SF-3, 1970-2000.

The trends in educational segregation within metropolitan areas that are described in Tables 1.2 and 1.3 are less pronounced than the county-level educational segregation trends described in Table 1.1. Nonetheless, Table 1.2 clearly indicates that educational segregation increased within metropolitan areas between 1970 and 2000, and the degree of segregation within metropolitan counties is remarkably high. The population-weighted index of residential dissimilarity between college graduates and high school graduates in American metropolitan counties rose markedly between 1970 and 1980 and continued to increase more gradually during the 1980s and 1990s. This trend clearly demonstrates that the geographic distribution of college graduates in metropolitan America has become increasingly uneven. Over the course of this period, the proportion of the metropolitan population that would have to move to create an even geographic distribution of college graduates and high school graduates

Any county that does not meet these metropolitan criteria is considered nonmetropolitan. This definition is closely related to the more commonplace distinction between rural and urban places. However, it is not identical. For example, respondents who live in the open country in a county that contains a large city are considered metropolitan, while respondents who live in the middle of a city of less than 50,000 residents are considered nonmetropolitan.

increased by .13, from .21 in 1970 to .34 in 2000. Likewise, the isolation of college graduates nearly doubled during the 1970-2000 period.

By contrast, the segregation measures in Table 1.2 suggest that metropolitan *racial* segregation declined between 1970 and 2000. The dissimilarity index, measuring the proportion of the population that would have to relocate to establish an even distribution of the African-American and white population, declined by .20 over this period, as blacks became less residentially isolated from whites. Metropolitan America remains considerably more segregated by race than by educational attainment. In 2000, 56 percent of the metropolitan population would have had to move to racially desegregate the average U.S. metropolitan county, while 34 percent of the population would have to move to desegregate educationally. But Table 1.2 suggests that metropolitan America is making progress on racial segregation, even as it becomes increasingly educationally segregated.

Furthermore, Table 1.2 shows the changes in *economic* segregation that occurred between 1970 and 2000 were modest relative to the sharp increase in educational segregation over the entire course of this period. This table records small increases in both economic dissimilarity measures. During this period, dissimilarity between the poor and non-poor increased by .02 and dissimilarity between the poor and the affluent did not change. These changes are dwarfed by the .13 increase in educational dissimilarity, as well as the .20 decline in black/white dissimilarity that occurred among metropolitan census tracts in the same period. These small changes point to extremely modest increases in segregation between the poor and the non-poor and the poor and the affluent. Well-off metropolitan dwellers became somewhat less

likely to live near the poor in the late 20th Century, and the residential isolation of the affluent increased by .04 between 1970 and 2000. Again, however, this shift is far smaller than the decline in high school graduate exposure to bachelor's degree holders that occurred during this period. Overall, changes in metropolitan economic segregation were modest relative to the changes in educational segregation.

Table 3: Census tract level indices of residential segregation (areas not in 1970 MSAs only)

	1970	1980	1990	2000
Index of dissimilarity (D)				
(1=complete segregation; 0=complete integration)				
4 + years college/High school graduate	--	.20	.21	.21
MA+/High school graduate	--	--	--	.24
Black/white	--	.47	.47	.43
Below poverty/above poverty	--	.19	.19	.19
Below poverty/affluent (4x poverty)	--	.32	.30	.30
Index of isolation (P*)				
(1=complete isolation; 0=complete interaction)				
4 + years college	--	.17	.17	.21
MA+	--	--	--	.08
Black	--	.19	.15	.15
Below poverty	--	.16	.18	.17
Affluent	--	.04	.05	.06

Source: U.S. Census SF-3, 1970-2000.

Table 1.3 examines these same segregation trends among nonmetropolitan census tracts and block numbering areas.⁶ The indices recorded in this table show very little change in educational, racial, or economic segregation within nonmetropolitan areas between 1980 and 2000. Brain drain migration from nonmetropolitan to metropolitan areas is likely a major source of the county-level segregation trends that Table 1.1 describes. Nevertheless, Table 1.3 demonstrates that

⁶ Throughout this period, there were many nonmetropolitan American counties that had not been divided into census tracts. In these counties, data from block numbering areas are used instead of census tracts. Beginning with the 1990 Census, every county in the United States is subdivided into either census tracts or block numbering areas. Like census tracts, block numbering areas are small statistical subdivisions of a county. In the 1980 Census, a small number of nonmetropolitan counties that were not divided into census tracts or block-numbering areas are excluded from analysis.

residential segregation patterns have changed very little over the last 30 years within American nonmetropolitan areas.

Finally, Table 1.4 focuses attention on the changes in segregation patterns that occurred between 1970 and 2000 within the United States' most and least highly educated metropolitan counties. The first two columns of this table consider average segregation trends within the 100 counties that had the highest concentration of college graduates in 2000; the second two columns consider average segregation trends within the 100 counties that had the lowest concentration of college graduates in 2000.⁷ This table shows that highly educated metropolitan counties are much more segregated on racial, economic and educational lines than less highly educated metropolitan counties. But the most pronounced difference between the segregation patterns within America's 100 most highly educated counties and those within the nation's 100 least highly educated counties is in educational segregation. In 2000, 35 percent of the college-educated residents of the top 100 highly educated counties would have had to move to create an even distribution of college graduates within their borders. By contrast, only 20 percent of college graduates would have to move to eliminate educational segregation in the counties with the lowest concentration of college graduates. Indeed, Table 1.4 suggests that college graduates in America's most highly educated metropolitan areas are more residentially isolated than African-Americans are in the same communities.

This table shows that highly educated metropolitan areas are experiencing far more rapid increases in educational segregation than less educated

⁷ In each of the top 100 counties, at least 34 percent of the population has a BA degree or higher; in each of the bottom 100 counties, college graduates made up less than 12.5 percent of the population.

Table 1.4: Census tract level indices of residential segregation within the nation's most and least highly educated counties

	Top 100		Bottom 100	
	2000	Change 1970- 2000	2000	Change 1970- 2000
Index of dissimilarity (D) (1=complete segregation; 0=complete integration)				
4 + years college/High school graduate	.35	+.16	.20	+.02
Black/white	.53	-.20	.45	-.20
Below poverty/above poverty	.34	+.04	.20	-.02
Index of isolation (P*) (1=complete isolation; 0=complete interaction)				
4+ years college	.49	+.22	.14	+.07
Black	.27	-.12	.17	-.07
Below poverty	.14	-.01	.18	-.01

Source: U.S. Census SF-3, 1970-2000.

metropolitan areas. Between 1970 and 2000, the index of dissimilarity within the nation's 100 most highly educated counties increased by .16; compared to a modest .02 increase among the nation's least highly educated metropolitan counties.

Similarly the residential isolation index shows a .22 increase in the isolation of college graduates in America's most highly educated metropolitan areas, compared to a .07 increase in residential isolation for their peers in less highly educated communities.

Metropolitan segregation trends

Table 1.5 examines residential segregation trends within 12 U.S. metropolitan areas between 1970 and 2000. Educational, racial, and economic dissimilarity and isolation indices are calculated for the eight MSAs profiled in Figure 1.4, along with four others: Atlanta, Chicago, Houston, and Los Angeles. This table, therefore, profiles residential segregation trends in the United States' five most populous metropolitan areas (New York, Los Angeles, Houston, Chicago, and Atlanta), as well as a diverse selection of smaller metropolitan areas.

Table 1.5: Census tract level indices of residential segregation within selected metropolitan areas

	Dissimilarity		Isolation	
	2000	Change 1970- 2000	2000	Change 1970- 2000
Atlanta, GA				
4 + years college/High school graduate	.40	+.04	.43	+.18
Black/white	.64	-.16	.62	-.14
Below poverty/above poverty	.36	-.04	.18	-.06
Chicago, IL				
4 + years college/High school graduate	.40	+.04	.42	+.20
Black/white	.79	-.12	.72	-.14
Below poverty/above poverty	.43	+.01	.22	+.01
Houston, TX				
4 + years college/High school graduate	.45	+.16	.41	+.24
Black/white	.61	-.11	.45	-.14
Below poverty/above poverty	.35	-.01	.21	-.03
Huntington, WV				
4 + years college/High school graduate	.27	-.03	.20	+.07
Black/white	.58	-.20	.14	-.13
Below poverty/above poverty	.22	-.02	.21	-.03
Indianapolis, IN				
4 + years college/High school graduate	.42	+.07	.38	+.18
Black/white	.72	-.12	.53	-.17
Below poverty/above poverty	.37	+.01	.15	-.03
Las Vegas, NV				
4 + years college/High school graduate	.30	+.10	.22	+.09
Black/white	.41	-.45	.19	-.63
Below poverty/above poverty	.33	+.03	.17	+.03
Los Angeles, CA				
4 + years college/High school graduate	.39	+.06	.37	+.16
Black/white	.59	-.29	.29	-.43
Below poverty/above poverty	.35	+.03	.23	-.05
Memphis, TN				
4 + years college/High school graduate	.43	+.14	.36	+.19
Black/white	.68	-.11	.73	-.07
Below poverty/above poverty	.41	-.05	.26	-.11
Minneapolis, MN				
4 + years college/High school graduate	.36	+.05	.41	+.19
Black/white	.60	-.25	.22	-.19
Below poverty/above poverty	.41	+.04	.15	-.01
New York, NY				
4 + years college/High school graduate	.36	-.01	.42	+.19
Black/white	.74	+.01	.55	-.06
Below poverty/above poverty	.44	+.05	.25	+.02
Raleigh-Durham, NC				
4 + years college/High school graduate	.43	+.04	.49	+.16
Black/white	.44	-.16	.41	-.20
Below poverty/above poverty	.34	+.02	.16	-.11
San Francisco, CA				
4 + years college/High school graduate	.37	+.02	.47	+.20
Black/white	.61	-.16	.27	-.29
Below poverty/above poverty	.32	-.03	.14	-.04

Source: U.S. Census SF-3, 1970 and 2000.

Table 1.5 demonstrates, once again, the widespread nature of contemporary America's educational segregation trend. The index of dissimilarity points to rising educational segregation in 10 of the 12 metropolitan areas profiled in Table 1.5. The index of isolation for college graduates points to rising educational segregation in all 12 metropolitan areas. In the New York metropolitan area and the Huntington, WV metropolitan areas, educational segregation as measured by the dissimilarity index decreased slightly, even though college graduates became more residentially isolated. While educational segregation levels rose in metropolitan areas of all sorts, the increases were particularly pronounced in sun-belt cities such as Houston, Memphis, and Las Vegas.

By comparison, segregation between blacks and whites as measured by the index of dissimilarity fell in all but one of these metropolitan areas, and African-Americans were less residentially isolated in 2000 than in 1970 in all 12. The picture for economic segregation is relatively uneven: Segregation between the poor and the non-poor rose in 5 of the 12 metropolitan areas, and families living below poverty were more isolated in 4 of the 12 metropolitan areas.

CONCLUSION

This chapter demonstrates that the educational geography of mid-20th Century America – in which college graduates were few, but relatively evenly distributed across the nation's communities – has been replaced by a new, highly unequal, post-industrial educational geography. The analyses reported here confirm each of the three hypotheses regarding the implications of post-industrialization on the spatial distribution of human capital in the United States.

As the first hypothesis suggests, the American educational landscape became increasingly polarized during the last half of the 20th Century. Human capital has become increasingly concentrated in a handful of global cities; places specializing in management, commerce, and technological innovation. The expansion of higher education has meant that the proportion of the population holding a bachelor's degree or higher has risen in every corner of America. However, this growth is particularly pronounced in such nodal areas as New York City, Northern California, the beltway suburbs of the Washington, DC metropolitan area, and North Carolina's research triangle. The growing concentration of human capital in these post-industrial nodes has generated a trend toward educational segregation at the county level. Between 1940 and 2000, the index of dissimilarity measuring segregation between college graduates and high school graduates increased by nearly 250 percent at the county level, and the index of residential isolation for college graduates increased by more than 500 percent.

But as the second and third post-industrialization hypotheses suggest, educational segregation is also rising within metropolitan areas, particularly in the global cities in which the concentration of college graduates is most pronounced. In the nation's 100 most highly educated counties, the index of dissimilarity measuring educational segregation increased by .16; compared to a .02 increase in the nation's 100 least highly educated counties. Within these highly educated counties, college graduates are now more residentially isolated than African-Americans are. By analyzing residential segregation trends separately in a dozen different metropolitan

areas, I have demonstrated that this trend toward rising educational segregation is taking place in a wide variety of metropolitan areas across the United States.

According to a standard metric, segregation is thought to be low when dissimilarity indices are less than .30, moderate when they are between .30 and .60, and high when they are above .60 (Kantrowitz 1973). By this metric, educational segregation increased from low to moderate levels in metropolitan America between 1970 and 2000, and educational segregation levels are now in the moderate range in 11 of the 12 MSAs individually profiled.

The rise in educational segregation that occurred over the last half of the 20th Century is particularly striking since these trends are at odds with the trends in racial and economic segregation that occurred during the same period. The evidence presented in Tables 1.1-1.5 underscores the continuing social relevance of racial segregation. These tables demonstrate that residential patterns in most American communities are more sharply divided on racial lines than on class or educational lines. Nonetheless, recent developments in racial segregation have mostly been positive. While racial segregation levels are still unacceptably high in the United States, this chapter, like many others, demonstrates that it has begun to decline in recent decades.

Furthermore, this chapter shows that economic segregation has changed relatively little during the course of the late 20th Century. While this finding is at odds with Massey's "age of extremes" thesis, the analyses of economic segregation presented here are largely consistent with the analyses that Massey and others have conducted. Compared to the dramatic increase in educational segregation that I have

documented, recent changes in economic segregation are small. This divergence between the trajectory of educational, racial, and economic segregation suggests that these residential patterns are independent, and that increasing educational segregation is not simply an artifact of increasing racial or economic segregation. While the increase in residential segregation slowed during the 1990s, the analyses included in this chapter suggest that educational segregation was the leading segregation trend of the late 20th Century.

This chapter is only a starting point for the study of educational segregation. It is beyond the scope of this chapter to provide an exhaustive treatment of this phenomenon's sources or its consequences, which are undoubtedly wide-ranging. More research is needed to better understand why educational segregation has occurred, and to measure its consequences for the places and the people that it affects. A few likely implications stand out: Economic research suggests that a polarized educational geography will contribute to increasingly uneven patterns in economic development, as the concentration of human capital stimulates innovation and rapid economic growth in the places where the highly educated congregate. It is also possible that educational segregation will contribute to declining inter-generational mobility, as educational opportunities and resources cluster in the same places as the highly educated cluster. Furthermore, this trend toward educational segregation likely has a polarizing influence on American political culture, contributing to the sharp geographical disparities famously demonstrated in the red state/blue state maps of the 2000 and 2004 presidential electorate (Judis and Teixeira 2002). These themes will be developed in the chapters that follow.

Chapter 2:

Economics, amenities, and path dependency: Why college graduates cluster in some places and not in others

The educational segregation tables described in Chapter 1 may be news to many social scientists, but to the residents and natives of many communities on the losing end of these trends, they will come as no surprise. In much of the United States, brain drain has become a social concern and a political issue.

In Michigan and Oklahoma, brain drain worries have stimulated state-government efforts to increase the rates of college attendance among young adults and to improve college graduation rates (Burdman 2005; Irving 2005). But for most places facing brain drain, the problem is not that too few students are earning college degrees. In places like Iowa, Kansas, Montana, North Dakota, and West Virginia, the problem is holding on to young adults once they have completed their degrees. Each of these states has considered policy initiatives to slow the brain drain, including plans that offer tax breaks, college tuition remission, and low-interest home and business credit to young highly educated residents. In 2004, the Iowa state legislature debated a bill that would eliminate all state income taxes for residents under 30 years old. Several small towns in Kansas have begun offering free land in an attempt to entice settlers (Klinkenborg 2005; Ritter 2005). Many of these places were originally settled after the federal government began giving away land under the 1862 Homestead Act. In 2003, the New Homestead Act was introduced to the United States Senate, calling for a federal response to depopulation in American rural areas.

For the most part, these policy responses assume that educational segregation is an economic phenomenon, and an attempt to reverse brain drain trends by creating new economic incentives to counteract the attraction of human capital hubs. But this chapter will demonstrate that reversing educational segregation is not as simple as that: While college graduates clearly gravitate toward places where the economy is strong and growing, the factors underlying educational segregation are not solely economic. This chapter will show that amenities – both natural and cultural – also play an important role in attracting college graduates to communities. In addition, this chapter demonstrates that highly educated migrants – much like international immigrants – follow migration chains, moving to human capital hubs in part because these communities already have a large concentration of college graduates. Once started, therefore, educational segregation develops a self-sustaining momentum that is difficult to reverse.

The chapter will conclude with a first look at the wide-ranging implications of educational segregation, showing that the spatial concentration of human capital generates local economic growth. One of the reasons that college graduates cluster in certain communities is to take advantage of the economic opportunities that these human capital hubs offer. In this sense, economic inequality between places is a cause of educational segregation. But it is also a consequence: As this chapter will demonstrate, when large numbers of highly educated people congregate, they create new economic opportunities. Brain gain communities enjoy robust economic growth, while brain drain communities experience economic stagnation.

PART I: A PROFILE OF AMERICAN EDUCATIONAL SEGREGATION

Where do college graduates live?

As educational segregation has deepened over the past half century, a growing chasm has emerged between the places in which college graduates concentrate and the places they leave behind. Table 2.1 lists the 20 American counties that have the highest concentration of college graduates. An examination of this list reveals that the counties at the highest level of America's segregated educational landscape are a diverse group. America's most highly educated counties are scattered throughout the United States. While the East Coast is overrepresented on this list, every region has its human capital hubs. While the South has fewer college graduates per capita than the rest of the country, the region is home to two of the nation's most highly educated counties: Orange County, NC and Albemarle County, VA.

Most of America's most highly educated counties lie on the suburban fringes of large metropolitan areas. Indeed 6 of America's 10 most highly educated counties are Maryland and Virginia counties within commuting distance of Washington, DC. Like the Washington suburbs, many highly educated counties border cities that have much lower educational profiles. Nearly half of the adult residents of the Kansas City suburb of Johnson County, Kansas have college degrees, but across Stateline Road, in Kansas City, Missouri, just 23.4% of adults are college educated. Similarly, the

concentration of college graduates in suburban Hamilton County, Indiana is twice that in neighboring Marion County, which includes downtown Indianapolis.

Table 2.1: America's 20 most highly educated counties
BA-holders as a proportion of total population

	% BA or higher	Total population	1990- 2000 change % BA+	Metro?
1. Falls Church, VA	63.7	10,377	+11%	Yes
2. Los Alamos County, NM	60.5	18,343	+7%	Yes
3. Arlington County, VA	60.2	189,453	+8%	Yes
4. Pitkin County, CO	57.1	14,872	+7%	No
5. Fairfax County, VA	54.8	969,749	+6%	Yes
6. Montgomery County, MD	54.6	873,341	+5%	Yes
7. Alexandria, VA	54.3	128,283	+5%	Yes
8. Howard County, MD	52.9	247,842	+6%	Yes
9. Boulder County, CO	52.4	291,288	+10%	Yes
10. Douglas County, CO	51.9	175,766	+11%	Yes
11. Orange County, NC	51.5	118,227	+5%	Yes
12. Marin County, CA	51.3	247,289	+7%	Yes
13. New York County, NY	49.4	1,537,195	+7%	Yes
14. Hamilton County, IN	48.9	182,740	+13%	Yes
15. San Miguel County, CO	48.5	6,594	+8%	No
16. Summit County, CO	48.3	23,548	+8%	No
17. Washtenaw County, MI	48.1	322,895	+6%	Yes
18. Johnson County, KS	47.7	451,086	+8%	Yes
19. Albemarle County, VA	47.7	79,236	+9%	Yes
20. Johnson County, IA	47.6	111,006	+4%	Yes

Source: Author's analyses of 2000 Census Summary File 3

Other highly educated counties house land grant research universities. The University of Colorado is located in Boulder County; the University of North Carolina is in Orange County; the University of Michigan is in Washtenaw County; the University of Virginia is in Albemarle County; and the University of Iowa is in Johnson County. While no university campus is located in Los Alamos, New Mexico, this county bears a resemblance to these college communities, since it is the home of the United States National Laboratories.

Three of the nation's most highly educated counties are outside of metropolitan areas. But these highly educated nonmetropolitan counties are by no

means typical of rural America. All three are resort communities located in Colorado's Rocky Mountains. Pitkin County, Colorado is home to the Aspen ski resort, Telluride is located in San Miguel County and Breckenridge is located in Summit County.

Just one of America's most highly educated counties is located at the center of a large metropolitan area. New York, New York is, by far, the largest of America's most highly educated counties with a population of 1.5 million. This county is also the site of striking educational inequality. While 49.4% of Manhattan residents have a college degree; across the Harlem River in the Bronx, that proportion is just 14.6%.

The list of America's most highly educated counties is remarkable in its diversity. By contrast, the 20 American counties listed in Table 2.2 that have the lowest concentration of college graduates have a great deal in common with one another. Most of America's least highly educated counties are located in the rural South. Seventeen of these 20 counties are south of the Mason-Dixon line, and another is nearby – rural Vinton County is located in the Appalachian highlands of southern Ohio. The two remaining non-Southern counties are extremely remote. Buffalo County is a thinly populated county in the middle of South Dakota, approximately 100 miles from the state capital, Pierre. And Alaska's Aleutians East Borough is a narrow band of peninsula and islands off of Alaska's southwestern tip, separating the Pacific Ocean from the Bering Sea. The county's 2,700 residents are scattered over 15,000 square miles. Eighteen of America's 20 least highly educated counties are located outside of a metropolitan area, and the remaining two metropolitan counties

Table 2.2: America's 20 least highly educated counties
BA-holders as a proportion of total population

	% BA or higher	Total population	1990- 2000 change % BA+	Metro?
1. Aleutians East Borough, AK	4.9	2697	-.08	No
2. Edmonson County, KY	4.9	11644	.00	No
3. Buffalo County, SD	5.4	2032	.01	No
4. Lake County, TN	5.4	7954	.00	No
5. Twiggs County, GA	5.4	10590	.00	Yes
6. Newton County, TX	5.5	15072	.00	No
7. Macon County, TN	5.6	20386	.01	No
8. McDowell County, WV	5.6	27329	.01	No
9. Union County, TN	5.8	17808	.02	Yes
10. Long County, GA	5.8	10304	.01	No
11. Lincoln County, WV	5.9	22108	.01	No
12. Loving County, TX	5.9	67	.02	No
13. Morgan County, TN	6.0	19757	.02	No
14. Vinton County, OH	6.0	12806	.01	No
15. Quitman County, GA	6.1	2598	-.01	No
16. Cocke County, TN	6.2	33565	.00	No
17. Brantley County, GA	6.2	14629	.00	No
18. Lee County, KY	6.3	7916	.00	No
19. Benton County, TN	6.3	16537	-.01	No
20. Poinsett County, AR	6.3	25614	.00	No

Source: Author's analyses of 2000 Census Summary File 3

are located at the suburban fringes of small Southern cities – Twiggs County is near Macon, Georgia and Union County is near Knoxville, Tennessee.

The graphs in Figure 2.1 further explore the differences between highly educated counties and less educated counties. These graphs place American counties into five categories based on the size of their college-educated populations. These categories are designed to draw attention to the large number of outlier counties – counties with either uncommonly large or uncommonly small concentrations of college graduates. The bottom category includes the approximately 150 counties that make up the bottom 5 percent of the American educational distribution. In these

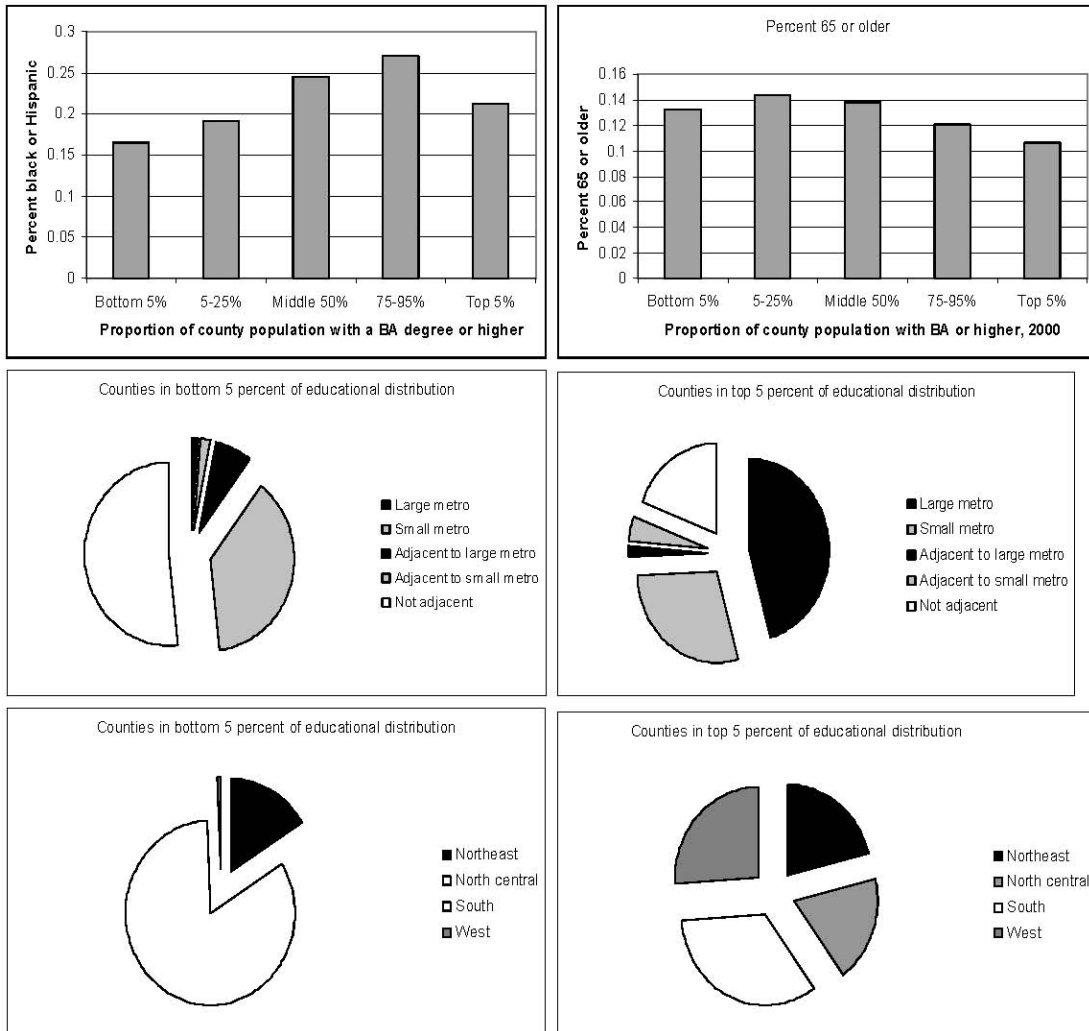
counties, less than 8.3 percent of the population has a bachelor's degree or higher. The second category includes counties whose college graduate population is between the 5th percentile and the 25th percentile. The third category includes the great middle of American counties – counties whose educational composition places them between the 25th percentile and the 75th percentile. The fourth category stretches from the 75th percentile to the 95th percentile. And the fifth category includes only the very most highly educated counties in the United States – counties whose concentration of college graduates places them among the top 5 percent of American counties. To make it into this category, college graduates must make up more than 32.4 percent of the adult population. In this bell-shaped categorization scheme, most communities are in the middle category and communities in the top and bottom categories are fairly extreme cases.

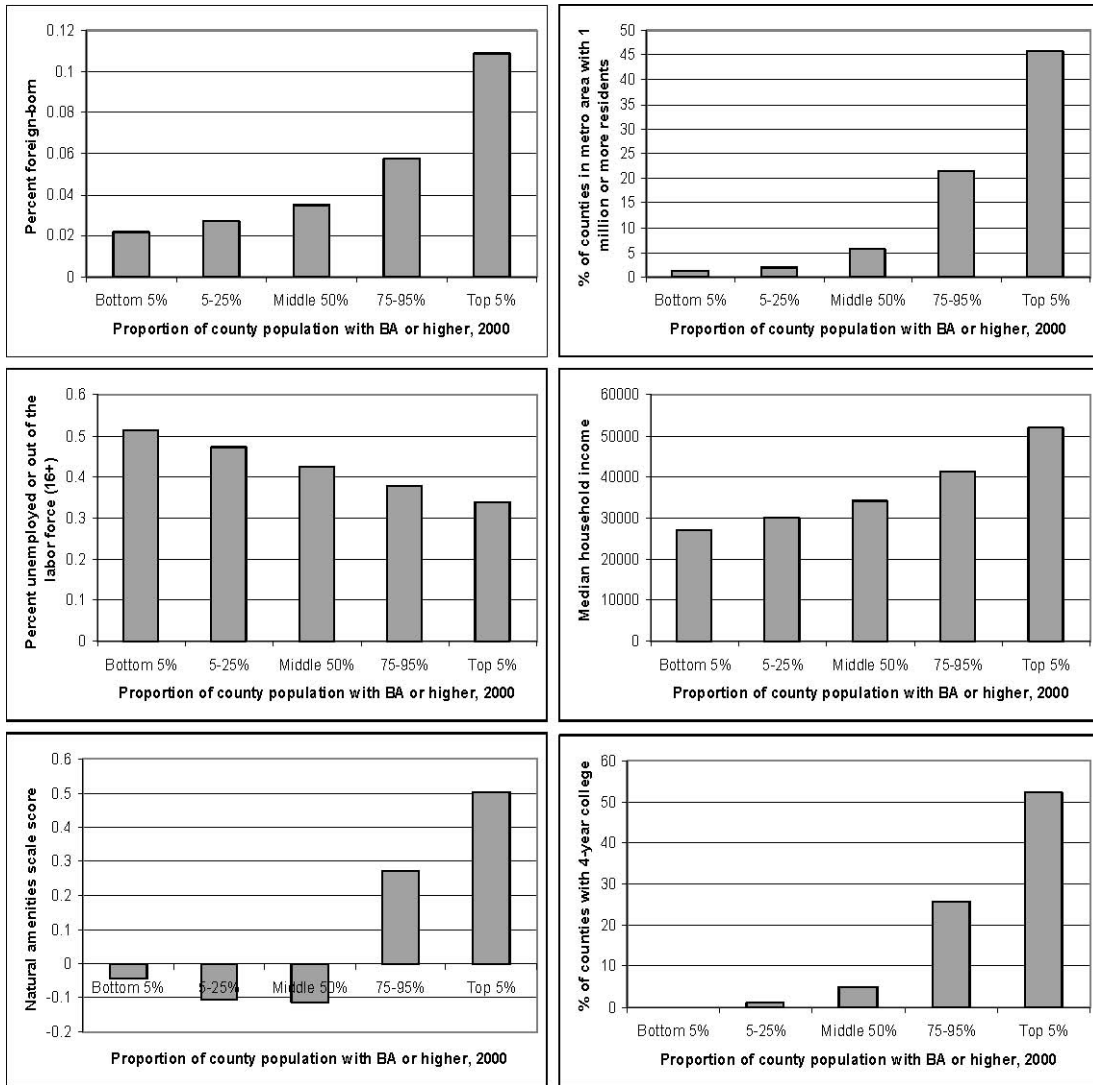
The first two of these graphs point to areas where the differences between highly educated counties and less educated counties are not pronounced. While places with large college graduate populations tend to also have relatively large concentrations of African-Americans and Hispanics, this relationship is weak, and it falls apart at the upper end of the educational distribution. Minority populations are surprisingly small in the most highly educated counties. Likewise, the relationship between county educational concentration and age composition is weak and nonlinear. Nonetheless, highly educated counties have relatively small old-aged populations overall.

The rest of the graphs on this page show differences between highly educated counties and less educated counties that are more pronounced. The pie graphs

confirm the impressions left by comparing the top 20 educated counties with the bottom 20. Counties in the top 5 percent of the American educational distribution are disproportionately metropolitan, but are scattered fairly evenly across the United States. By contrast, counties that have small concentrations of college graduates tend to be in remote nonmetropolitan areas, particularly in the South.

Figure 2.1: How do counties with large BA populations compare to less educated communities?





Source: Author's analyses of 2000 Census Summary File 3

Immigrants are clustered overwhelmingly in counties with large college graduate populations, and this relationship is particularly pronounced at the high end of the educational distribution. In large part, this may be because counties with high concentrations of college graduates are overwhelmingly metropolitan. Half of the counties with high concentrations of college graduates are located in large metropolitan areas with more than 1 million residents.

The economic picture in highly educated counties is much brighter than the picture in counties with lower concentrations of college graduates. In America's least educated counties, more than half of the adult population is unemployed or out of the labor market.⁸ In the nation's most educated counties, 34 percent of the adult population is not working. Furthermore, the median household income in America's most highly educated counties is nearly twice the median household income in the nation's least highly educated counties. While the modal family in a low human capital county earns just \$27,000 a year, the modal family in a high human capital county earns \$52,000. As the multivariate models at the end of this chapter will demonstrate, this economic inequality is both a cause and an effect of educational segregation.

Finally, the last row of graphs in Figure 2.1 looks at the association between amenities and educational concentration. College graduates seem to be drawn to natural amenities. America's most highly educated counties have much higher scores on the natural amenities scale, which was created by the U.S. Department of Agriculture and includes information about the average temperature, days of sunshine, as well as access to mountains, lakes, oceans, rivers, and other natural attractions (McGranahan 1999). In addition to clustering in places that are rich in natural amenities, college graduates congregate overwhelmingly in places that have 4-year colleges.

⁸ The measure used here is labor force nonparticipation. Unlike the traditional unemployment rate, which includes only workers and people actively looking for work, this measure considers the employment status of all people aged 18-65, regardless of whether or not they are looking for work. Nonparticipation rates are typically higher than unemployment rates, but they arguably measure joblessness levels more accurately.

Where are college graduates going?

College graduates tend to flow out of communities with few college graduates and into communities that already have relatively high educational concentrations. Even as the proportion of college graduates in the entire U.S. population increased by 4.1% between 1990 and 2000, three of America's least highly educated counties experienced net brain drain. This brain drain was particularly pronounced in Alaska's Aleutians East Borough, where the proportion of the population with college degrees declined from 13 percent in 1990 to less than 5 percent in 2000. The rest of America's least highly educated counties experienced very slow growth in their college graduate populations, and none of America's 20 least educated counties came close to meeting the national BA population growth rate. By contrast, all of the nation's most highly educated counties at least matched the national BA growth rate, and many counties experienced much more rapid rates of brain gain. In fact, nine of the 20 highly educated counties doubled the national college graduate growth rate; and three of these counties (Hamilton County, Indiana; Falls Church, Virginia; and Douglas County, Colorado) nearly tripled the national college graduate growth rate.

Tables 2.3 and 2.4 suggest that educational segregation is on the rise in America because the concentration of college graduates in the nation's counties that are already highly educated is growing at a rate that less educated counties cannot match. A more systematic look at the 1990 and 2000 U.S. Census data confirms that impression. The proportion of county residents with college degrees in 1990 correlates significantly with growth in educational composition between 1990 and

2000 at .500.⁹ This highly statistically significant Pearson correlation suggests that county college population in 1990 accounts for half of the between-county variation in 1990-2000 college graduate growth rates.

Table 2.3: 20 fastest brain gain counties:
BA-holders as a proportion of total population 1990-2000

	1990- 2000 change % BA+	% BA or higher	Total population	Metro?
San Juan County, CO	+20%	43.7	558	No
Forsyth County, GA	+19%	34.6	98,407	Yes
Teton County, WY	+16%	45.8	18,251	No
Delaware County, OH	+15%	41.0	109,989	Yes
Loudoun County, VA	+14%	47.2	169,599	Yes
Carver County, MN	+13%	34.3	70,205	Yes
McPherson County, NE	+13%	22.2	533	No
Mineral County, CO	+13%	31.2	831	No
Hamilton County, IN	+13%	48.9	182,740	Yes
Summit County, UT	+13%	45.5	29,736	No
Scott County, MN	+12%	29.4	89,498	Yes
Manassas Park, VA	+12%	20.3	10,290	Yes
Kenedy County, TX	+12%	20.3	414	No
Union County, SD	+12%	26.3	12,584	No
Oconee County, GA	+12%	39.8	26,225	Yes
Kendall County, TX	+11%	31.4	23,743	No
Teton County, ID	+11%	28.1	5,999	No
Douglas County, CO	+11%	51.9	175,766	Yes
Dallas County, IA	+11%	26.8	40,750	Yes
Falls Church city, VA	+11%	63.7	10,377	Yes

Source: Author's analyses of 1990 and 2000 Census Summary File 3

However, the relationship between absolute levels of college graduate concentration and graduate growth rates should not be overstated. The .500 correlation between county educational composition and county educational growth implies that this association, while strong, is far from ironclad. Table 3 lists the 20 U.S. counties that experienced the most rapid brain gain between 1990 and 2000. It

⁹ 1990 and 2000 Census SF-3 county files, weighted by normative 2000 county population weight.

suggests that many places that attracted college-educated population growth during the 1990s are places that had large human capital concentrations at the beginning of the decade. Three of the brain gain counties in Table 2.3 appeared in the list of the most highly educated counties in Table 2.1.

But not *all* of the counties that experienced rapid brain gain between 1990 and 2000 had large college graduate populations to begin with. Ten of the counties that experienced rapid brain gain during this period were counties in which college graduate populations were underrepresented compared to the national average in 1990. In particular, Nebraska's McPherson County, Virginia's Manassas Park and Kenedy County in Texas are all places that experienced rapid brain gain during the 1990s, despite having very low concentrations of college graduates in 1990. No single impetus explains the educational concentration in these three outlier counties: During the 1990s Manassas Park, Virginia, which is situated less than 50 miles from downtown Washington, DC, experienced rapid suburbanization. In the remote south-Texas Kenedy County, new oil discoveries seem to have attracted a small surge in highly-educated migration.

While a few counties with relatively low educational concentration enjoyed growing college graduate populations during the 1990s, no counties with a large concentration of college graduates experienced brain drain. Table 2.4 shows the 20 U.S. counties that experienced the most rapid brain drain during the 1990s. All of the brain drain counties listed in Table 4 had far fewer college graduates than the national average in 1990.

Table 2.4: 20 fastest brain drain counties:
BA-holders as a proportion of total population 1990-2000

	1990- 2000 change % BA+	% BA or higher	Total population	Metro?
1. Aleutians East Bo, AK	-.08	4.9	2,697	No
2. Sutton County, TX	-.07	13.0	4,077	No
3. Gilliam County, OR	-.06	13.4	1,915	No
4. Crockett County, TX	-.05	10.4	4,099	No
5. La Salle County, TX	-.05	6.4	5,866	No
6. Aleutians West Ce, AK	-.04	11.0	5,465	No
7. Powell County, MT	-.04	13.1	7,180	No
8. Blaine County, NE	-.04	12.3	583	No
9. Wrangell-Petersbu, AK	-.04	16.3	6,684	No
10. Moffat County, CO	-.04	12.5	13,184	No
11. Bent County, CO	-.04	11.5	5,998	No
12. Jones County, TX	-.03	8.2	20,785	No
13. Carroll County, KY	-.03	8.3	10,155	No
14. Dickens County, TX	-.03	8.4	2,762	No
15. Logan County, NE	-.03	10.5	774	No
16. Hartley County, TX	-.02	17.6	5,537	No
17. Owsley County, KY	-.02	7.7	4,858	No
18. Bullock County, AL	-.02	7.7	11,714	No
19. Kodiak Island, AK	-.02	18.7	13,913	No
20. Harney County, OR	-.02	11.9	7,609	No

Source: Author's analyses of 1990 and 2000 Census Summary File 3

PART II: WHY DO COLLEGE GRADUATES CLUSTER WHERE THEY DO?

Path dependence is clearly a major factor in determining which communities experience brain drain and which experience brain gain. As we will see, college graduates tend to flee places that are poor in human capital and flock in places that are rich in human capital. But this correlation is far from perfect and an awareness of the path dependence of educational concentration is no substitute for a theory of brain drain and brain gain. Why do some places attract college graduates while others do not? The correlation between educational composition and change in educational

composition is likely spurious, at least in part, since the same factors that attracted college graduates to communities prior to the 1990s likely continue to attract them today. To understand what drives educational segregation, we must identify these factors and separate out their influence from that of prior educational concentration. This chapter will attempt to do so, using multivariate modeling techniques and county level data from the U. S. Census Survey File 3.

A review of the literature on educationally selective migration patterns and regional and metropolitan growth patterns suggests several hypotheses for understanding which communities experience brain gain and which experience brain drain.

Human capital theory conceptualizes migration decisions as attempts by individual rational actors to maximize the returns on their human capital investments. Sjaastad (1962) was among the first to conceptualize migration in terms of human capital, arguing that individuals will migrate only if they expect their lifetime earnings at the destination to exceed their lifetime earnings at the place of origin. Sjaastad's work implies that the migration behavior of individuals within places is dependent on their social and economic characteristics. The human capital perspective suggests that younger workers are more likely to migrate than older workers, since they have more time in their careers to recoup the costs associated with moving. Furthermore, human capital theory suggests that the migration behavior of highly educated workers will be more sensitive to income variations between places. This theory suggests, therefore, that highly educated workers tend to migrate relatively frequently, and that their migration paths will generally lead from places

where income and the returns to education are low toward places where they are higher.

A large body of empirical research supports human capital theory, particularly in cases when migration decisions are motivated by opportunities at the place of destination, rather than hardships at the place of origin (Kodrzycki 2001; Borjas, Bronars, and Trejo 1990; Long 1988; Ritchey 1976; Bowles 1970; Blau and Duncan 1967). Todaro (1980) synthesizes this research, saying that “migrants typically do not represent a random sample of the overall population. On the contrary, migrants tend to be disproportionately young, better educated, less risk-averse, and more achievement-oriented and to have better personal contacts in destination areas than the general population in the region of out-migration.” A recent study comparing the educational profiles of American immigrant groups with that of non-migrants in their home countries confirms this assessment, demonstrating that nearly all immigrants to the United States are more highly educated than those who stay behind (Feliciano 2005).

In the context of educational segregation, human capital theory implies the following hypothesis:

H1: Educational growth rates are highest in counties with high mean incomes, low unemployment rates, and high returns to human capital.

While the human capital perspective continues to be influential, several recent researchers have argued that cultural differences, rather than economic gaps, explain why some places are more attractive to highly educated workers than others.

Richard Florida (2002a, 2002b) amends human capital theory, arguing that in their effort to maximize returns to human capital, highly educated workers look for labor markets where not only are the returns to human capital relatively high, but the barriers to entry for human capital are relatively low. Florida's argument is that these workers prefer to live and work in places where diversity is tolerated and individuality is encouraged, since these labor markets are uniquely meritocratic. As a result, Florida expects the highly educated to gravitate toward diverse and socially liberal communities; places where artists and nonconformists are comfortable and a "live and let live" attitude prevails. Florida operationalizes these cultural characteristics in his research by examining the relationship between the size of communities' gay and lesbian populations and several economic variables. He demonstrates, for example, that high tech companies tend to locate in places with large gay and lesbian populations and that these communities have relatively high per capita income levels and median home prices. While he does not directly test the relationship between diversity and educational concentration, Florida's theory suggests the following hypothesis:

H2: Highly educated population growth rates are highest in socially diverse counties, where the gay and lesbian population, as a proportion of the total population, is relatively high.

Other researchers in the "creative cities" literature distance themselves further from the human capital perspective, arguing that the forces pulling college graduates into brain gain communities are purely non-economic. Richard Lloyd and Terry

Nichols Clark (2001) describe the postindustrial city as an “entertainment machine”. Like the postindustrial theorists encountered in Chapter 1, Lloyd and Clark argue that knowledge industries have recently replaced location-specific productive and extractive industries at the core of American economic life. They maintain that one of the implications of this postindustrial transition is that business locations have become less dependent on proximity to physical supply chains, and more dependent on the proximity to human capital. In other words, in the contemporary economy, economic opportunities follow highly educated workers, rather than the other way around. Freed from economic constraints, highly educated workers flock to places where natural and cultural amenities are plentiful and the quality of life is high, according to these theorists. The empirical base behind these claims is somewhat uncertain. Contrary to his theory, Clark (2003) demonstrates that economic factors predicted county-level college graduate population growth in the 1980s. Rogers (2004), on the other hand, demonstrates that non-economic factors were important in the 1990s, when places with rich literary scenes experienced rapid growth in their highly educated populations. This work suggests a third hypothesis to explain why some places experience brain gain and others experience brain drain:

H3: Counties with high levels of natural or cultural amenities should experience relatively rapid college graduate population growth rates.

Each of these three hypotheses implies that the strong association between initial county educational composition and change in educational composition is spurious. College graduates may flock to places that already have high concentrations

of college graduates, but these theories suggest that counties with relatively low human capital concentrations can attract large numbers of highly educated migrants as well. While the mechanisms vary, these three theories suggest that after controlling for the appropriate covariates the observed association between community-level educational composition and educational change should disappear, or at least be substantially reduced.

But a fourth theory suggests that educational concentration is, itself, an important factor underlying a community's chances of experiencing college graduate population growth. Sociologists of immigration speak of "cumulative causation" and "migration chains", arguing that when migrants move from one place to another, they establish social network ties and structural links which make it easier for other migrants to follow (c.f. Brown 2002; Massey 1987; Portes 1995). This concept is an example of path dependence, since it suggests that past migration behavior is an independent determinant of future migration trends. Cumulative causation suggests that brain gain and brain drain migration trends are self-sustaining, since highly educated potential migrants are more likely to have social ties to places that already have large college graduate populations. These social ties reduce the costs and risks associated with migration, and through these social ties, places that have high concentrations of human capital attract even higher human capital concentrations over time. Put simply, cumulative causation suggests the following hypothesis:

H4: A community's prior educational composition is an independent predictor of future brain drain or brain gain.

These four hypotheses are not mutually exclusive, but they suggest four very different interpretations of the process underlying the educational segregation trends outlined in Chapter 1.

Data and Methods

By isolating the community characteristics that differentiate places that experienced brain gain during the 1990s from those that experienced brain drain, this chapter aims to shed light on the social dynamics that are driving educational segregation. In the analysis that follows, I use the same Census SF-3 county-level data that I drew upon in Chapter 1 and in the descriptive statistics earlier in this chapter. Unlike the earlier analyses in this chapter, however, I have used a normative population weight in these analyses.¹⁰ While this population weight does not affect the number of cases included in the analysis for purposes of significance testing, counties with large populations carry more influence in these models than counties with small populations, and issues of heteroskedasticity are thereby averted.

In these models, the dependent variable represents the change that occurred between 1990 and 2000 in the proportion of adult county residents with a BA degree or higher, with values ranging from -8 to $+20$. This analysis includes data from the 3,137 counties that had nonmissing data for educational composition in both 1990 and 2000. Four cases are excluded from analysis because their reported value for percent BA or higher in the 1990 or 2000 Census SF-3 file was either missing or out of range.

¹⁰ For any given county, the normative population weight equals the population size of the county divided by the mean population size for all counties.

These 3,137 cases violate the assumptions of OLS regression in an important way: Since they represent all of the counties in the United States, they are not truly independent of one another. Instead, spatial autocorrelation is likely. Counties that border one another are likely to be similar in many ways, since they are located in the same labor markets and may share political structures. One-way analysis of variance reveals, for example, there is a highly significant intraclass correlation of .43 in educational growth rates within metropolitan areas and among nonmetropolitan areas, within states. To address autocorrelation, I use the “areg” command in the STATA software package. This hierarchical regression technique adds a dummy variable representing the metropolitan area in which each metropolitan county is located and the state in which each nonmetropolitan county is located. In effect, this technique executes fixed effects models, separating the effect of variation between metropolitan areas and states from the reported effect of within metropolitan area and within state variation (STATA 2001). The reported results, therefore, control for unmeasured spatial correlation in addition to controlling for the measured, and reported, independent variables.

These hierarchical regression models proceed in three steps. The first step measures the effect of prior educational concentration on county educational growth rates without any controls. The second model adds controls for several basic demographic and economic factors that may influence growth patterns. The demographic controls include: Percent of 1990 county residents black or Hispanic, percent 65 years of age or older, percent of foreign-born and percent of households with children headed by a single mother. This model controls for county urbanicity

with a series of urban influenced dummy variables. The measured categories in this series are large cities (1990 metropolitan area population greater than 1 million); small cities (between 50,000 and 1 million in 1990); nonmetropolitan counties that are not adjacent to a metropolitan area but include a large town; and “frontier” nonmetropolitan counties, which are not adjacent to a metropolitan area and have no town with 10,000 or more residents. The reference category includes nonmetropolitan counties that are located near metropolitan areas. In addition, a control for county 1994-2000 per capita violent crime rates is included in the model.

As well as controlling for these potentially important background factors, the independent variables included in the first linear regression model were designed to test human capital theory of economic concentration (H1). Two predictors measure the influence of economic factors on highly educated population growth rates, and test the human capital theory: Logged mean county income in 1990 and the 1980 Gini coefficient. These measures point to two different ways in which economic factors may influence educational concentration patterns. If counties with high mean incomes experience rapid college graduate population growth, then county educational concentration can be said to respond to overall economic conditions. High income inequality, as measured by the Gini coefficient, points to a different economic mechanism. Labor markets with high earnings inequality tend to be places where the returns to human capital are particularly pronounced (Borjas, Bronars, and Trejo 1990).¹¹ Therefore, if county Gini coefficients predict BA population growth, a more

¹¹ Gini coefficients are not available in the 1990 Census SF-3 county file. As a result, 1980 values are used here. While county-level income inequality measures are fairly stable from decade to decade, the need to use older inequality data undoubtedly introduces some measurement error to the model. As a

focused human capital effect is likely taking place, in which the locational decisions of the highly educated respond to the returns to human capital, rather than overall economic conditions.

The third model includes controls designed to test newer theories of educational population change, which argue that the cultural characteristics of places, rather than economic opportunities, generate highly educated population growth. Following Florida, the proportion of county households that were gay or lesbian in 1990 is used as a proxy for the diversity and social liberalism of the labor market. If Florida's culturalist interpretation of human capital theory is correct, college graduates will tend to flock toward places where gays and lesbians make up a relatively large proportion of the population, expecting to find meritocratic labor markets where the barriers to entry for human capital are low.

In addition, three measures added to the third model assess the effect of amenities on county educational composition change. First, the U.S. Department of Agriculture's natural amenities scale measures the extent to which desirable weather and natural attractions such as lakes, rivers, and mountains attract college graduates to brain gain counties. Second, a per-person amenity count measures the availability of constructed and cultural amenities. This variable uses data collected by Terry Lewis Clark and his urban amenities project in the late 1990s (Clark 2003) and it focuses on the types of amenities that are, according to research by Clark and others, most attractive to the highly educated. It was calculated by adding the total number of bookstores, microbreweries, coffee shops, public and institutional libraries, 4-year

result of this measurement error, it is likely that the result reported here understate the relationship between income inequality and county educational profile change.

colleges and universities, wine bars, theatres, juice bars, bicycle events, and museums. Finally, a dummy variable indicating whether or not a four-year college or university is located in the county is included in the analysis.

If the measure of initial educational attainment, which measures the proportion of county residents aged 25 and older who had completed a BA degree or higher in 1990, continues to predict educational population growth rates over and above these other predictors, then educational concentration patterns can be said to be truly path dependent. Cumulative causation is difficult to prove. It is likely that the factors that once encouraged college graduates to cluster in some places rather than others will continue to predict the locational patterns of the highly educated in the future. The covariates included in this model attempt to address this potential bias. In addition, the modeling technique, which absorbs counties into neighboring groups by adding a dummy variable for each metropolitan area or for the state of each nonmetropolitan county controls for more unmeasured covariation. Nonetheless, unmeasured variable bias may continue to inflate the observed relationship between the proportion of county residents with college degrees in 1990 and educational composition change between 1990 and 2000. But if the fully-specified hierarchical regression model returns a strong and significant association between initial educational composition and educational change, it provides evidence to support the notion of “cumulative causation” advocated by Massey and others.

Findings

There are many reasons why college graduates tend to leave places that have low educational concentrations and gather in places where the proportion of college

graduates is already high. As noted before, places with high concentrations of college graduates tend to be economically advantaged. They are often located in large, vibrant metropolitan areas and their populations tend to be relatively diverse and cosmopolitan. Furthermore, places where college graduates predominate are often rich in natural and constructed amenities. The regression coefficients reported in Table 2.5 suggest that college graduates find many of these community characteristics to be appealing. Nevertheless, these regressions suggest that cumulative causation also occurs in educational concentration patterns – even after controlling for county demographic, economic, and cultural characteristics, as well as the availability of cultural and natural amenities, college graduate populations tend to grow particularly quickly in counties that already have large proportions of college graduates.

This three-staged hierarchical regression analysis provides a multivariate look at the factors that predicted brain gain between 1990 and 2000. Model 1 suggests that the BA population growth rate for counties that are 1 standard deviation apart on their 1990 educational concentration diverged by approximately .4 standard deviations over the course of the 1990s.

Model 2 suggests that about half of this observed association between initial educational composition and county college-educated population growth is spurious. In this model, the leading predictor of county BA population growth is mean income. College graduates gravitate toward places where mean incomes are relatively high, while places with low mean incomes have dwindling college-educated populations. In addition, county income inequality is a significant and positive predictor of highly

educated population growth. This finding suggests that college graduates cluster in places where the returns to higher education are high. These associations lend support

Table 2.5: Predictors of county population with a BA or higher, 2000.
 Linear regression coefficients, including fixed effects absorbing labor market area
 (standardized coefficients in parentheses)

	Model 1	Model 2	Model 3
	Coefficient	Coefficient	Coefficient
Percent BA or higher	.13206*** (.38745)	.0754*** (.22121)	.05801*** (.17021)
Percent black or Hispanic	--	-.01852*** (-.14048)	-.01107* (-.08396)
Percent foreign-born	--	.0319*** (.05096)	.03061*** (.0489)
Percent households female-headed	--	-.01382 (-.03853)	-.02645** (-.07374)
Mean income (natural log)	--	3.1806*** (.30803)	3.0485*** (.29524)
Gini coefficient (1980)	--	.15966*** (.15577)	.12521*** (.12216)
Percent 65 or older	--	.03134** (.06228)	.0125 (.02484)
Per capita murder rate (1994-2000)	--	-.99346 (-.0227)	-.58837 (-.01345)
Metro area, 1 million +	--	1.0487*** (.13961)	1.2176*** (.16209)
Metro area, less than 1 million	--	.21004 (.03498)	.36707* (.06113)
Remote nonmetro area, with small city	--	-.03929 (-.00461)	.02649 (.0031)
Remote nonmetro area, no small city	--	.24959 (.05276)	.1296 (.0274)
Percent of households gay or lesbian	--	--	.48355 (.03407)
Natural amenities	--	--	.1208*** (.12287)
Constructed amenities per 1,000 persons	--	--	3.0437*** (.29323)
Has 4-year college	--	--	-.24084** (-.03301)
Constant	1.2877***	-45.999***	-41.638***
R-square	.5545	.5982	.6126

Source: Author's analyses of 1990 and 2000 Census SF-3 county data

to the traditional economic perspective on human capital concentration, suggesting that economic attractions pull the highly educated into human capital hubs.

In addition, Model 2 demonstrates that county demographic characteristics also influence county-level change in college graduate populations. Counties with higher minority populations attracted fewer college graduates during the 1990s, while the concentration of college graduates grew in counties with larger immigrant populations. In addition, counties in large metropolitan areas drew college graduates at a rate that significantly outpaced nonmetropolitan communities.

Nonetheless, this hierarchical regression model demonstrates that even after controlling for economic and demographic factors, counties where the college-educated population were large to begin with continue to experience relatively rapid college-educated growth rates. Controlling for these factors reduces the association between initial educational concentration and educational population change by nearly one-half, but initial educational concentration remains a large and highly significant predictor of county college graduate growth rates. Indeed, of all the factors included in this model, 1990 percent college-educated (?) is the second most important predictor of highly-educated population change, after county mean income.

The third model confirms that the association between initial educational concentration and college-graduate population growth remains significant even after controlling for non-economic lures such as social diversity and tolerance (as measured by percent gay and lesbian), natural amenities, constructed amenities, and the presence of colleges and universities. In this fully-specified model, economic opportunities remain the most important predictor of BA population growth, a finding

that lends support to the human capital view of population growth. During the course of the 1990s, college graduates became increasingly clustered in counties where mean incomes were relatively high. Lending further support to the human capital view, the association between earnings inequality and county college graduate population growth revealed in Model 2 remains significant even after controlling for amenities in Model 3.

However, this model suggests that economic factors are not the only factors that pull college graduates into some counties and push them out of others. The constructed amenities scale was a highly significant predictor of growing educational concentration during the 1990s, with college graduates increasingly clustering in places that were rich in constructed amenities. While the association between natural amenities and college graduate population growth was less strong, it too was statistically significant in this model. However, not all of the non-economic factors included in this model predicted BA population concentration: The association between the 1990 county gay and lesbian population size and the 1990-2000 change in BA population was small and statistically insignificant in this hierarchical regression model. This finding undermines Florida's "creative class" theory, which treats the gay and lesbian population as a proxy for the diversity and social liberalism of a county, and argues that these cultural characteristics attract highly educated workers because they signal a meritocratic labor market. However, it seems likely that gay and lesbian population size is an imperfect proxy for the cultural attitudes that Florida links to "creative class" accumulation.

Why, then, do college graduates cluster in some places rather than others? The findings presented in this chapter suggest that no one factor single-handedly explains recent patterns in the concentration of college graduates. Economic factors are the single most important predictor of county-level BA population gain, but cultural factors and natural amenities also matter. In sum, there are several different kinds of human capital hubs, and multiple paths to community brain gain.

PART III: WHAT ARE THE IMPLICATIONS OF EDUCATIONAL SEGREGATION FOR ECONOMIC GROWTH?

Economically, the concentration of human capital is a self-fulfilling prophecy. As my previous analyses have demonstrated, college graduates cluster in certain communities in part to take advantage of specialized economic opportunities. In the process, they also create new economic opportunities. Previous economic research has clearly demonstrated that the agglomeration of human capital leads to new innovations, increased productivity, and ultimately, economic growth (Florida 2002a; Glaeser 1994). Looking at trends in economic growth in American cities, Glaeser and Shapiro (2001) show that “skilled communities rise – unskilled communities fall. This has been true in every time period going back to the late 19th century. In fact, the relationship between growth and human capital was stronger between 1970 and 1990 than between 1950 and 1970.”

Economists attribute the association between community educational composition and economic growth to two sources: At the most basic level, human capital creates wealth by improving the productivity of individual workers. But above and beyond the role that human capital plays in predicting individual economic success, economists argue that “intellectual spillovers” occur when highly skilled workers cluster in one place (Glaeser 1994). Rauch (1993) provided strong evidence for the existence of these intellectual spillovers when he demonstrated that living in a high human capital city has a positive effect on the earnings of all workers, regardless of their educational background.

To illustrate educational concentration’s role in influencing patterns of economic growth, I examine the factors that predict county mean income change in American metropolitan and nonmetropolitan counties between 1990 and 2000. Previous research has clearly demonstrated that places that have high levels of human capital also have high levels of economic growth. This analysis replicates that finding and takes it one step further. I demonstrate that the spatial concentration of college graduates stimulates economic growth and – over and above this effect – change in local educational concentration independently predicts local growth rates.

The analysis uses the same population-weighted county-level data from the 1990 and 2000 U.S. Census summary file 3 utilized earlier. The multivariate models proceed in three steps: In the first step, the change in county mean income between 1990 and 2000 is regressed on county population density, racial and ethnic composition, educational composition, unemployment rate, age composition, immigrant population, population stability, percent of county households female-

headed, and region. In the second step, a quadratic term is added to measure nonlinearity in the effect of educational composition on economic growth. In the third and final step, an educational change score is added to measure whether changes in counties' human capital stock influences economic growth between 1990 and 2000.

Table 2.6 summarizes the predictors of 1990-2000 economic growth for metropolitan counties. As the previous literature clearly suggests, this table's first model shows that metropolitan counties with large concentrations of college graduates experienced relatively rapid economic growth during the 1990s. This effect is large, and highly statistically significant. Indeed, the observed positive relationship between county BA population and economic growth is larger than all other observed relationships, with the exception of the negative relationship between female-headed households and growth.

Furthermore, according to the second model on Table 2.6, the effect of human capital concentration is nonlinear. The positive and statistically significant value on the squared BA graduate term demonstrates that the returns to county human capital increase as human capital increases. This model demonstrates that the effect of human capital on metropolitan income growth is exponential, rather than linear. The more college graduates live in a county, the faster the rate of income growth.

Table 2.6's third model speaks most directly to the effects of educational concentration on economic growth patterns in metropolitan America. This model demonstrates that college graduate population growth is, by far, the best predictor of income growth for metropolitan counties. In fact, this model suggests that the basic relationship between county human capital and economic growth observed in the first

model is largely an artifact of the much stronger relationship between human capital growth and population growth. The greater the proportion of the county's population

Table 2.6: Standardized OLS Coefficients, the effect of county demographic on mean income growth 1990-2000, metropolitan counties only

	Model 1	Model 2	Model 3
Population density (1990)	.236***	.212***	.070*
Percent African-American (1990)	.257***	.294***	.287***
Percent Latino (1990)	.070*	.112***	.214***
Percent with less than HS (1990)	.024	-.070	-.207***
Percent with BA or higher (1990)	.369***	.210***	-.166**
Percent with BA or higher (1990) squared	--	.145***	.216***
Change in percent with BA 1990-2000	--	--	.585***
Percent unemployed or out of labor force (1990)	-.107**	-.144***	-.010
Percent 65 or older (1990)	-.003	.017	-.140***
Percent foreign-born (1990)	-.213***	-.196***	-.091*
Percent relocated from another county (1990)	.020	-.010	-.057
Percent female-headed households (1990)	-.615***	-.599***	-.494***
Region: Northeast	-.306***	-.295***	-.273***
Region: North-central	-.126***	-.138***	-.213***
Region: South	-.243***	-.248***	-.210***
Adjusted R ²	.4336	.4423	.6409
N	N=835	N=835	N=835

Source: Author's analyses of 1990 and 2000 Census SF-3 county data

had a BA or higher in 1990, the faster the county's college-educated population grew between 1990 and 2000.¹² The faster the college-educated population grew during the same period, the faster the economy grew.

Table 2.7 presents the same analyses run on nonmetropolitan U.S. counties. The results summarized in this table suggest that the effect of human capital on the income growth of rural counties is very different from the effect of human capital on the development of urban and suburban counties. While Table 6 shows a strong positive relationship between metropolitan human capital and economic growth, the first two models reported in Table 7 show a significant *negative* relationship. Large concentrations of college graduates are associated with strong economic growth in

¹² As noted earlier, the Pearson correlation for these two county characteristics was .500 and statistically significant.

metropolitan counties; but nonmetro counties with large college-educated populations experienced

Table 2.7: Standardized OLS Coefficients, the effect of county demographic on mean income growth 1990-2000, nonmetropolitan counties only

	Model 1	Model 2	Model 3
Population density (1990)	-.066	-.065	-.069***
Percent African-American (1990)	.104	.103	.130***
Percent Latino (1990)	.045	.050	.042
Percent with less than HS (1990)	-.081	-.102	-.057
Percent with BA or higher (1990)	-.152*	-.154*	-.279***
Percent with BA or higher (1990) squared	--	.030	-.008
Change in percent with BA 1990-2000	--	--	.377***
Percent unemployed or out of labor force (1990)	-.274***	-.279***	-.197***
Percent 65 or older (1990)	.024	.028	-.040
Percent foreign-born (1990)	-.033	-.033	.001
Percent relocated from another county (1990)	.175**	.173	.156***
Percent female-headed households (1990)	-.152*	-.146*	-.149***
Region: Northeast	-.139**	-.137**	-.120***
Region: North-central	-.036	-.038	-.021
Region: South	-.067	-.062	-.071
Adjusted R ²	.1541	.1544	.2594
N	N=2301	N=2301	N=2301

Source: Author's analyses of 1990 and 2000 Census SF-3 county data

economic decline over the 1990s. One possible explanation for this counter-intuitive finding is that in an era of educational segregation, nonmetropolitan counties may have a more difficult time retaining and taking advantage of their human capital. The third model reported in Table 7 lends some support to this reading: It suggests that despite the negative relationship between human capital and economic growth in nonmetropolitan America, nonmetropolitan counties with growing college-educated populations experienced relatively rapid economic growth between 1990 and 2000. I will return to this issue in Chapter 4, when I address the relationship between educational segregation and nonmetropolitan outmigration in detail.

Sassen (2000) argues that post industrialization severs the economic ties between global cities and their periphery, leading to increasingly uneven patterns of economic development. The analyses presented here suggest that educational concentration may be one mechanism through which this uneven economic development occurs. Large and growing concentrations of college graduates are strongly associated with robust economic growth, particularly in metropolitan counties. Furthermore, the relationship between economic growth and educational segregation is nonlinear – the counties that have the highest human capital concentrations experience the strongest economic growth.

CONCLUSION

This chapter began by comparing counties in which college graduates are plentiful with counties in which they are rare, finding that communities at the winning end of the contemporary educational segregation trend are a diverse bunch. The list of the United States' most highly educated counties that started this chapter includes central-city, suburban, and nonmetropolitan counties in the Northeast, Midwest, West, and South. By comparison, virtually all of America's least highly educated counties are remote, rural communities, and the vast majority are in the South.

There are several routes that communities can follow to attract rising concentration of college graduates. The hierarchical regression models reported in this chapter indicate that economic factors play a central role in determining which counties experience brain gain and which experience brain drain, as the human capital model predicts. College graduates cluster in counties where mean incomes are high.

Furthermore, counties with high levels of earnings inequality experienced relatively rapid college graduate population growth, a finding that lends further support to the human capital model, since earnings inequality works as a proxy in these models for the returns to higher education.

College graduate population growth was also pronounced in counties that were rich in amenities, particularly in those counties that had many of the cultural and lifestyle amenities measured in the per capita constructed amenities index. This finding is consistent with Clark's theory, which holds that non-economic attractions are becoming increasingly important to community development. However, these regression models do not lend support to Florida's closely related "creative class" theory. Some noneconomic factors clearly do attract college educated population growth, but gay and lesbian population is not an independent predictor of human capital growth.

These findings suggest some good news for policymakers looking for mechanisms to stem the tide of brain drain migration. Communities with low concentrations of human capital may be able to retain and attract college graduates using either economic or cultural incentives. However, even after controlling for economics and amenities, counties with low concentrations of college graduates face a significant disadvantage in the competition for human capital. The hierarchical regression models summarized in Table 2.5 suggest that educational concentration patterns are also path dependent: When college graduates move from one place to another, the social networks and migration infrastructures that they establish bring other college graduates in their wake.

The chapter's final analyses suggest another way in which educational segregation trends may be self-sustaining. As recent economic theory and research has suggested, the spatial concentration of human capital is an independent predictor of local economic growth in metropolitan areas. For high human capital communities, this finding points to a virtuous cycle: Economic opportunities attract college graduates, which, in turn, generate new economic opportunities. For communities at the losing end of educational segregation, however, the cycle is vicious: Where economic opportunities are scarce, it can be difficult to retain human capital, and without human capital, the possibilities for economic growth are constrained.

Chapter 3:

Educationally-selective migration and its returns

So far, the discussion of educational segregation in this dissertation has taken a bird's-eye view of the phenomenon. In Chapter 1, I used aggregated data to demonstrate that the geographical distribution of human capital in the United States has grown increasingly unequal during the second half of the 20th Century. Large numbers of college graduates have concentrated in a relatively small number of counties; and even within these human capital hubs, the highly educated have become more and more residentially segregated. Chapter 2 took a look at some of the attributes of counties that are attracting growing concentrations of college graduates, revealing that both economic and non-economic factors play independent roles in predicting county-level human capital accumulation.

This detached perspective is important to understanding the overarching demographic trend of educational segregation. But this approach also has its costs: When the analysis focuses exclusively on the attributes of communities or neighborhoods, it is easy to lose sight of the millions of people whose educational and migration experiences contribute to rising educational segregation. The bird's-eye view makes it possible to see the broad demographic trend toward educational segregation; but it takes a tighter perspective to address the *how*'s, the *why*'s, and the *so-what*'s of educational segregation.

In this chapter, I turn my attention to the individual experiences that underlie the national educational segregation trend, drawing on survey data from the National

Longitudinal Survey of Youth's 1979 cohort (NLSY79). This study followed a representative cohort of Americans from young adulthood in the late 1970s to middle age in 2000. In the course of this study, NLSY79 respondents from across the United States completed their formal educations, moved out of their childhood homes, and entered the labor market. Many of these respondents migrated from one part of the country to another as they embarked on their adult lives. The long-term longitudinal data that this study provides make it possible to study the ways in which peoples' origins, their educational histories, and migration histories interact to create the highly unequal educational geographies that Chapters 1 and 2 describe.

The analyses of NLSY79 data contained in this chapter will demonstrate that educational segregation is primarily a result of a spatial sorting process, through which the highly educated gravitate toward human capital hubs and the less highly educated move toward places with lower educational concentration. This spatial sorting process is largely consistent with the human capital theory of migration, introduced in Chapter 2. This theory posits that migration behavior is closely related to educational attainment. In order to maximize the returns on their human capital investments, highly educated workers tend to seek out labor markets where wages and the economic returns to education are high. As a result, workers with high levels of human capital are more likely to move out of the communities in which they were raised than are workers with less human capital. When they move, these highly educated workers tend to gravitate toward communities that are already rich in human capital.

The analyses in this chapter show that individual educational attainment predicts the educational profile of the places in which NLSY respondents settle. Regardless of where they come from, college graduates are more likely than high school graduates to live in human capital hubs by the time they reach middle age. Educationally selective migration is the key to this spatial sorting – college graduates have a high propensity to migrate, and highly educated migrants tend to move toward places with high human capital concentrations. Migrants with less formal education, meanwhile, tend to move toward places with low human capital concentrations.

But, as in the county-level analyses in Chapter 2, the individual-level analyses in this chapter will also point to limitations in the purely economic human capital approach. This chapter will consider the ways in which educationally selective migration influences the lives of NLSY respondents. If economic incentives were the primary force behind the spatial clustering of college graduates, we would expect that highly educated people who move from places where human capital is scarce to places where it is plentiful would experience substantial earnings, income, and wealth gains. But the NLSY data do not bear this expectation out: The analyses presented here suggest that the economic advantages associated with educationally-selective migration are typically offset by the high costs of living in human capital hubs.

Data

The NLSY79 is a nationally representative sample of young adults who were between 14 and 22 years old when the survey began in 1979 and were 35 to 43 years old in 2000 when the most recent follow-up occurred. For the first 15 years of the

survey, respondents were interviewed annually, with new data collected on their educational attainment, family composition, employment status and history, and other topics. More recently – between 1994 and 2000 – respondents were interviewed every other year. In addition to the data collected in interviews, I utilize restricted geocoded data, which provides an identifier for the county that each respondent lived in at 14 years old and at the time of each of the NLSY survey rounds. These county identifiers make it possible to study respondents' migration histories and to match NLSY respondents with the same county-level U.S. Census SF-3 data utilized in the first two chapters. The matched Census data allow me to analyze the relationship between aspects of respondents' counties of origin, their likelihood of migrating, and several demographic characteristics of their migration destinations.

Since I am concerned with the relationship between educational attainment, residential and migration experience, and labor market and other adult outcomes, the definition of residential origins and destinations is a key issue for the analyses in this chapter. Nearly three-fourths of the respondents in this sample, and more than 90 percent of the respondents under 18, still lived with at least one of their parents or adult guardians when they were first interviewed in 1979. I considered these respondents' 1979 counties of residence as their counties of origin. For respondents who had moved out of their parents' household before 1979, I used the county in which they resided when they were 14 years old as their residential origins.¹³ The

¹³ Since this county is measured retrospectively, and since respondents may have moved with their families between age 14 and the time they moved out of their childhood household, the recorded county of origin for respondents who left their childhood home before 1979 may be subject to measurement error. However, the survey provides no other mechanism for measuring these respondents' residential origins. Furthermore a comparison of the mean values for respondents who lived with their families in 1979 and those who did not on several characteristics of origin counties shows no evidence of systematic bias.

coding of residential destinations was relatively straightforward: I considered respondents 2000 county of residence as their destination county. For respondents who were missing county data in 2000, I used 1998 or 1996 data; respondents who were missing data from each of the three most recent survey rounds were excluded from the analysis. The analyses reported in this chapter compare respondents' counties of origin with their destination to capture their migration histories.¹⁴

The original NLSY sample contained 12,686 respondents; 8,642 of these respondents participated in one of the follow-up survey rounds in 1996, 1998, or 2000 and provided complete geographic data. The analyses in this chapter use data gathered from these 8,642 respondents.

Origins and Destinations: The Role of Educationally-Selective Migration

Table 3.1 compares NLSY respondents from counties with low concentrations of college graduates with respondents from counties with high concentrations of college graduates. For the purposes of this table, NLSY respondents are divided into quintiles on the basis of the college graduate concentration in their counties of origin. Not surprisingly, this table shows that respondents who come from counties with low educational concentrations are less likely to have college-educated parents than those

¹⁴ Ham, Li, and Reagan (2003) argue that county-based migration measures such as those used in this paper overstate the extent of migration by as much as 40 percent, since many between-county moves take place within metropolitan areas or regional labor markets. While this data limitation should not be ignored, it also cannot be avoided, since the NLSY does not make the confidential geocoding that Ham, Li, and Reagan utilized available to outside researchers. Furthermore, for the purposes of this paper, inter-county moves may be as matter as much as moves between labor markets. As the discussions of educational segregation in Chapters 1 and 2 reveal, educational segregation occurs both within and among labor markets. When a college graduate migrates from the Bronx to Manhattan, for example, she does not move between labor markets; but she does contribute to rising educational segregation, moving from a place where the concentration of college graduates is low to a place where that concentration is high.

Table 3.1: NLSY79 respondents by educational concentration in county of origin.

	Bottom quintile (≤ 6.6% BA or higher)	2 nd quintile (6.6- 8.8% BA or higher)	3 rd quintile (8.8- 10.9% BA or higher)	4 th quintile (10.9%- 13.0% BA or higher)	Top quintile (>13.0% BA or higher)	All cases
% have college-educated parent	16.7%	20.2%	31.7%	32.1%	36.1%	27.1%
% have parent with BA or higher	8.2%	9.5%	17.0%	20.0%	22.9%	15.3%
Mean parental SEI	32.83	33.99	39.73	40.94	42.52	37.92
Mean score, AFQT	35.62	34.69	41.22	39.73	43.46	38.84
% went to college	49.2%	53.6%	62.6%	58.4%	64.4%	57.5%
% earned AA degree	8.9%	8.6%	10.5%	7.3%	8.2%	8.7%
% earned BA or higher	16.2%	14.2%	20.9%	21.5%	26.4%	19.7%
% ever moved between counties	66.8%	62.6%	62.4%	59.7%	70.2%	64.3%
% lived in 2000 outside county of origin	51.8%	45.0%	48.0%	44.7%	56.9%	49.3%
Mean % BA+ in 2000 county	15.47	16.80	19.81	22.08	24.96	19.65
Mean 2000 personal earnings	\$30,679	\$32,221	\$37,001	\$36,599	\$43,342	\$35,761
Mean 2000 household income	\$45,623	\$48,772	\$55,622	\$57,611	\$65,389	\$54,285
	(N=1878)	(N=1685)	(N=1856)	(N=1630)	(N=1593)	(N=8642)

Source: Author's analyses of NLSY79

who come from counties where college graduates were relatively plentiful. 36.1 percent of respondents from counties in the highest educational concentration quintile

had at least one parent who had attended college, compared to 16.7 percent of respondents from the lowest educational concentration counties. The gap in BA parents was even more pronounced: 22.9 percent of NLSY respondents from high human capital counties had at least one parent with a BA, compared to 8.2 percent in the lowest human capital quintile. Furthermore, respondents from counties with large concentrations of college graduates tended to come from relatively high status families, as measured by mean values on parental SEI.

Despite the pronounced family background disadvantages associated with growing up in a county with a low concentration of college graduates, Table 3.1 suggests that relatively large numbers of young adults from these counties made it to college and ultimately earned degrees. Nearly half of respondents from counties with the lowest concentrations of college graduates went to college (49.7 percent), and 16.2 percent earned a BA or higher. By comparison, 64.4 percent of respondents from the most highly educated counties went to college and 26.4 percent earned a BA or higher.

The gap between the educational attainment of NLSY respondents from low human-capital counties and respondents from high human-capital counties is much smaller than one might expect, particularly given the stark differences between the family backgrounds of these two groups. Young adults in the top quintile on home county educational concentration were more than twice as likely to have a parent who went to college and nearly three times as likely to have a college graduate parent. Compared to these huge gaps in family background, the differences in college attendance and graduation are modest. The college attendance rate for NLSY

respondents in the top quintile were just 31 percent higher than the college attendance rate for respondents from the counties with the lowest concentration of college graduates; their rate of BA attainment was 67 percent higher.

These numbers suggest that schools in communities with low concentrations of college graduates were producing enough college graduates to reduce spatial human capital inequalities. Had all of the teen-agers of the late 1970s stayed in their counties of origin, the least highly educated counties in the United States would have begun to catch up with the most highly educated counties in terms of BA concentration. But, as we have seen, that is not what happened. Instead, educational segregation rose during recent decades, as college graduates from communities with low educational concentration moved toward human capital hubs and the less highly educated moved out of these communities. These figures make clear that educational segregation is on the rise because some communities are more able to attract and retain college graduates than others, not because youth from some communities are more likely to go to college and earn degrees. Educationally-selective migration patterns, therefore, are the key to rising educational segregation.

Nearly two-thirds of the NLSY respondents lived outside of their origin counties at some point between 1979 and 2000. While some of these outmigrants returned to their home counties, most established permanent residences outside of the places in which they were raised. In 2000, nearly half of the young men and women of the NLSY continued to live outside of the county in which they were raised. The bivariate statistics in Table 3.1 show that these migration figures are not monotonically related to the BA concentration in respondents' counties of origin –

respondents in counties with low concentrations of college graduates and those in counties with high concentrations of college graduates are both somewhat more likely to migrate than those in the middle quintiles. This table makes it clear that large proportions of young adults move out of their home counties and settle elsewhere, regardless of the human capital profile in their county of origin.

What, then, differentiates migrants from nonmigrants? Table 3.2 provides descriptive statistics comparing respondents with different migration histories. It indicates that migration is closely linked to family background and educational attainment, and that this association is particularly pronounced for men and women who follow a brain drain migration trajectory, moving to places where the concentration of college graduates is considerably higher than in their counties of origins. In this table, the NLSY79 sample has been divided into five categories. The first two categories include respondents who were living in their county of origin in 2000. Nonmigrants are respondents who never moved out of their counties of origin during the study period; while return migrants are respondents who lived outside of their counties of origin at some point during the study period, but had returned to their origin county by 2000. The remaining three columns categorize migrants by the educational concentration in their destination community relative to their origins. The first group of migrants includes respondents who left their counties of origin for counties in which the concentration of college graduates was less than concentration of college graduates in their origin counties. The second group includes respondents who relocated during the study period, but whose origin and destination counties had

Table 3.2: NLSY79 respondents by migration status

	Nonmigrant	Return migrant	Migrated to county with lower % BA+ concentration	Migrated to county with equivalent BA+ concentration	Migrated to county with much higher % BA+ concentration
% of respondents in category	31.9%	18.8%	5.2%	21.5%	22.5%
% have college-educated parent	16.6%	26.2%	30.4%	31.3	37.8
% have parent with BA or higher	7.2%	14.1%	18.9%	17.8	24.4
Mean % BA+ in county of origin	9.99	9.96	15.47	10.41	9.28
Mean parental SEI	32.09	36.31	39.72	41.13	43.63
Mean score, AFQT	30.60	36.03	40.63	42.90	48.62
% went to college	45.4%	54.5%	59.8%	60.7%	73.5%
% earned AA degree	9.0%	8.9%	9.6%	8.7%	8.1%
% earned BA or higher	7.3%	16.3%	23.6%	22.8%	36.3%
Mean % BA+ in 2000 county	18.66	18.65	12.17	15.62	27.00
Mean 2000 personal earnings	\$29,182	\$32,293	\$36,318	\$36,245	\$46,735
Mean 2000 household income	\$43,703	\$48,620	\$52,323	\$58,120	\$70,337
Mean 2000 Household income relative to median home price in 2000 county of residence	.5743	.6371	.8110	.7918	.6902
	N=2755	N=1629	N=1860	N=1946	N=1946

Source: Author's analyses of NLSY79

roughly equivalent educational profiles.¹⁵ Finally, the third group includes brain drain migrants, respondents who moved to counties where the concentration of college graduates was more than 10 percent greater than the concentration of college graduates in their counties of origin.

As this table reveals, many migrants flow from places where human capital concentrations are relatively small to places where they are relatively large. Just 5.2 percent of the NLSY respondents moved to counties where the concentration of college graduates was lower than the concentration in their origin counties, while 22.5 percent (nearly half of all migrants) moved to destinations where the concentration of college graduates was more than 10 percent greater than at their origins.

In general, migrants are more likely to have highly-educated and high status parents than non-migrants. Among brain-drain migrants, this relationship is particularly pronounced. 24.4 percent of movers to counties with higher concentrations of college graduates had at least one parent with a BA degree; compared to less than 20 percent of all other migrants and just 7.2 percent of nonmigrants. Likewise, migrants – and particularly migrants to places with higher human capital concentrations – are more likely to have gone to college and earned a bachelor’s degree than nonmigrants. Nearly three-fourths of movers whose path of migration led to places with a higher concentration of college graduates went to college; 36.3 percent of these movers earned a BA degree or higher. By comparison,

¹⁵ The proportion of college graduates in these respondents destination counties was less than 10percent greater than the proportion of college graduates in their counties of origin. Since the proportion of the population with a BA degree or higher grew by nearly 10 percent during the study period (from 15percent in 1980 to 24 percent in 2000), these educational concentrations are considered roughly equivalent.

less than half of all nonmigrants went to college and just 7.3 percent earned a BA.¹⁶ The relatively high rates of migration among the highly educated, coupled with their tendency to migrate toward places where college graduates are already clustered, are the factors underlying the rising educational segregation currently underway in the United States.

Table 3.2 suggests that migrants, on average, enjoy higher personal earnings and household incomes than nonmigrants. Furthermore, among migrants, those who move to places with higher human capital concentrations have particularly high earnings and household incomes. The personal earnings and the household incomes of people who follow brain drain migration patterns are 60 percent higher than the personal earnings and household incomes of nonmigrants. Even relative to other migrants, brain drain migrants enjoyed strong earnings and household incomes: Migrants who moved toward places with higher concentrations of human capital had household incomes and personal earnings that were approximately 30 percent higher than the personal earnings and household incomes of migrants who moved toward places with fewer college graduates.

However, there is reason to suspect that higher costs of living cut into the economic advantages associated with migration. The last row of Table 3.2 attempts to control for costs of living in origin destinations by dividing respondents' household income by median home price in their 2000 county of residence. This row suggests that migrants are still better off economically than nonmigrants are, but this

¹⁶ The association between migration and education does not hold for associate degree holders. Nonmigrants and return migrants are slightly more likely to hold AA degrees than migrants are. Furthermore, migrants to counties with lower concentrations of college graduates are the migrant group with the highest proportion of AA degree recipients.

advantage is considerably smaller than the raw earnings and income numbers would suggest. The economic gap between brain drain migrants and nonmigrants was just 21 percent on this measure; far smaller than the 60 percent gap that divided the personal earnings and incomes of brain drain migrants and nonmigrants. Furthermore, since median incomes are particularly high in places where the college-educated concentrate, brain drain migrants experience particularly small relative earnings gains. Net of median home prices, the incomes of brain drain migrants are lower than the incomes of other migrants.

Table 3.3 examines the predictors of migration in a multivariate context. The three logistic regression models reported in this table compare different groups of NLSY migrants with respondents who lived in their counties of origin in 2000 (including both nonmigrants and return migrants).

The first column compares all NLSY migrants with all respondents still in their county of origins. In this analysis, respondents who were living in a different county from their origin county in 2000 are coded “1”; respondents who lived in 2000 in the same county in which they were raised were coded “0.”

The logistic coefficients reported in the second column of this table represent the odds of engaging in brain drain migration. The dependent variable utilized in the second column compares respondents who moved to a more highly educated county with those still living in their counties of origins. In this model, respondents who migrated to a county in which the concentration of college graduates was at least 10 percent higher than in their origin county are coded “1” and respondents who lived in their county of origin in 2000 were coded “0.” Respondents who migrated to counties

Table 3.3: Logistic regression models predicting NLSY79 respondents' migration

	Dependent variable: R lived outside of county of origin, 2000	Dependent variable: R migrated to county with higher educational concentration than origin	Dependent variable: R migrated to human capital hub
Black	-.27744***	.146	.45454**
Hispanic	-.26999***	-.04813	-.00189
Female	-.0915*	-.15358**	-.21761
Age (in years)	-.00445	-.01609	-.02859
Dummy: Lived in two parent family at 14	-.04288**	-.14873*	-.29887*
Highest of parents occupation prestige at 14	.00402	.00457*	.00075
Dummy: Mother worked for pay when R was 14	-.03498	.02937	.09019
Dummy: Neither parent completed high school	-.09506	-.11409	-.13551
Dummy: At least one parent had some college	.05584	.05219	-.20479
Dummy: At least one parent had a BA degree or higher	.21714**	.3799***	.52322**
Dummy: R lived in the South at 14	-.12001	-.29998**	-.42124*
Dummy: R's county of origin is metropolitan	-.14424*	.02668	-.24567
Median household income at R's county of origin	-.00011***	-.00014***	-.00018**
% unemployed or out of workforce in R's county of origin	.00939	.01122	-.08003
Violent crime rate in R's county of origin	1.1e-05	5.8e-06	9.2e-06
% of adults have BA or higher in R's county of origin	.04134***	-.05638***	.10288***
Dummy: R is high school drop-out	.02202	-.10504	.21227
Dummy: R went to college, but did not earn a degree	.26133***	.34545***	.3074
Dummy: R's highest degree is AA	.119	.09119	.02447
Dummy: R's highest degree is BA or higher	.92856***	1.1762***	1.4516***
AFQT score, 1980	.00443***	.00781***	.01524***
R's educational aspirations	.01065	.07242***	.09857***
Constant	.33547	-.10832	-2.5984*
R-square	.0637	.1177	.1919
	N=8642	N=6330	N=4791

*p<.05 *p<.01 ***p<.001

Source: Author's analyses of NLSY79

where the concentration of college graduates was less than or equivalent to the concentration in their origin counties are excluded from this analysis.

Finally, the logistic regression coefficients reported in the third column of Table 3.3 represent the odds of migration to a human capital hub. In this regression model, respondents who migrated to a county in the top 5 percent on the national distribution of educational concentration are coded "1", regardless of the educational concentration in their county of origin. Again, respondents who lived in their counties

of origin in 2000 are coded as “0” in this model. Those who migrated to any other county are excluded from the analysis.

Each of these three regression models point to the decisive relationship between education and migration. In all three models, several measures of respondents’ human capital levels – as well as the educational attainment of their parents – are highly significant predictors of migration behavior. In general, these models reveal that men and women with high levels of human capital are more likely to migrate than men and women with less formal education and fewer academic skills.

On all three models, standardized coefficients (not reported here) reveal that respondent’s BA is the most powerful predictor of migration. One way to conceptualize the magnitude of this effect is to imagine two hypothetical respondents: Despite being at the population mean on each of the predictors included in Table 3.3, one hypothetical respondent completed his or her formal education with a high school diploma, the other earned a BA. According to this first model, the hypothetical high school graduate’s odds of migrating were 43 percent. The hypothetical college graduate’s migration odds were nearly a third higher, at 65 percent. The effect of educational attainment is even starker in the second two models, which consider migration to places rich in human capital. The findings in the second row suggest that our hypothetical college graduate was more than twice as likely than our hypothetical high school graduate to migrate from a place with few college graduates to a place with a higher human capital concentration. The predicted probability for migrating to a place with a higher concentration of college graduates is 48 percent for a BA holder,

versus 22 percent for a high school graduate. The findings in third row suggest that our hypothetical college graduate was nearly four times more likely to migrate to a human capital hub than the hypothetical high school graduate. The predicted probability of migrating to a human capital hub is 15 percent for a BA holder, versus 4 percent for a high school graduate.

In two of the three models reported in Table 3.3, respondents who enrolled in college but left without a degree were also significantly more likely to migrate than high school graduates, although this effect was less pronounced than the effect for BA graduates. Furthermore, formal educational attainment is not the only human capital variable that predicts migration. In all three models, respondents' academic skills – as measured by the Armed Services Vocational Aptitude Battery, administered to all NLSY79 respondents in 1980 – positively predict migration odds, as indicated by the statistically significant coefficients for AFQT scores. Finally, in the two models that measure respondents odds of migration to places that are rich in human capital, respondents educational aspirations predict migration behavior, over and above their ultimate educational attainment.

After accounting for this pronounced human capital effect, the relationship between respondents' race and gender and their migration odds is uneven, and often nonsignificant. While African-American and Hispanic young adults are somewhat less likely to have moved out of their home counties than whites with similar educational and family backgrounds, this racial effect does not hold for brain drain migration. Net of controls, there are no significant differences between ethnic groups on the odds of moving to places with higher concentrations of college graduates. And

in fact, black NLSY respondents are significantly more likely to have moved to a human capital hub than similar whites. Gender also influences migration odds, and women are less likely to have moved out of their home counties than men. But again, this relationship is relatively weak, and it is not consistent across the three models – while women are less likely to move and less likely to move to a place with a higher concentration of college graduates, the association between gender and migration to a human capital hub is statistically insignificant.

Similarly, after controlling for human capital factors, the relationship between respondents' family background and their migration behavior is uneven. Although the bivariate statistics summarized in Table 3.2 suggest, for example, that migrants tend to come from relatively high-status families; this multivariate model suggests this is largely due to the association between parental occupation and respondents' human capital. The only family background factor that exercises a consistent and significant influence on migration behavior after controlling for human capital factors is family composition. Each of the three models summarized in Table 3.3 suggest that respondents from intact two-parent families are significantly less likely to migrate than respondents who come from single-parent families. While the relationship between family composition and migration has largely been neglected in the migration literature, this finding is consistent with recent research pointing to the role that social networks play in influencing migration behavior (Massey 1987; Stark 1991; Borjas 1993; Tcha 1996).

The economic prospects in respondents' counties of origin also predict migration behavior: The more affluent the respondents' county of origin, the lower

the odds that he or she will migrate. This effect is consistent across the three models reported in Table 3, suggesting that young adults from affluent counties are also less likely to follow brain drain migration paths. This finding is consistent with classical migration theory (i.e. Ravenstein 1885), which suggests that migrants tend to move from places where conditions are poor toward places that are more hospitable.

But the relationship between human capital concentration and migration odds points in the reverse direction: People from places that are rich in human capital are more, not less, likely to migrate. In two of the three models reported in Table 3.3, the proportion of residents in counties of origin positively predict migration odds. The first and third columns of this table demonstrate that respondents who grow up in counties with a high concentration of college graduates are more likely to migrate, and they are more likely to migrate to a human capital hub. The sign for this coefficient is reversed in the second column, suggesting that respondents who grew up in counties with high human capital concentrations were less likely to move to counties with higher concentrations of college graduates. However, this result does not necessarily contradict the association between human capital concentration in origin counties and migration, since ceiling effects limit the brain drain migration possibilities for respondents who started off in places where human capital is concentrated.

The findings reported in Table 3.3 suggest that what is true of migration in general is true of brain drain migration. Like the bulk of previous migration research, these multivariate models suggest that human capital plays a fundamental role in influencing migration behavior. A long line of human capital research has linked

higher educational attainment to higher rates of migration, beginning with Sjaastad (1962) and Bowles (1970). More recently, Feliciano (2005) has demonstrated that every immigrant group in the U.S. has higher levels of educational attainment than the population at large in their origin countries. Kodrzycki (2001), meanwhile, analyzes migration of young adults within the U.S., finding that educational attainment increases both the odds and the frequency of Americans' interstate migration. Table 3.3 indicates that the relationship between human capital and brain drain migration is as strong as – if not stronger than – the already well-established relationship between human capital and migration overall.

Returns to educationally-sensitive migration

The pronounced educational selectivity of migration patterns revealed by this study and others lends credence to the notion that the highly educated migrate in order to maximize the returns to their human capital investments. While the analyses presented in Chapter 2 suggest that economic factors are not the only lures that draw BA-holders to human capital hubs, it is clear that human capital theory provides some measure of insight into the migration decisions that underlie rising educational segregation.

But does migration really improve workers labor market prospects? Human capital theory suggests that anticipated economic gains motivate migration decisions. But although this theory clearly implies that migrants expect their moves to yield economic dividends, it does not necessarily follow that migration actually does improve workers' earnings prospects. In fact, some economic research suggests that

workers who remain behind may enjoy greater benefits associated with migration. In labor markets that lose workers to outmigration, the departure of highly-qualified potential workers can create local job market openings and put an upward pressure on wages. In destination labor markets, on the other hand, the growing supply of labor may suppress wages (Ranis and Fei 1961). Furthermore, since migrants often lack social networks and knowledge of their destination job markets, they typically experience a temporary earnings set-back as they establish themselves in their new homes (Lipset 1955; Borjas 1990).

In the American context, many of the studies that have investigated the consequences of migration for movers focused on migrants who moved from nonmetropolitan origins to metropolitan destinations: Schwarzweller and Brown (1971) report that outmigrants from the Appalachian “Beech Creek” community experience considerable economic and occupational success relative to those who never left. However, since they also show that outmigrants come from relatively affluent and well-educated backgrounds, it is impossible to know to what extent these observed differences are due to the effect of outmigration and to what extent they are due to the background differences between migrants and nonmigrants.

Wenk and Hardesty (1993) use proportional hazards modeling to address the issue of spurious correlation in their consideration of the effect of metropolitan migration decisions on the amount of time that poor nonmetropolitan residents spend in poverty and out of work. Their findings suggest that at least some of the positive effects that Schwarzweller and Brown associated with metropolitan migration are independent of mover’s educational and class background. Controlling for age,

education, and household composition, Wenk and Hardesty show that the decision to move to the city has a significant negative effect on the time poor black and white women spend in poverty; and that metropolitan moves decrease the amount of time that poor nonmetropolitan black and white men as well as white women (but not black women) spend unemployed.

Other studies compare migrants with nonmigrants in other contexts. DeJong and Blair (1994) use ordinary least squares regression and data from the Phillipines to compare the occupational prestige of nonmetropolitan outmigrants with nonmetropolitan return migrants and nonmetropolitan residents who did not move. They uncover a net negative effect of nonmetropolitan outmigration and argue that Filipino metropolitan migrants would have been better off had they stayed in place. On the other hand, Borjas, Bronars, and Trejo (1992) argue that Americans who have moved from one state to another in the United States (regardless of metropolitan status) earn more, over time, than the native residents of their destination states do, even after controlling for salient background characteristics.

These and other multivariate estimates represent a substantial improvement over simple bivariate comparisons of migrants and nonmigrants. However, the reliability of these multivariate estimates of the effect of migration is limited because they do not effectively address the issue of selectivity.

Traditional multivariate models attempt to address selectivity by controlling for potentially selective factors. Wenk and Hardesty; Lipset; Blau and Duncan; Long and Heltman; DeJong and Blair; and Borjas, Bronars, and Trejo and others estimate the effect of migration on economic outcomes net of several confounding background

variables. But these studies have not controlled for every factor that has a simultaneous influence on migration odds and the outcomes of interest. Wenk and Hardesty, for instance, control for the race, gender, age, educational attainment, and household composition of their respondents, but do not control for respondents' school and family histories, their parents' socio-economic position, and characteristics of their places of origin (including economic opportunities and proximity to metropolitan labor markets). Each of these factors is likely to influence both migration odds and economic outcomes, and therefore confound the relationship between migration and socio-economic conditions. However, this list is not exhaustive. It is likely that difficult-to-measure personal characteristics – such as intelligence, self-confidence, and independence – further obscure the actual association between migration and economic outcomes.

Indeed, even a fully-specified multivariate model may under- or overestimate the true effects of migration, since it is likely that migration is selective even *within* control categories. Indeed, when selection effects are present, it is possible that the traditional control variable approach may actually produce *less accurate* estimates than simple bivariate comparisons (Lieberson 1985). An additional limitation associated with traditional multivariate estimates of the effects of migration is that they cannot account for potential heterogeneity in the consequences of migration. Multivariate regression techniques yield a single coefficient, representing the average effect of migration net of controlled factors. But if the decision to migrate is socially selective, it is likely that the consequences of migration are socially selective as well.

If neither simple bivariate comparisons nor more elaborate multivariate models provide reliable estimates of the effect of migration on individual's life chances, how is one to approximate the consequences of metropolitan-to-nonmetropolitan migration? The best way to get an unbiased estimate of the effect of a treatment, even in the presence of selection effects, is through a randomized experiment (Harding 2003). However, in this case, such an experimental study would be nearly impossible – and highly unethical – to undertake. To approximate the conditions of a randomized experiment, the analyses in the remainder of this chapter use the counterfactual model of causal inference, or propensity score matching (Rosenbaum and Rubin 1983, 1985; Heckman and Hotz 1989; Heckman et al 1998; Winship and Morgan 1999). Ham, Li, and Reagan (2003) have used this technique to estimate the earnings effects of migration within the United States, using data from the NLSY. They find that migration improves the long-term earning prospects for college graduates, even as it impedes the earnings of high school drop-outs and has no significant effect on all others.

This chapter will extend Ham, Li, and Reagan's analysis, focusing on the implications of brain drain migration, and considering the implications of migration on NLSY respondents' hourly wages, household incomes, spending power, and net worth. In the analyses that follow respondents will be sorted into treatment and control groups on the basis of their migration history. Throughout, respondents who moved to counties in which the percent of the adult population with a BA degree or higher was at least 10 percent higher than in their counties of origin will comprise the treatment group. The matching models will attempt to estimate the consequences of

their moves, relative to three control groups: In the first analysis, brain drain migration will be compared with NLSY respondents who did not migrate out of their counties of origin. (As in the earlier logistic regression models, nonmigrants include all respondents living in their county of origin in 2000, including respondents who lived outside of that county at some point but returned.) In the second, respondents who moved to counties with higher concentrations of college graduates will be compared with all other migrants. And in the third, these brain drain migrants will be compared with migrants who moved to places with lower concentrations of college graduates than their origin counties.

Propensity score analyses proceed in two steps: The first is to estimate each respondent's propensity to receive the treatment, rather than remaining in one of the three control groups. The propensity scores are generated using three logistic regression models much like the models reported in Table 3.3. In all three models, the dependent variable is coded "1" for respondents who moved to places with higher concentrations of college graduates. In the first, only respondents who still lived in their county of origins in 2000 are coded "0"; in the second, respondents who migrated, but not to a place with a higher concentration of college graduates are coded "0"; and in the third, only respondents who migrated to place in which the percent of adults with a BA was lower than in their origin county are coded "0". In addition to the predictor variables included in the models in Table 3.3, these three logistic regression models include a series of two-way interaction terms and exponential terms to capture nonlinear effects. For each combination of treatment and controls, the results of these regression models are used to assign each respondent

with a propensity score ranging from zero to one, reflecting the respondent's predicted probability to migrate.

In the second step of the analysis, each respondent who actually migrated (the treatment group in this simulated experiment) is matched with a respondent from the control group who had a nearly-identical estimated propensity to receive the treatment using the “prmatch” application in the Stata software package.¹⁷ The resulting matched pairs are then compared on the outcomes of interest. The difference between the mean values of respondents in the treatment group and those of respondents in the control groups are understood as the true effect of brain drain migration. Since the analyses summarized in Table 3.3 suggest that educational attainment plays a decisive role in determining individual migration trajectories, I have also run a second round of matching, requiring that matched pairs have the same level of educational attainment as well as nearly identical propensities to have received the treatment.

The standard biases reported in Appendix A suggest that the propensity matching was successful. Just as random assignment is expected to generate a treatment and a control group that are balanced on the covariates, the propensity score matching procedure created a balanced sample in which the treated cases are nearly identical to the control cases on all observable covariates. Statistical simulation shows that matching on the observables also improves the balance on unmeasured covariates (DiPrete and Engelhardt 2000). In general, therefore, propensity score matching

¹⁷ The “prmatch” program uses a caliper matching system. In these analyses, I required treatment and control cases to have propensity scores that are within .01 of one another in order to make a match.

Table 3.4: Economic returns to brain drain migrants

	Bivariate	Regression	Propensity matched	Propensity matched, forced on education
Treatment 1: Migrants to place with higher BA concentration vs. nonmigrants				
Hourly earnings (logged)	.370***	.180***	.148***	.167***
Household income (logged)	.660***	.250***	.258***	.271***
Household income/county median home value (logged)	.177***	-.124***	-.130**	-.122**
Total net worth (logged)	.667***	.144*	.230*	.204*
Treatment 2: Migrants to place with higher BA concentration vs. all other migrants				
Hourly earnings (logged)	.246***	.185***	.185***	.198***
Household income (logged)	.324***	.193**	.195*	.160*
Household income/county median home value (logged)	-.136***	-.283***	-.274***	-.274***
Total net worth (logged)	.232***	.123*	.179*	.138

Source: Author's analyses of NLSY79

reduces the risk that the confounding influence of unmeasured variables will obscure the actual treatment effect.

Table 3.4 summarizes the findings that these propensity matched models yield regarding the economic effects of brain drain migration for migrants. For purposes of comparison, this table also reports simple bivariate comparisons between metropolitan migrants and those who stay behind, as well as traditional multivariate regression estimates of the effects of metropolitan migration, using the same control variables utilized in the Table 3.3 models predicting migration.

The first panel on Table 3.4 the compares the personal earnings, household income, adjusted household income, and net worth of people who moved to places where the concentration of college graduates is high against those of people who remained in their counties of origin. As the first column makes clear, brain drain migrants are, on average, considerably better off economically than nonmigrants. People who had moved to places with higher levels of human capital earned, on average, 37 percent more per hour than nonmigrants in 2000. Their annual household

income was 66 percent higher and their net worth was 68 percent higher than that of nonmigrants. However, the higher costs of living in their new counties of residence offset much of that income advantage – the average household income as a proportion of median home prices in their counties of residence for brain drain migrants was on average 18 percent higher than that for nonmigrants.¹⁸

As the remaining three columns suggest, many of the economic advantages associated with brain drain migration are a function of migrants' relatively privileged backgrounds and their high levels of educational attainment, *rather than migration itself*. Nonetheless, many of the advantages associated with brain drain migration are significant even after controlling for background factors and correcting for selectivity. The matched models suggest that migrants enjoy hourly earnings that are at least 15 percent higher than what they would have earned had they remained in their counties of origins. Furthermore, these models suggest that moving to a county in which human capital is more highly concentrated leads to an increase of approximately 25 percent in migrants' household incomes and a 20 percent increase in net worth. These significant effects point to economic gains associated with migrating to counties in which the college-educated population is relatively high. However, what brain drain migrants gain in the labor market, they lose due to higher costs of living in their communities. As a fraction of local home prices, the household incomes of brain drain migrants are significantly lower than those of matched nonmigrants, by 12-13 percent.

¹⁸ Cost-of-living indices are not available at the county-level nationwide, so county-level median home prices are used as a proxy. If housing prices vary more dramatically from place to place than other cost-of-living factors, this measure may overstate between-place variation in living expenses.

The findings reported in the first panel of Table 3.4 suggest that brain drain migrants have higher earnings, higher household income, and higher net worth than they would have had they stayed home, but that higher costs of living in their destination counties undermine these economic gains. The limitation of the findings reported in the first panel of Table 3.4 is that they do not make it possible to differentiate between the effects of migration itself and those of brain drain migration. The second panel of Table 4 is designed to address this limitation, by comparing the economic status of brain drain migrants with the situation of people who followed less educationally-sensitive migration trajectories. The first column of this second panel indicates that brain drain migrants are better off economically on average than other migrants. On average, people who move from places where the concentration of human capital is low to places where that concentration is higher earn approximately 25 percent more than other movers. Furthermore, their mean household income is 33 percent higher and their mean net worth is 23 percent higher. However, as we have seen, counties with high concentrations of college graduates are relatively expensive places to live, and the high average household incomes of brain drain migrants may not offset these high costs of living. As a proportion of local median home prices, the average incomes of brain drain migrant families is significantly lower than that of other migrant families.

The analyses summarized in the three remaining columns of this table indicate that the earnings and income differences between brain drain migrants and other migrants are not purely a function of the compositional differences between these two groups. The hourly earnings of brain drain migrants are nearly 20 percent higher than

those of other migrants in the propensity matched sample. Likewise, the brain drain migrants' household incomes are 16-20 percent higher than they would have been had they followed a different migration trajectory. However, the matched models also show that the wealth gap between brain drain migrants and other migrants is not statistically significant, suggesting that the net worth of people who migrated to places with high concentrations of college graduates is no higher than it would have been had they not migrated. Furthermore, the significant negative coefficients that these models report on household income as a proportion of destination median home price suggest that despite their income and earnings advantages, brain drain migrants have less spending power than they might have had if their migration had led to places with lower concentrations of college graduates.

The gaps between brain drain migrants and other migrants reflected in the bottom panel of Table 3.4 are smaller than the gaps between brain drain migrants and nonmigrants reflected in the top panel. However, the regression models and matched models in this table indicate that the effect of migrating to a place where the concentration of college graduates is higher does not vary substantially by the comparison group. The returns to brain drain are distinct from the returns to migration. Young adults who move to places where college graduates cluster enjoy earnings and income advantages that they likely would not have encountered had they moved to places with a lower concentration of college graduates. However, as these analyses have repeatedly shown, brain drain migrants also experience distinct disadvantages when their household incomes are adjusted by median home prices in their destination counties. Since the cost of living tends to be relatively high in places

where bachelor's degree holders make up a relatively large proportion of the population, many of the economic advantages associated with brain drain migration may be illusory.

One limitation of the findings reported in Table 3.4 is that they report the effect of brain drain migration for the average brain drain migrant. However, previous research suggests that migration may have very different implications for the economic status of highly educated migrants than it does for movers with lower levels of educational attainment. Professional networks and specialized labor markets may make it possible for highly-educated workers to search out high-wage jobs in new locations before they make a move. By contrast, labor markets for workers with less human capital tend to be relatively local, and as a result, the economic advantages associated with migration may elude less educated movers. As a result, Ham, Li, and Reagan (2001) find evidence in the NLSY data suggesting that migration significantly boosts the wages of college graduates, even as it has a small negative effect on the wages of other migrants. Ham, Li, and Reagan's study does not explicitly consider whether these effects vary further by migrants' destinations, but the theory of migration effects that emerges from their work suggests that the effects of brain drain migration might be particularly educationally heterogeneous.

The analyses reported in Table 3.5 are designed to explore this potential heterogeneity by analyzing the economic effects of educational attainment separately by respondent's level of educational attainment. As in the analyses summarized in Table 3.4's fourth column, Table 3.5 reports the findings from propensity matched

models in which treatment and control cases must have the same level of educational attainment, in addition to matching on their propensity to receive the treatment. These

Table 3.5: Matched estimates of migration effects, by mover's educational attainment

	Propensity matched, HS dropouts	Propensity matched, HS diploma	Propensity matched, some college no degree	Propensity matched, AA degree	Propensity matched, BA degree or higher
Treatment 1: Migrants to place with higher BA concentration vs. nonmigrants					
Hourly earnings (logged)	.171 N=148	.107 N=376	.204** N=936	.186* N=282	.168** N=732
Household income (logged)	.377 N=206	.271 N=392	.381** N=1018	.184 N=300	.151 N=776
Household income/county median home value (logged)	-.089 N=184	-.216* N=368	-.074 N=984	-.192 N=290	-.075 N=756
Total net worth (logged)	-.349 N=158	.100 N=354	.209 N=934	-.014 N=272	.398*** N=760
Treatment 2: Migrants to place with higher BA concentration vs. all other migrants					
Hourly earnings (logged)	.324 N=130	.082 N=322	.183** N=676	.202 N=190	.272*** N=678
Household income (logged)	.088 N=180	.184 N=340	.196 N=760	.180 N=208	.174 N=730
Household income/county median home value (logged)	-.238 N=164	-.221 N=322	-.290*** N=730	-.285* N=200	-.273*** N=710
Total net worth (logged)	-.396 N=138	-.033 N=304	.045 N=702	-.102 N=190	.390*** N=732

Source: Author's analyses of NLSY79

matches require that every BA in the treatment group be matched with a BA in the control group; likewise for AA's, college drop-outs, high school graduates, and high school drop-outs. This matching strategy makes it possible to ask whether or not the effects of brain drain migration are educationally heterogeneous. However, this strategy has a drawback that should not be overlooked: Since the NLSY sample is split into five educational groups in these analyses, the number of cases included in each model is substantially reduced. As a result of this reduction in statistical power, standard errors are much larger in these analyses than in previous analyses and few findings achieve traditional levels of statistical significance.

Nevertheless, the findings presented in Table 3.5 do provide strong evidence of educational heterogeneity in the effects of brain drain migration in one area: Brain drain migration has a significantly larger effect on the wealth accumulation of migrants with a bachelor's degree or higher than it does for less highly educated migrants. These models suggest that BA holders who moved to places where the concentration of college graduates is higher than at their origins were rewarded with a wealth boost of nearly 40 percent compared to what their net worth would have been had they not migrated or had they moved to a place with a lower concentration of college graduates. By comparison, these models find no significant wealth effects associated with brain drain migration for any other educational group; and indeed, they suggest that brain drain migration may have negative wealth effects for movers with less than a high school education.

In other areas, however, the results posted in Table 3.5 suggest that the earnings and income returns to brain drain migration do not vary systematically by the migrant's educational attainment. Although the returns to migration revealed in this table are uneven – for example, the table's first row suggests that the earnings boost enjoyed by migrants with some college experience is nearly twice as large as the boost experienced by migrants who completed their formal education after high school – these differences are not statistically significant and the patterns of heterogeneity are inconsistent from one outcome to the next.

It is not clear why the wealth returns to brain drain migration vary so dramatically by educational attainment, while the other effects of brain drain migration are relatively homogenous. One possibility suggested by Ham, Li, and

Reagan's research is that highly educated migrants assimilate more rapidly into their new labor markets, enjoying income and earnings advantages relative to less educated migrants in the years immediately after their moves. These short-term income and earnings advantages would not be visible in the estimates of the long-term effects of migration that this chapter has presented, but their effects may persist in the estimates of the wealth consequences of brain drain migration. However, to test this hypothesis would require a time-series analysis that is beyond the scope of this chapter.

Conclusion

Educational segregation is the net result of educationally selective migration patterns. While rates of college attendance and graduation vary between young adults growing up in different places, these differences in the rates of BA production do not explain broadening spatial inequalities in human capital concentration. Indeed, if all young adults returned to the communities in which they were raised after completing their educations, educational segregation would have *declined* over the last several decades. As we have seen, the reverse has occurred.

In this chapter, I have examined the causes and the consequences of brain drain migration. As human capital theory predicts, young adults who move to human capital hubs tend to be better off than their neighbors who stay behind. Migrants to human capital hubs generally come from families that are relatively affluent, they tend come from highly educated families, and they are overwhelmingly well educated themselves.

After moving, brain drain migrants out-earn their former neighbors, have higher household incomes, and have higher net worth. Propensity matched models suggest that these effects of migration are independent of migrants background characteristics. In other words, these analyses suggest that brain drain migration does itself change movers' economic prospects. However, the analyses presented in this chapter suggest that these gains are reduced once the higher costs of living in migrants' destination counties are taken into account. The places to which brain drain migrants move are expensive places to live, and these higher costs of living eat up the income advantages associated with brain drain migration.

The findings presented in this chapter validate parts of human capital migration theory and invalidate others. As human capital theory suggests, migration is socially selective. People who have made substantial investments in their human capital are far more likely to move than their peers with lower levels of human capital; and this educational selectivity is particularly pronounced in my analyses of brain drain migration. But the analyses presented here cast some doubt on human capital theory's prediction that migration tends to hold economic rewards for migrants. What brain drain migrants gain in income, they lose in higher living expenses. On the average, these analyses suggest, brain drain migration tends to be a losing prospect for migrants. This finding resonates with the findings presented in Chapter 2, which suggest that brain drain migration is not a strictly economic phenomenon and that amenities and other social lure also attract highly educated migrants into human capital hubs.

Chapter 4:

What clean break? Educational segregation and recent migration trends between metropolitan and nonmetropolitan areas

After a century of slow and steady outmigration, nonmetropolitan America experienced an unexpected population reversal in the 1970s. For the first time since the 1890s, the number of people who moved into nonmetropolitan American communities in the early 1970s outpaced the number of people who moved out.

For many scholars, the “rural renaissance” of the 1970s represented a clean break with previous demographic patterns. In the past, migration typically followed jobs, and the logic of industrial concentration led to increasing population concentration in a few core urban areas. But according to the clean break theory first articulated by Vining and Strauss (1977), the logic of internal migration in the United States changed fundamentally in the 1970s. In the wake of the rural renaissance, scholars associated with the clean break theory argued that post-industrial American population patterns had begun to respond primarily to consumer preferences, rather than to traditional economic factors (Easterlin 2000; Garkovich 1989; Long 1988; Long and DeAre 1988; Long and Nucci 1997). This theory assumed that Americans generally preferred to live in small towns or rural areas. As a result, it predicted a dramatic new counterurbanization trend as new transportation infrastructure and improved communications technologies eliminated the economic incentives associated with industrial concentration. According to clean break theory, the rural renaissance of the 1970s was just the beginning of a new era in which more and more

Americans would move out of the nation's large cities into outlying areas (Fuguitt 1985; Frey 1987).

Nonmetropolitan migration patterns in the decades that followed have neither conclusively confirmed nor contradicted this prediction. Net metropolitan migration rates have reversed repeatedly since the first unexpected nonmetropolitan turnaround of the 1970s. In the 1980s, the balance of metropolitan/non-metropolitan migration favored urban areas; but during the 1990s, the nation experienced a rural rebound. At the dawn of the 21st Century, net nonmetropolitan rates have once again reversed. In the late 1990s, the rate of nonmetropolitan outmigration sharply outpaced the rate of immigration, and for each of the years between 1998-99 and 2003-04 America's nonmetropolitan communities lost more residents to metropolitan migration than they gained.

In recent years, the popular press has provided many accounts of rural depopulation (c.f. Egan 2003). In fact, concerns about nonmetropolitan outmigration have stimulated policy-making activity, including tax-break plans in North Dakota and Iowa and tuition-relief plans in Ohio. In 2003, "The New Homestead Act" was introduced to the United States Senate. This bill would provide tax incentives and investment credit to people interested in moving to and starting businesses in depopulating rural areas.

Despite the popular attention that it has received, the recent nonmetropolitan downturn has received very little scholarly attention. This is unfortunate. Outmigration has wide-ranging implications for many rural areas that are currently experiencing depopulation. Furthermore, net nonmetropolitan outmigration presents a

fundamental challenge to the clean break theory and the understanding of postindustrial American population patterns that it implied.

This chapter will reassess the optimistic predictions that scholars made in the wake of the 1970s rural renaissance in light of the population losses that nonmetropolitan America has recently suffered. It will examine recent migration trends between metropolitan and nonmetropolitan areas. It will investigate the factors that have predicted migration between metropolitan and nonmetropolitan areas over time, and demonstrate how those factors have changed over time. The evidence presented in this chapter suggests that the demographic break that nonmetropolitan America experienced in the 1970s was not as clean as previously hypothesized. I demonstrate that nonmetropolitan America has experienced a deepening brain drain over the last two decades – a trend that can be explained largely in terms of economic incentives. While the clean break theory hinged on a direct opposition between preference-driven migration and economically-motivated migration, recent nonmetropolitan migration trends undermine this either/or construction.

The Rural Renaissance and its reversals

The nonmetropolitan turnaround of the 1970s represented a watershed moment in the study of American population dynamics. Prior to the 1970s, the idea that more people would move out of America's nonmetropolitan areas than would move in had come to be regarded as something of a demographic inevitability (Fuguitt 1985). America's cities had been growing faster than its countryside ever since the 1820s (Johnson and Beale 1998) and by the 1920s more than half of all

Americans lived in the nation's 10 most densely populated counties (Long and DeAre 1988).

In the early 1970s, however, this long-standing urban-to-rural migration trend reversed, and suddenly more Americans were moving from cities and suburbs to nonmetropolitan areas than vice versa. This "rural renaissance" attracted new scholarly attention to migration between nonmetropolitan and metropolitan areas. Meanwhile, it prompted a theoretical reassessment of American population dynamics, and generated a great deal of optimism regarding rural and small town America's future.

As William Frey argued (1986), the rural renaissance of the 1970s became a testing ground for theories of American postindustrial development. Some scholars linked the population deconcentration trends of the 1970s to changes in the organization of production, suggesting that the relocation of labor-intensive production activities from traditional urban cores to the periphery forced workers to move from old industrial cities in the Northeast and Midwest to new rural production centers in the South and West (Castells 1989, 2000; Sassen 2000). Other scholars attributed these patterns to consumer choice. These scholars argued that technological changes had liberated workers from the need to cluster in cities, allowing non-economic factors to shape migration decisions and consumer preference for open space and rural communities to assert itself (Easterlin 2000; Garkovich 1989; Long 1988; Johnson and Fuguitt 2000).

Frey argued that these two theories implied radically different predictions regarding future nonmetropolitan migration patterns. Economic theories of

postindustrialization suggested that the 1970s rural renaissance would be a short-term response to the movement of industrial facilities to rural areas. In the long-run, economic theory predicted that population would once again flow to America's core cities, as more and more Americans found work in the management ranks of multinational corporations, in highly skilled service and technological sectors, and in low-wage service areas. On the other hand, the theories that focused on consumer preference predicted an on-going trend toward population deconcentration. Americans have long held a strong affection for small-town and rural living. Theories that emphasized the role of consumer preference argued that postindustrialization would make it increasingly easy for workers to act on these tastes, leading to continued robust nonmetropolitan population growth in the future. Arguing that the rural rebound was likely to last into the 1980s and beyond, Frey lent his support to the consumer preferences argument.

But, in fact, the rural rebound of the 1970s was short-lived. Nonmetropolitan population growth peaked in the middle of the 1970s (Richter 1983); and throughout the 1980s, more people migrated from nonmetropolitan areas to metropolitan areas than moved in the reverse direction (Johnson 1989).

Although it grew out of the rural renaissance of the 1970s, the clean break theory outlived that nonmetropolitan population boom, retaining influence in American population research throughout the 1980s and 1990s – and indeed, to the present. Many researchers saw the nonmetropolitan downturn of the 1980s as an aberration, arguing that the preference-driven demographic patterns of the 1970s would soon reassert themselves (*c.f.* Easterlin 2000; Long and DeAre 1988).

Furthermore, rather than focusing on declining net rates of nonmetropolitan immigration, researchers emphasized absolute nonmetropolitan population levels, which remained higher than before the 1970s rebound (Johnson 1989).

In early 1990s, net metropolitan-nonmetropolitan migration rates reversed once again, lending new credence to the clean break theory. For much of the decade, more people moved away from metropolitan areas into nonmetropolitan than moved in the reverse direction. Many observers saw the demographic gains that rural America enjoyed in the 1990s as a continuation of the 1970s rural renaissance, arguing that the downturn that came between these two periods of net nonmetropolitan immigration was an exception to a new demographic rule favoring nonmetropolitan population growth (Fuguitt and Beale 1996; Johnson and Beale 1998). At the height of the 1990s rural rebound, one observer went so far as to predict the “death of cities,” proclaiming that “cities are leftover baggage from the industrial era” (Gilder 1995).

Assessing the clean break theory

The fact that the 1970s rural renaissance did not usher in a new, permanent era of metropolitan-to-nonmetropolitan migration undermines the clean break theory. Brown, Fuguitt, Heaton, and Waseem (1997) show that residential preferences have remained unchanged since the 1970s, even as net nonmetropolitan migration rates have fluctuated widely. In the absence of changing preferences, it is clear that recent metropolitan migration trends do not point to an unambiguous shift in the sociological dynamics underlying American internal migration.

Nonetheless, questions still remain about the role that residential preferences and economic incentives play in influencing migration patterns within the United States. In recent years a new, weaker, version of the clean break theory has emerged, suggesting that increasing differentiation in migration patterns by age, region, and community type may point to the rising importance of residential preferences. This new theory, as articulated by Johnson and Fuguitt (2000, p. 28), proposes that “if the turnaround heralded a new kind of migration with fewer economic constraints, the change should have been reflected in a greater differentiation of migration patterns across the life cycle, as persons at different stages in their lives, with varying needs, preferences, and experiences, made decisions about where to live.”

According to this theory, young people are more likely to prefer urban areas, and have an increased willingness to gamble on locations where costs of living are high but potential opportunities are also high. As they age and form families, however, their preferences change, and residential amenities become increasingly salient factors. Finally, residential preferences change once again as people reach retirement age. With incomes limited and recreational time expanding, retirees become increasingly interested in places where costs of living are low and amenities are high (Howell and Frese 1983; Mueser, White, and Tierney 1988). According to the revised clean break theory, the shift from economically-motivated migration patterns to patterns that are based on residential preferences that the clean break theory implies is not necessarily inconsistent with a net migration rate that favors metropolitan areas. This is a theory of segmented migration trends, which suggests

that residential preferences and the role they play in influencing migration decisions vary over the life course.

The “creative cities” literature in urban sociology and economics complements the revised clean break theory by suggesting that residential preferences may also be segmented by educational attainment. Heather Rogers (2004), for example, studies college-educated population growth between 1990 and 2000 for metropolitan and nonmetropolitan American counties. She demonstrates that counties with bookstores and highly developed literary scenes attract college graduates, even after controlling for covariates like county demographics, metropolitan status, and unemployment rates. Using similar data, Terry Nichols Clark (2003) demonstrates that constructed amenities, such as opera, museums, and cafes, attract highly educated migrants. Economist Richard Florida (2002, 2002a) argues that it is not amenities that attract highly educated workers, but instead that highly educated people are attracted to highly diverse communities.¹⁹ For the purposes of this chapter, this dispute is less important than the more general point that Rogers, Clark, and Florida agree upon: All three argue that noneconomic factors disproportionately attract highly educated residents to metropolitan areas.

However, segmentation of nonmetropolitan migration patterns by age and educational attainment can also be attributed to economic incentives. Economists, beginning with Sjaastad (1962) and Bowles (1970) understand migration as a human capital decision, in which rational actors attempt to maximize the anticipated returns on their investments in education and training. Human capital theory’s most basic

¹⁹ Florida operationalizes diversity by examining the percent of county households that are gay- or lesbian-headed

implication is that migration will tend to flow away from places where earnings and the returns to education are low and toward places where they are high. As Frey noted (1986), economic theories generally predict net nonmetropolitan-to-metropolitan migration trends, since median incomes in American metropolitan areas have long been higher than median incomes in nonmetropolitan areas, (*c.f.* Ghelfi 2000; Gibbs and Parker 2001).

But in the contemporary context, the distinction between preference-driven migration theories and economic-driven theories is not as clear as it once was. Like the revised clean break and creative cities theories, human capital theory hypothesizes that the propensity to migrate from nonmetropolitan areas to metropolitan areas varies by age and level of education. Since young people have more productive labor market time to recoup the costs associated with migration, human capital theory suggests that the migration decisions of youth will tend to be more sensitive to economic pressures than older people's migration decisions (Borjas, Bronars, and Trejo 1990; Bowles 1970). Furthermore, since the potential gains associated with migration are greater for people with high levels of human capital, human capital theory suggests that the migration behavior of the highly educated will tend to be more contingent on economic factors than the migration behavior of the less educated (Bowles 1970; Mills and Hazarika 2001).

In short, while some argue that the age and educational segmentation of contemporary metropolitan/nonmetropolitan migration implies that noneconomic factors are increasingly important predictors of contemporary migration behavior; others view the same segmentation in economic terms. Given these cross-cutting

arguments, assessing relative importance of economic and non-economic factors in recent metropolitan-nonmetropolitan migration is a difficult task indeed.

One way out of this empirical dilemma is to study migration patterns in different types of nonmetropolitan areas separately. If post-industrialization allows consumers to discount economic factors in their residential location decisions, one would expect population growth patterns to favor nonmetropolitan communities blessed with a convenient location, a temperate climate, scenic views, and plentiful natural amenities. And indeed, recent nonmetropolitan migration patterns strongly suggest that this has occurred. The relatively remote nonmetropolitan areas of the Great Plains states have been largely exempt from the periodic rebounds that many nonmetropolitan areas elsewhere in the United States experienced since the 1970s (Albrecht 1993); as have the nonmetropolitan areas designated as “farm counties” by the U.S. Department of Agriculture. Meanwhile, migration trends have been relatively positive in nonmetropolitan counties that contain a city of at least 10,000 people, counties that are within commuting distance of a metropolitan area, and counties that are rich in recreational opportunities (Johnson and Fuguitt 2000). But the influence of economic incentives can be seen even in the nonmetropolitan communities that have most benefited from consumer preference-driven immigration. As Johnson and Fuguitt (2000) demonstrate, nonmetropolitan communities of all types – from farm counties to recreational counties – experienced net outmigration of young adults in every decade between 1950 and 1990. But this population growth is largely among the middle-aged and the elderly. Economic incentives still matter for

the young, and they continue to drive migration toward metropolitan areas (Johnson and Fuguitt 2000).

This chapter takes a different approach to disentangling the relative importance of economic incentives and consumer preferences in metropolitan-nonmetropolitan migration. Here, I study the change in migration patterns over time, taking note of how the changing migration patterns of different groups relates to changing economic conditions in metropolitan and nonmetropolitan areas. While aggregate consumer residential preferences change very little over time, labor markets and the earnings advantages associated with working a metropolitan labor market can be volatile. If net metropolitan/nonmetropolitan migration rates (particularly for the young and the highly educated) track to these changes, the influence of economic incentives on net migration patterns is apparent.

Data and Methods

This chapter uses data from the Current Population Survey's Annual Social and Economic Survey (also known as the Annual Demographic File or March Supplement) to analyze trends in migration between nonmetropolitan and metropolitan areas in the United States between 1989 and 2004. Administered by the U.S. Bureau of the Census and the Bureau of Labor Statistics, the CPS is a monthly survey of the American labor force. The CPS's Annual Social and Economic Survey, administered each March, provides a detailed annual snapshot of the U.S. population, with questions about respondent family status, educational history, and migration behavior over the past year. The CPS Annual Social and Economic Survey data used

throughout this chapter are weighted using a population weight, and describe the entire American population.

Respondents who moved from a nonmetropolitan area to a metropolitan area in the year leading up to the March survey are considered nonmetropolitan “outmigrants” for the purposes of this study. Respondents who moved from a metropolitan area to a nonmetropolitan area are considered nonmetropolitan “inmigrants.”

Census Department metropolitan statistical area (MSA) definitions are used throughout this chapter to distinguish between metropolitan and nonmetropolitan areas. These county-level definitions are updated with each decennial Census. They define any county that contains an agglomeration of 50,000 or more residents, as well as highly interconnected adjacent counties, as metropolitan. Any county that does not meet these metropolitan criteria is considered nonmetropolitan. This definition is closely related to the more commonplace distinction between rural and urban places. However, it is not identical. For example, respondents who live in the open country in a county that contains a large city are considered metropolitan, while respondents who live in the middle of a small city of less than 50,000 residents are considered nonmetropolitan.

Between the March, 1994 survey and the March, 1995 survey, the CPS definitions for MSA as 1990 decennial Census data were incorporated. As metropolitan areas grew spatially, they absorbed previously nonmetropolitan counties. Likewise, when the population of nonmetropolitan cities expanded beyond the 50,000 threshold, the counties in which these cities are located became

metropolitan by definition. (Cases in which metropolitan counties shrink and become nonmetropolitan are extremely rare.) Residents of these newly-metropolitan counties are not considered nonmetropolitan-to-metropolitan migrants; but nonmetropolitan migrants to these counties are considered nonmetropolitan-to-metropolitan migrants.²⁰

Changing MSA borders reflect a changing reality, in which processes of urbanization are ongoing. However, they could potentially bias statistical analysis of migration trends. With each revision of MSA borders, the number of places that are nonmetropolitan decline and the number of places that are metropolitan increase. On the one hand, MSA border revisions decrease the number of potential nonmetropolitan outmigrants (since many previously nonmetropolitan residents are now counted as metropolitan). This suggests that changing MSA borders will exert a downward pressure on nonmetropolitan outmigration trends. On the other hand, MSA border revisions increase the number of potential metropolitan migration destinations (since many previously nonmetropolitan counties are now counted as metropolitan). This implies an upward bias on nonmetropolitan outmigration trends. As we will see, these two biases seem to cancel out one another, and the CPS MSA redefinition was not accompanied by a sharp discontinuity in metropolitan/nonmetropolitan migration trends.

This chapter begins by graphing net annual nonmetropolitan migration rates between 1989 and 2004. For each survey year, nonmetropolitan immigration rates are

²⁰ The 1995 and 2001 CPS surveys both had inconsistencies in the coding of metropolitan and nonmetropolitan areas, so both are excluded from this analysis. Until recently, the 2002 and 2003 March surveys had a similar problem, in which a few metropolitan areas were mistakenly coded as nonmetropolitan. However, the CPS has corrected this mistake and issued revised estimates of nonmetropolitan migration. The analyses in this chapter use the corrected CPS data.

calculated as the number of migrants who moved from metropolitan America and abroad to nonmetropolitan destinations, divided by the total U.S. nonmetropolitan population. Nonmetropolitan outmigration rates are calculated by dividing the number of migrants leaving nonmetropolitan areas, divided by the total U.S. nonmetropolitan population. The net nonmetropolitan migration rate is the difference between the nonmetropolitan immigration rate and the nonmetropolitan outmigration rate.

Tables 4.1 and 4.2 summarize several logistic regression analyses which decompose the nonmetropolitan migration trends apparent in the descriptive figures. Table 4.1 compares the demographic characteristics of nonmetropolitan-to-metropolitan migrants with all other nonmetropolitan residents. The universe for the analyses summarized in Table 4.1 is all nonmetropolitan residents aged 21 and up, including people who moved from a nonmetropolitan area to a metropolitan area in the previous year. Table 4.2, meanwhile, compares metropolitan-to-nonmetropolitan migrants with all other metropolitan residents. The universe for the analyses summarized in Table 4.2, then, is all metropolitan residents aged 21 and up, including people who moved from a metropolitan area to a nonmetropolitan area.

Comparing coefficients for predictors of migration in 1988-89, 1995-96, and 2003-04 yields insight into the ways in which the factors underlying migration patterns have changed over the past 15 years. To test whether or not coefficients from separate survey years are statistically significant from one another, Wald chi-square statistics are calculated. While these statistics are not reported in the chapter, each of the changes that are described as statistically significant are instances in which the

Wald chi-square calculated using 1988-89 coefficients and 2003-04 coefficients correspond to a p value of less than .05.

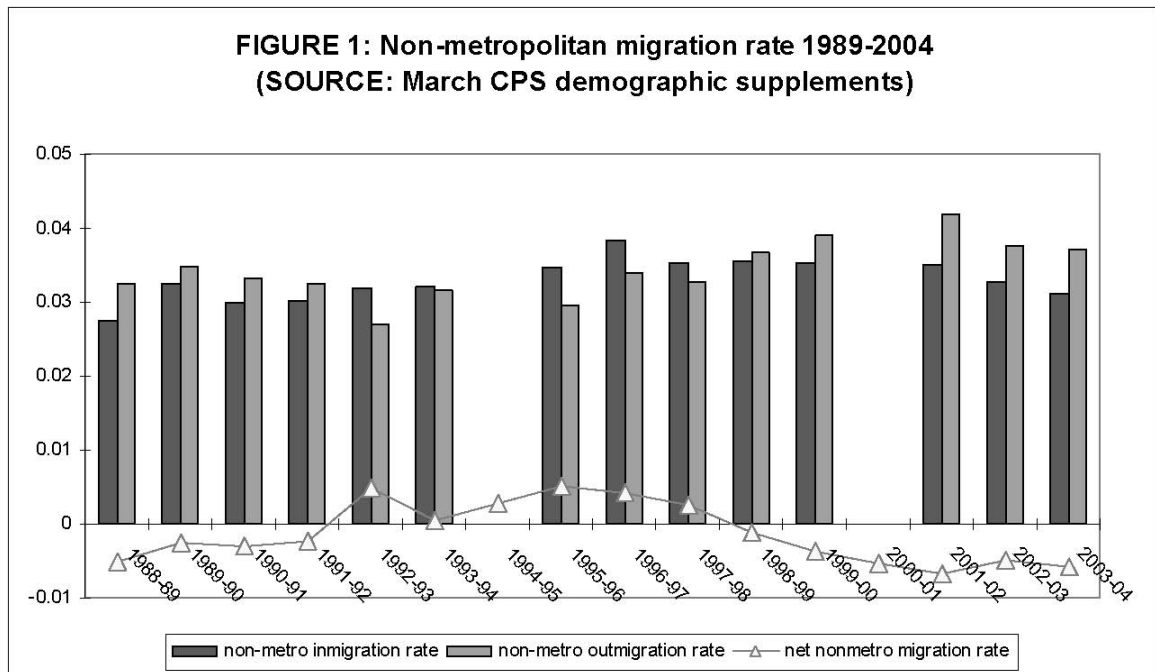
In both of these tables, migrants and non-migrants are compared in 1989, when nonmetropolitan migration rates were just beginning to recover from a 1980s slump; in 1996, when the rural rebound of the 1990s was at its zenith; and, most recently, in 2004. Each of the logistic regressions summarized in Tables 1 and 2 control for respondent race, gender, region of residence, age, and educational attainment. Race is measured in these analyses as a series of dummy variables, for which white non-Hispanic is the reference category. Gender is also coded as a dummy variable, with males set to “1” and females set to “0”. Region is coded using U.S. Census definitions, Northeast is the reference category. Respondent’s age is measured as a continuous variable. In addition, three dummy variables are included to capture discontinuities in migration odds among 18-to-24 year-olds, 25-to-30 year-olds, and respondents over 60. Educational attainment is captured in a series of dummy variables measuring respondents’ highest degree attained; high school graduates are the reference category. These analyses are weighted by a normative weight, which is generated by dividing the population weight by its mean. This weight corrects for nonresponse bias and oversampling, yielding representative national samples. At the same time, normative weights allow significance testing on the number of cases actually in the analysis, rather than on the inflated weighted number of cases. Together, these tables provide a multivariate portrait of the net population change that nonmetropolitan America experienced during each of these years.

Finally, the results of these tables are compared against the trends in fulltime earnings for nonmetropolitan and metropolitan residents between 1989 and 2004, reported in Tables 4.3 and 4.4. Like the other analyses in this chapter, these trends are calculated using population-weighted CPS data for respondents aged 18 and older.

Findings

Far from witnessing the death of cities, at the dawn of the 21st Century, we are once again witnessing the rapid metropolitanization of the American population. Figure 1 examines trends in migration between metropolitan and nonmetropolitan areas for the period between 1989 and 2004. It demonstrates that net metropolitan-nonmetropolitan migration rates have again reversed at the beginning of the 21st Century, leading to sizable population losses for many nonmetropolitan areas. Between 2001 and 2004 alone, nearly 6 million people moved from America's countryside and small towns to its cities or suburbs, and non-metropolitan America has experienced net outmigration of nearly 1 million people.

The line graph in Figure 4.1 reveals that the rural rebound of the 1990s lasted for approximately six years. In the year that began March 1992, more people moved to nonmetropolitan areas of the U.S. than moved out of them, and for the next several years, this trend held. But by March, 1999, more nonmetropolitan residents were moving to metropolitan areas than metropolitan residents were moving to nonmetropolitan areas.



Comparing the dark bars that represent the rate of nonmetropolitan immigration with the light bars that represent the rate of nonmetropolitan outmigration for each year, it becomes clear that this reversal in the net rate of nonmetropolitan migration is primarily due to an increase in the number of people moving out of nonmetropolitan areas. As a proportion of the total nonmetropolitan population, outmigrants rose from a low of 2.6% in 1992-93 to a high of nearly 4.5% in 2001-02. After peaking in 2001-02 the proportion of nonmetropolitan residents who outmigrate in a given year has declined modestly. Throughout this period, and indeed ever since the rural renaissance of the 1970s, migration between America's metropolitan and nonmetropolitan areas has been highly inefficient. That is, large numbers of people have moved in both directions between metropolitan and nonmetropolitan areas. Compared to the total number of movers, the net migration rates have been relatively small.

The recent increase in nonmetropolitan outmigration has resulted in a substantial population loss for nonmetropolitan areas. The net nonmetropolitan-to-metropolitan migration that has occurred since 1999 has completely offset the net metropolitan-to-nonmetropolitan migration that occurred earlier in the 1990s. During the rural rebound period of March, 1992 to March, 1998,²¹ approximately 640,000 more migrants moved into nonmetropolitan America than moved out. On the other hand, nonmetropolitan outmigration has outpaced immigration by 1.15 million people during the downturn in rural migration rates that began in March, 1998 and has continued at least through March, 2004.²²

Tables 4.1 and 4.2 examine American metropolitan-nonmetropolitan migration in a multivariate context. These tables demonstrate that over the past 15 years, educational attainment has become the single most important predictor of migration between American metropolitan and nonmetropolitan areas. Furthermore, these tables show that the educational selectivity of these migration trends is not an artifact of other attributes of migrants between nonmetropolitan and metropolitan areas. Table 4.1 compares nonmetropolitan residents with respondents who migrated from nonmetropolitan areas to metropolitan areas during the 1988-89, 1995-96, and 2003-04 CPS study periods. Table 4.2 compares metropolitan residents with respondents who migrated from metropolitan areas to nonmetropolitan areas during the same time period.

²¹ Excluding 1994-95, a year for which reliable CPS data are not available.

²² Again, this figure excludes a year in which reliable CPS data are not available – in this case, 2000-01.

Table 4.1: Logistic regression coefficients, comparing nonmetro-to-metro migrant vs. nonmetropolitan residents

		1989	1996	2004
Race	Black	-.182	.401**	.370**
	Hispanic	.519**	-.105	.336**
	Other	.204	.262	.459**
Region	Midwest	.461**	-.222	-.306*
	South	.537***	-.039	.076
	West	.973***	.206	.599***
Age	Male	.124*	.029	.086
	Age	-.026***	-.038***	-.029***
	18-24 years old	.635***	.849***	.975***
	25-30 years old	.588***	.583***	.724***
Education	Over 60 years old	.004	.379	.114
	Less than high school	-.032	.104	-.023
	Some college/AA	.619***	.195+	.397***
	Bachelor's degree	-.050	.893***	.976***
Constant	Master's degree or higher	.954***	.388+	.946***
		-3.418***	-2.330	-2.784***
Pseudo R-square		.093	.090	.109
		N=27665 (937 moves)	N=18956 (580 moves)	N=30987 (1083 moves)

Source: Author's analysis of 1989, 1996, and 2004 CPS demographic supplements

Table 4.1 points to both continuities and discontinuities in the characteristics of nonmetropolitan outmigrants during this time period. It shows that the effect of race on respondents' nonmetropolitan outmigration odds changed significantly between 1988-89 and 2003-04. While African-Americans were no more likely than whites to move from nonmetropolitan areas to metropolitan areas in 1989-90, by 2003-04 the black outmigration rate has risen significantly. This is a surprising finding, given earlier research referring to a "great return migration" Stack (1996) and suggesting that African-Americans living in northern cities were beginning to return to southern rural areas (McHugh 1987).

The relationship between region of residence and nonmetropolitan migration odds also changed significantly during this period. While the Midwest, the South, and the West all had higher nonmetropolitan outmigration rates than the Northeast in

1988-89, by 2003-04, the regional base of nonmetropolitan outmigration had largely evened out. In 2003-04, nonmetropolitan Midwesterners were actually less likely to migrate to metropolitan areas than nonmetropolitan Northeasterners, and there was no difference between the outmigration odds of nonmetropolitan Southerners and nonmetropolitan Northeasterners. Only Westerners had significantly higher odds of nonmetropolitan outmigration than Northeasterners by 2003-04.

Gender, on the other hand, was not a very powerful predictor of nonmetropolitan migration, and its influence has changed very little over the past 15 years. Men were slightly more likely to move from nonmetropolitan areas to metropolitan areas than women in 1988-89. While this relationship became weaker and statistically insignificant in the 1995-96 and 2003-04 surveys, the change in the effect of gender was quite small and not statistically significant.

As Johnson and Fuguitt (2000) have noted, age is a fairly constant predictor of nonmetropolitan outmigration. In each of these logistic analyses, four coefficients represent the association between the age of nonmetropolitan respondents and their likelihood to move out of nonmetropolitan areas into metropolitan areas. The first of these four coefficients is labeled “age” and represents the linear effect of age on outmigration odds. In each of the three analyses, this coefficient is significant and negative, suggesting that with each year they age, the odds that nonmetropolitan residents will migrate to metropolitan areas declines. Three additional dummy variables capture potential nonlinearities in the relationship between age and nonmetropolitan outmigration odds. The first two, labeled “18-24 year olds” and “25-30 year olds”, suggest that young adults aged 18-24 and 25-30 were significantly

more likely to outmigrate from nonmetropolitan areas than their elders, even after controlling for the basic, linear relationship between age and outmigration. The coefficients for these two dummy variables increased significantly between 1988-89 and 2003-04, suggesting that the age differentiation in nonmetropolitan outmigration has increased over the past 15 years. The last age dummy, labeled “over 60 years old” suggests that despite these nonlinearities in the outmigration odds of young nonmetropolitan residents, there are no nonlinearities in the outmigration odds of older nonmetropolitan respondents.

But the most striking change that Table 4.1 shows in the demographic composition of nonmetropolitan outmigrants involves their educational attainment. In 1988-89, there was no significant difference between the nonmetropolitan outmigration odds of BA-holders and those of high school graduates, net of other factors. Master’s degree holders were significantly more likely to move to metropolitan areas than high schools graduates; as were nonmetro residents who had attended college but left without a bachelor’s degree. But during the early 1990s, this pattern changed dramatically. In 1995-96, bachelor’s degree holders were significantly more likely to migrate to metropolitan areas than high school graduates. By 2003-04, this pattern became even more pronounced. In the 2003-04 model, the relationship between educational attainment and nonmetropolitan outmigration odds is strong, nearly monotonic, and positive. Nonmetro respondents with a high school diploma were less likely to migrate to a metropolitan area than nonmetro respondents with some college or an associates degree. These respondents, in turn, were less likely to migrate to a metropolitan area than nonmetropolitan residents who had earned a

bachelor's degree or higher. Nonmetropolitan BA holders were significantly more likely to migrate to metropolitan areas in 2003-04 than they were in 1988-89. Indeed, in the 2003-04 logistic regression model, educational attainment was the single most powerful predictor of nonmetropolitan-to-metropolitan migration.

Table 4.2 provides a multivariate assessment of the predictors of migration in the reverse direction – from metropolitan areas to nonmetropolitan areas. This table suggests that there was very little change in many of predictors of nonmetropolitan immigration during this time period. The racial mix of nonmetropolitan immigrants remained nearly constant throughout this time period. In all three survey years, whites were significantly more likely to move from metropolitan areas to nonmetropolitan areas than were members of all other races. Likewise, the regional mix of nonmetropolitan immigration remained largely unchanged, with metropolitan Northeasterners having the lowest odds of moving to nonmetropolitan areas. The age composition of nonmetropolitan immigrants also shows very little sign of change: In all three survey years, the odds of nonmetropolitan immigration decline as respondents age.

There is some indication that the role of gender in predicting metropolitan-to-nonmetropolitan immigration may be changing. In 1988-89, men were somewhat more likely to move from metropolitan areas to nonmetro. By 2003-04 this relationship showed signs of reversing. While men's nonmetropolitan immigration odds were not significantly different from women's nonmetropolitan immigration odds in 2003-04, the coefficient had flipped from positive in 1988-89 to negative in 2003-04.

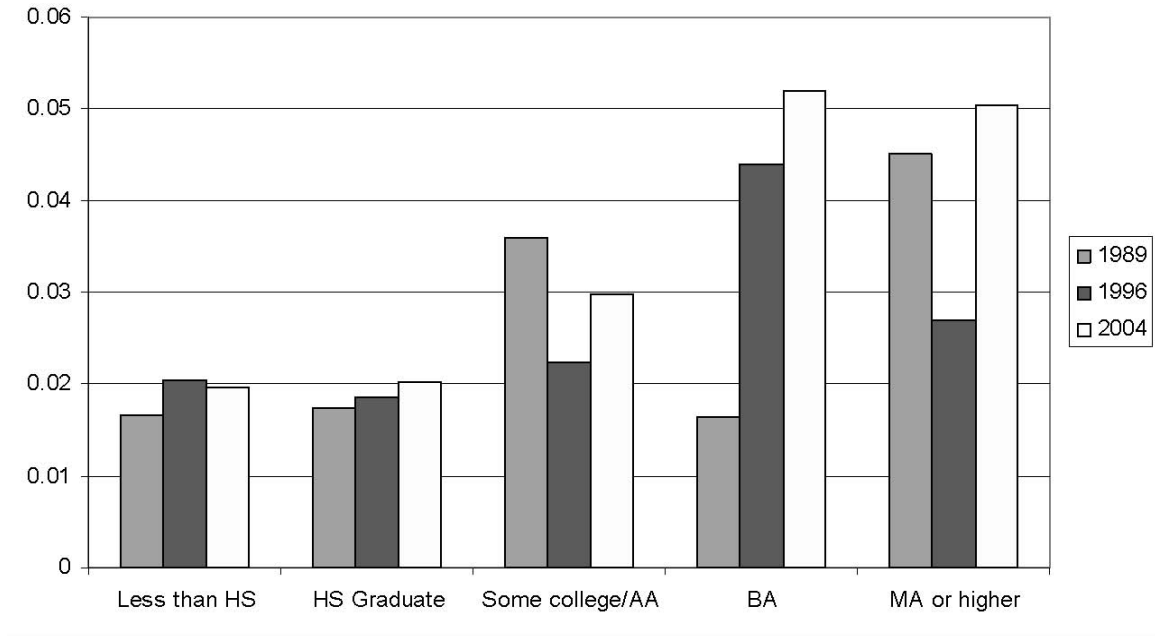
Table 4.2: Logistic regression coefficients, comparing metro-to-nonmetro migrants vs. metropolitan residents

		1989	1996	2004
Race	Black	-.733***	-.976***	-.762***
	Hispanic	-1.326***	-1.054***	-1.205***
	Other	-.204	-.710**	-.701***
Region	Midwest	.448**	1.012***	.896***
	South	.784***	1.330***	1.073***
	West	.712***	1.205***	.779***
Gender	Male	.162*	.025	-.066
Age	Age	-.018**	-.021**	-.028***
	18-24 years old	.236	.516**	.315*
	25-30 years old	.337*	.490**	.318*
	Over 60 years old	.011	-.089	.263
Education	Less than high school	.194	.345*	.228
	Some college/AA	-.238*	-.050	-.220*
	Bachelor's degree	-.309	-.340*	-.586***
	Master's degree or higher	-.195	-.033	-.555**
Constant		-4.547***	-4.888***	-4.210***
Pseudo R-square		.030	.045	.041
		N=75074 (597 moves)	N=66653 (534 moves)	N=103978 (708 moves)

Source: Author's analysis of 1989, 1996, and 2004 CPS demographic supplements

As in the consideration of nonmetropolitan-to-metropolitan migration trends in Table 4.1, the most striking changes to occur in metropolitan-to-nonmetropolitan migration trends involve the educational attainment of migrants. Between 1988-89 and 2003-04, highly educated nonmetropolitan residents became increasingly likely to relocate to metropolitan areas. During the same period, the highly educated metropolitan residents became less likely to move to nonmetropolitan areas. Indeed, in 1988-89, there was almost no relationship between a metropolitan resident's educational attainment and his or her odds of migrating to a nonmetropolitan area. By 2003-04, all categories metropolitan residents who attended college, and especially those who graduated with a BA degree or higher, were significantly less likely to migrate from metropolitan areas to nonmetropolitan areas.

FIGURE 2: Probability of migrating to metro area for average nonmetro respondent at each level of educational attainment (SOURCE: Table 1 logistic regressions on March CPS data)



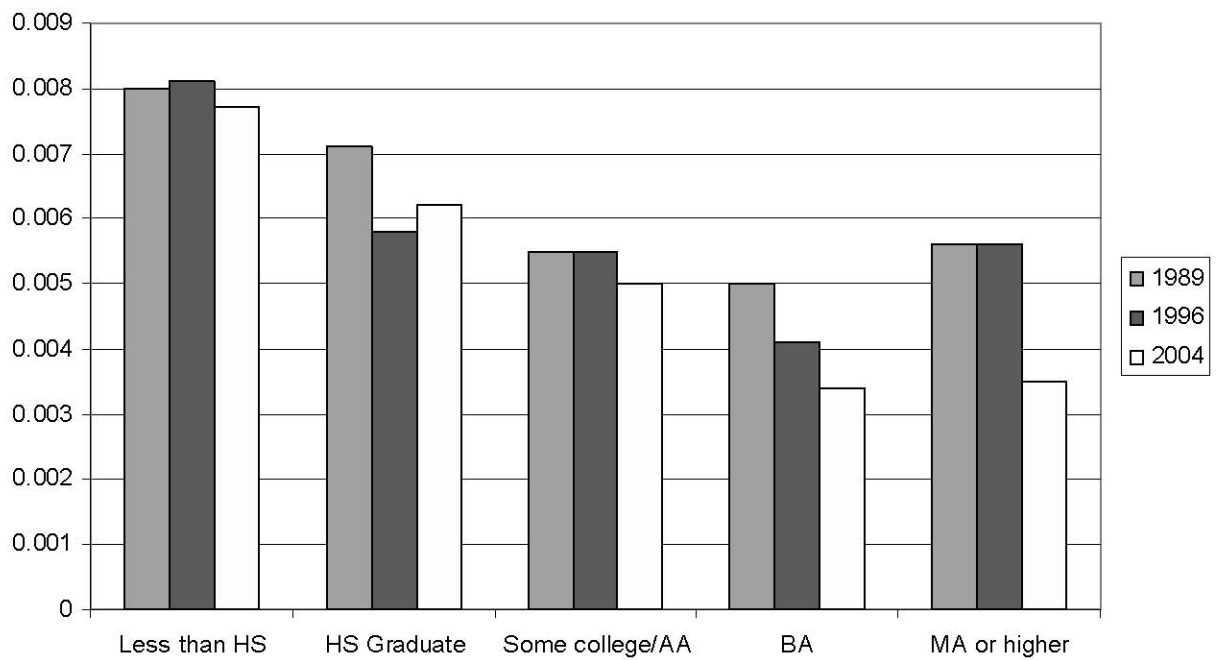
Figures 4.2 and 4.3 provides a graphical illustration of the changes that occurred between 1988-89 and 2003-04 in educational attainment's effect on nonmetropolitan migration odds. The bars on Figure 2 represent an average nonmetropolitan respondent's probability of migrating to a metropolitan area in 1988-89, 1995-96, and 2003-04; the bars on Figure 3 represent the average metropolitan respondent's probability of migrating to a nonmetropolitan area. Each of these probabilities are calculated using the logistic regression results from Tables 1 and 2. Probabilities are calculated for respondents at each of the education levels, with each of the remaining covariates held constant at the nonmetropolitan mean.

With the exception of some college and associates degree holders, Figure 2 shows rising rates of nonmetropolitan outmigration at every education level.

However, the increases are particularly pronounced among the college educated. The probability of outmigration for a nonmetropolitan BA-holder with average attributes more than tripled between 1988-89 and 2003-04, from .0164 to .0519.

Figure 3 illustrates this trend in the educational composition for metropolitan-to-nonmetropolitan migrants. This bar graph is essentially a mirror image of Figure 2. At most educational levels, the rate of migration out of metropolitan areas to nonmetropolitan areas declined during the period under study. But this decline is particularly pronounced among the college educated. For example, the probability of nonmetropolitan immigration for an average metropolitan resident with a bachelor's degree declined by more than 30 percent between 1988-89 and 2003-04, from .0005 to .0034.

FIGURE 3: Probability of migrating to nonmetro area for average metro respondent at each level of educational attainment
(SOURCE: Table 2 logistic regressions on March CPS data)



To summarize, these logistic regression models indicate that migration between metropolitan and nonmetropolitan areas is selective by age and educational attainment, and they suggest that migration is becoming increasingly selective over time. Both models show that youth is associated with migration, but this association is strongest – and growing fastest – in the models predicting migration from nonmetropolitan areas to metropolitan areas. Educational attainment is the leading predictor of migration in both of these models, and both show that its influence is on the rise. For nonmetropolitan residents, higher levels of educational attainment are associated with higher levels of metropolitan migration. For metropolitan residents, the relationship is reversed: Highly educated metropolitan residents are increasingly unlikely to migrate to metropolitan areas. The net result is a nonmetropolitan brain drain that is pronounced and becoming ever more pronounced. Nonmetropolitan areas are increasingly likely to lose their college-educated residents to metropolitan migration. At the same time, these nonmetropolitan areas are increasingly unlikely to receive college-educated migrants from metropolitan areas.

As noted earlier, both consumer preference-driven and economic incentive-driven theories of migration claim to account for age and educational selectivity in migration trends. The fact that young people are more likely than old people to migrate between metropolitan and nonmetropolitan areas is consistent with both the revised clean break theory and economic human capital theory. The rising nonmetropolitan brain drain seems to point more clearly toward economic theories; but here, too, residential preferences may play a role, if metropolitan preferences correspond with educational attainment.

However, the clean break theory and its preference-driven antecedents do not account for the changes in the selectivity of migration patterns over time. Human capital theory, on the other hand, suggests that migration patterns respond to fluctuations in metropolitan and nonmetropolitan labor markets. Tables 4.3 and 4.4 summarize the shifts in nonmetropolitan and metropolitan labor markets over the past 15 years to determine whether the rising tide of nonmetropolitan outmigration and its deepening educational selectivity have been driven by rising economic inequalities.

Table 4.3 examines the mean earnings for full-time metropolitan and nonmetropolitan workers over the age of 18 in 1989, 1996, and 2004. This table suggests that economic incentives do little to explain overall patterns in American internal migration. As we have already seen, net metropolitan/nonmetropolitan migration rates fluctuated during the 1989-2004 period. The net migration tide favored metropolitan areas in the early 1990s; shifted in favor of nonmetropolitan areas in the mid-1990s; and reversed once again over the last several years to favor metropolitan areas once again. Table 4.3 implies that earnings inequalities were not driving these changes, since it shows that the metropolitan earnings advantage remained largely unchanged throughout this period. In 1989, metropolitan men earned 31 percent more than nonmetropolitan men; in 1996, this gap remained at 31 percent; and in 2004, the metropolitan/nonmetropolitan earnings gap had shrunk to 30 percent. For women, the story is largely the same. In 1989, metropolitan women earned 39 percent more than nonmetropolitan women; by 1996 this gap had fallen to 35 percent; it remained at 35 percent in 2004.

Table 4.3: Mean earnings for full-time workers in metropolitan and nonmetropolitan areas, 1989, 1996, and 2004 (2004 dollars, inflation adjusted using Consumer Price Index)

		Metropolitan	Non-metropolitan	Metro/non ratio
Men	1989	\$49,678	\$37,948	1.31
	1996	\$51,096	\$38,876	1.31
	2004	\$54,489	\$41,805	1.30
Women	1989	\$30,026	\$21,602	1.39
	1996	\$31,676	\$23,549	1.35
	2004	\$36,439	\$27,564	1.35

Source: Author's analysis of 1989, 1996, and 2004 CPS demographic supplements

Table 4.3 shows no simple relationship between earnings and recent net metropolitan/nonmetropolitan migration trends for the population at large. But Table 4.4 suggests that changing economic conditions may have played a role in stimulating outmigration among highly educated nonmetropolitan youths. This table charts changes in the returns to college degrees in metropolitan and nonmetropolitan areas between 1989 and 2004. During the 15 year period that this study covers, the returns to higher education grew considerably among full-time workers in metropolitan areas, even as they held steady in nonmetropolitan areas. In 1989, the average full-time earnings for a metropolitan male with a Bachelor's degree was 41 percent higher than the average full-time earnings for a metropolitan male whose education ended with a high school diploma. Between 1989 and 2004, average earnings for metropolitan college graduates experienced robust growth, while the average earnings for metropolitan high school graduates declined. As a result, the returns to bachelor's degrees for metropolitan men who worked full-time nearly doubled during this

Table 4.4: Returns to BA in metropolitan and nonmetropolitan areas, 1989, 1996, and 2004 (2004 dollars, inflation adjusted using Consumer Price Index)

		BA	HS	Returns to BA
Men	1989 metro	\$59,560	\$42,110	1.41
	1989 nonmetro	\$47,417	\$34,991	1.36
	1996 metro	\$62,955	\$38,603	1.63
	1996 nonmetro	\$48,345	\$35,234	1.37
	2004 metro	\$68,102	\$39,891	1.71
	2004 nonmetro	\$51,760	\$36,685	1.41
Women	1989 metro	\$37,020	\$25,176	1.47
	1989 nonmetro	\$30,172	\$18,703	1.61
	1996 metro	\$40,236	\$25,369	1.59
	1996 nonmetro	\$31,635	\$19,750	1.60
	2004 metro	\$45,844	\$27,350	1.68
	2004 nonmetro	\$35,318	\$23,031	1.53

Source: Author's analysis of 1989, 1996, and 2004 CPS demographic supplements

period, growing to 63 percent by 1996 and to 71 percent by 2004. The returns to college degrees also widened for metropolitan women, although more slowly.

Nonmetropolitan college graduates did not share in the rapid earnings gains experienced by metropolitan college graduates, and between 1989 and 2004 the earnings returns to education remained largely unchanged in nonmetropolitan areas. For nonmetropolitan men, the full-time earnings premium associated with holding a bachelor's degree increased from 36 percent in 1989 to 37 percent in 1996 to 41 percent in 2004. In 1989 the average full-time earnings for nonmetropolitan women with BA degrees was 61 percent higher than that of nonmetropolitan women with only high school diplomas. In 1996 that gap was 60 percent, and by 2004 it had slipped to 53 percent.

For college graduates, therefore, economic incentives strongly favored metropolitan residence, and these incentives intensified over the course of this period. In 1989, the average full-time earnings for metropolitan BA men was 25% higher than the average full-time earnings for nonmetropolitan BA men. By 2004, that gap had widened to 31%. For college-educated women, the premium associated with living and working in a metropolitan area improved from 23% in 1989 to 30% in 2004.

These trends in the returns to education correspond closely with the trends in the selectivity of nonmetropolitan and metropolitan migration uncovered in Tables 4.1 and 4.2. All else equal, nonmetropolitan BA-holders were no more likely to migrate to metropolitan areas than any other nonmetropolitan resident in 1989. As the metropolitan returns to college degrees shot up during the early 1990s, the educational selectivity of nonmetropolitan outmigration also rose, and in 1996 and 2004 nonmetropolitan BA holders were much more likely than their less highly educated neighbors to migrate to metropolitan areas. Likewise, increasing returns to college degrees discouraged metropolitan outmigration among the highly educated. Table 2 shows no significant difference between the metropolitan outmigration rates of college graduates and high school graduates in 1989. But higher metropolitan returns to education were met with lower outmigration rates – in 1996 and 2004 highly educated metropolitan residents were significantly less likely to leave metropolitan areas for nonmetropolitan areas than high school graduates were.

Conclusion

Net nonmetropolitan migration rates have fluctuated unpredictably since the 1970s, swinging from negative to positive in the 1970s, positive to negative in the 1980s, back to positive in early 1990s, and back to negative once again in the late 1990s. It is not yet clear whether net migration rates will revert to the patterns that held prior to the 1970s, in which the number of people moving from nonmetropolitan to metropolitan areas consistently outweighed the number moving in the reverse direction. However, the fluctuations in net migration rates that have occurred over the last several decades clearly suggest that the rural renaissance of the 1970s was not permanent.

The recent changeability of recent net migration rates between America's metropolitan and nonmetropolitan areas also strongly argues against clean break theory, which held that post-industrialization allowed noneconomic factors to become increasingly salient predictors of migration behavior. Survey research has consistently shown that Americans prefer rural living arrangements. If residential preference were driving net migration patterns, we would expect nonmetropolitan in-migrants to consistently outnumber out-migrants.

But a recent migration trends defy simple economic explanations as well. For the population at large, the earnings inequalities between metropolitan and nonmetropolitan America have also remained unchanged. If metropolitan/nonmetropolitan decisions respond exclusively to economic incentives, we would expect a slow, steady trend toward metropolitan migration. Fluctuation in net nonmetropolitan migration rates suggests that the story underlying

American internal migration is more complex than either the clean break theory or traditional economic theories suggest.

The key to understanding the relative roles of economic incentives and consumer preferences in migration is to examine the ways in which migration behavior is socially selective. This chapter has demonstrated that above all else, the exodus of educated and ambitious rural youth has driven non-metropolitan America's migration downturn. Rural college graduates are three times more likely than their less educated neighbors to move to the city, and every year, more than 6% of all non-metropolitan BA-holders migrate to the metropolis. The educational selectivity of nonmetropolitan outmigration patterns emerged in the mid-1990s and has remained pronounced since. The multivariate analyses reported here suggest that educational attainment is currently the most important predictor of the odds of outmigration for nonmetropolitan residents. Furthermore, logistic regression analyses of the predictors of migration in the reverse direction – from metropolitan areas to nonmetropolitan – demonstrate that highly educated metropolitan residents have become increasingly unlikely to move out of metropolitan areas over the last two decades. The net result of these two trends is a deepening nonmetropolitan brain drain.

While this chapter has focused on this shifts in the relationship between age and educational attainment and nonmetropolitan/metropolitan migration, these are not the only predicts of migration behavior that have stifted over the last two decades. Net of controls, the odds of nonmetropolitan outmigration for African-Americans increased significantly between 1989 and 2004. This finding is inconsistent with recent ethnographic research, and deserves closer examination. Also during this time

period, the odds of nonmetropolitan outmigration for Midwesterners declined relative to those odds for nonmetropolitan residents in the Northeast. Both of these shifts are worthy of further research.

The rising educational selectivity metropolitan/nonmetropolitan migration argues against the clean break theory, pointing to the continuing relevance of economic factors in predicting internal migration patterns. This chapter has demonstrated that the educational selectivity of contemporary migration trends have corresponded with changes in metropolitan labor markets. In the past 15 years, the wages earned by metropolitan workers have become increasingly stratified by educational attainment. Between 1989 and 2004, the average fulltime earnings for metropolitan college graduates shot up by nearly one-third, while the average fulltime earnings for metropolitan high school graduates stagnated. Meanwhile, the economic returns to college degrees remained relatively constant in nonmetropolitan America. As a result, the economic incentives associated with living in a metropolitan area have become increasingly pronounced for the highly educated. Human capital theory suggests that the migration behavior of the highly educated is more responsive to economic incentives than the migration behavior of people with lower levels of education. Given the strong economic incentives in favor of nonmetropolitan migration, it seems likely that economic factors remain salient predictors of nonmetropolitan migration.

Beyond their theoretical implications, the findings reported in this chapter have troubling implications for the future of nonmetropolitan areas in the United States. Increasing educational differentiation in nonmetropolitan migration patterns

has profound implications for nonmetropolitan America's demographic future, particularly when it is simultaneous with an overall nonmetropolitan outmigration trend. Places with high levels of human capital enjoy robust economic growth, high productivity, and relatively strong levels of population growth (Rauch 1993; Glaeser 2001; Florida 2002; Lobo and Smole 2002). As nonmetropolitan America experiences deepening brain drain and metropolitan America enjoys brain gain, the advantages associated with human capital concentration flow disproportionately to metropolitan areas. The obvious risk is that these patterns create a vicious circle for nonmetropolitan America, in which brain drain undermines economic opportunity, which in turn stimulates further brain drain.

Chapter 5:

Educational concentration's consequences for children's schooling

Nearly two decades have passed since William Julius Wilson reintroduced the idea of ecological effects to the sociology of inequality. Noting that “the social transformation of the inner city has resulted in a disproportionate concentration of the most disadvantaged segments of the urban black population” (1995, p. 58), Wilson argued that increasing ghettoization exerted a drag on the life chances of poor African-Americans that was independent of the disadvantages associated with racism and poverty. Central to this treatment of inner-city poverty is the idea of ecological effects. Isolated, jobless, and without ties to the rest of American society, the ghetto poor that Wilson depicted were caught in a “tangle of pathology.” According to Wilson, the spatial concentration of poverty led rates of crime, single parenthood, and high school dropout to soar in the inner city.

Wilson's argument has undeniably renewed sociology's interest in ecological effects, a notion that had thrived in the discipline's early years but had fallen into neglect after the ascendance of the status attainment school and its survey-driven techniques (Massey 2001). In the years following the publication of *The Truly Disadvantaged*, the rate of publication for papers investigating neighborhood effects in major social sciences journals more than doubled. Much of this research has focused on the effects of concentration on the behavior of children and young adults.

Sociologists and other social scientists have studied the relationship between childhood neighborhoods, schools, and social networks and people's work history, reproductive behavior, criminal activities, and educational attainment. The study of ecological effects has become something of a cottage industry in the social sciences, and today, more than 100 articles investigating neighborhood effects are published annually (Sampson, Morenoff, and Gannon-Rowley 2002).

While this flurry of scholarly attention to the effects of school and neighborhood contexts on children's development has been productive, difficult questions remain. Researchers have convincingly demonstrated true ecological effects on a wide variety of children's outcomes – ranging from cognitive development to crime, teen-aged pregnancy, and high school dropout. Nonetheless, a complex of questions regarding which aspects of childhood context matter, the level of aggregation at which contextual effects occur, and, ultimately, *how* context affects children's development remain largely unanswered. In this chapter, I will argue that an awareness of educational segregation provides a key to unlocking some of these mysteries. While recent analyses of ecological effects have, following Wilson, focused on the economic characteristics of communities, I will demonstrate that local educational contexts are also important predictors of children's learning. Furthermore, while these analyses have largely focused on the smallest levels of aggregation available to quantitative researchers – the census tract and the school – I will show that important contextual effects also occur at the county level. I will argue that these findings suggest that institutional factors, such as school organization and

finance, are an important mechanism through which contextual characteristics influence children.

Literature review: Does context influence children's educational outcomes?

A series of methodological innovations have allowed researchers to address the most fundamental challenge facing the ecological effects literature – namely, demonstrating that independent ecological effects actually do occur. This is no small accomplishment. Since families and individuals often self-select into neighborhoods and schools, it is difficult to separate true ecological effects from the implications of this process of selection (Morenoff and Tienda 1997).²³

Traditional regression techniques help address the problem of separating out true ecological effects from the confounding effects of related individual and family characteristics, and the bulk of recent investigations of ecological effects rely on multivariate analyses. If, for example, relatively affluent families are less likely to raise their children in neighborhoods with high poverty rates, controlling for family income in a multivariate context helps to more accurately distinguish the independent effect of neighborhood poverty. However, there are many reasons to regard estimates of the size of contextual effects that are drawn from regression models with skepticism. Since many of the factors that influence ecological placement are not easily measured (and indeed, the act of selection may be endogenous to many of the ecological processes that social scientists study), traditional regression techniques may overestimate the size of ecological effects. As Ginther, Haveman, and Wolfe

²³ While these neighborhood effects and school effects literatures have developed separately to a remarkable degree, they cover much of the same conceptual territory, and much of this literature review attempts to cover both of these fields. As a result, I often use the generic terms to “ecological effects” or “contextual effects,” rather than more specific terms like “school effects” or “neighborhood effects”.

(2000) and Solon, Page, and Duncan (2000) note, measured ecological effect sizes vary dramatically from study to study, based on the number of covariates included in the estimation models.

Social scientists have attempted to overcome the limitations of traditional regression techniques by turning to instrumental variables, counterfactual modeling, and random-assignment experiments to estimate ecological effects. Instrumentation has been widely used in the economics literature to measure the effect of a treatment net of unmeasured selection bias. This technique involves estimating a regression model on the outcome of interest. In addition to using the treatment of interest and other relevant covariates to predict the outcomes – as would be done in a traditional regression analysis – a special covariate that is associated with the treatment but not directly associated with the outcome is added to the model. This special covariate, which is known as an instrumental variable, is designed to capture – and correct for – the confounding effect of unmeasured selection. Economists and other social scientists have used several instrumental variables to estimate neighborhood and school concentration effects on adolescent outcomes. Their models have consistently revealed statistically significant ecological effects. While these effects are often modest, instrumental variables research has shown that the spatial concentration of poverty increases crime, pregnancy, test scores, and high school dropout rates among young adults (c.f. Foster and McLanahan 1996; Cutler and Glaeser 1997; Card and Rothstein 2005).

Similar results have been obtained using counterfactual modeling techniques, which attempt to simulate random-assignment experimentation by matching

respondents who received a treatment with similar respondents who did not receive the treatment and then comparing the two groups to generate an unbiased estimate of the treatment effect. Harding (2003) matched young adults who grew up in poor neighborhoods with peers who grew up in affluent neighborhoods, but had a nearly-identical propensity to grow up in a poor neighborhood. Harding argues that this technique is uniquely effective in controlling for selection effects and unmeasured variable bias, since it estimates the effect of the treatment on the treated, rather than estimating an overall population effect. However, it is possible that this technique could lead researchers to underestimate the effect of contextual variables.

Counterfactual matching requires a dichotomous treatment – Harding, for example, matched respondents in the poorest 1/3rd of U.S. Census tracts with those in the least poor 1/3rd. While epidemic theories (Crain 1991) suggest that the functional form of contextual effects may be nonlinear, most contextual measures are continuous – for example, rates of poverty, affluence, crime, or median income – and information is inevitably lost when they are split into dichotomous treatment variables for the purpose of counterfactual matching. In any case, the results of Harding’s counterfactual investigations are similar to those reported by economists using instrumental variables: Harding finds that being raised in a high-poverty neighborhood has a modest, but statistically significant, effect on young adults’ odds of dropping out of high school and having a child while still a teen-ager.

In addition, convincing evidence regarding the existence of contextual effects has come from experimental studies based on the court-ordered Gautreaux and Moving to Opportunity programs. These policy experiments used random assignment

to separate residents of Section 8 low-income housing into three groups: A treatment group receiving a voucher to move to a new, relatively affluent neighborhood; another group which received a housing voucher with no geographic restrictions; and a control group which received no change in their public housing assistance. Because assignment is random, studies based on these policies are able to produce estimates of the consequences of moving into a middle class neighborhood for the inner-city poor that are relatively free of selection bias. (However, since respondents must opt into these programs, and since not all respondents in the treatment group actually agreed to change neighborhoods, it is possible that selection biases remain even in this experimental data.) In general, these studies report that changing neighborhoods has modest positive effects for adolescents, improving health, and discouraging criminal and other problem behaviors (Katz et al. 2001; Ludwig et al. 2001; Rosenbaum and Harris 2001).

Taken together, recent research using several approaches, including instrumental variables, counterfactual matching, and experimental policy design, has quite convincingly demonstrated that contextual factors do influence young adults' trajectories. After controlling for selection, these ecological effects are often small. Nonetheless, the available research plainly shows that the socio-economic characteristics of children's neighbors and classmates matter.²⁴

Given this robust evidence in favor of neighborhood effects, however, it is surprising to note that several smaller-scale studies specifically designed to measure

²⁴ It should be noted, however, that recent research using fixed-effects family models contradicts these findings. While Plotnick and Hoffman (1999) find contextual effects using multivariate techniques, their fixed-effects family models, which measure the effects of neighborhood change on outcomes measured within the same families, return nonsignificant results.

the interaction between neighborhoods, schools, and families in influencing children's educational and social development have found considerably weaker contextual effects. For example, Furstenberg, Cook, Eccles, Elder, and Sameroff (2000) studied more than 500 families located in 65 different Philadelphia census tracts, using both quantitative and qualitative methods. Although this study's quantitative analyses used regression techniques, which are far less conservative in addressing selection bias than the instrumental and propensity matching techniques described above, it found few instances in which neighborhood characteristics had a significant independent influence on parenting style or children's outcomes.

The fact that multi-city studies tend to produce more robust estimates of contextual effects than single-city studies could suggest that some portion of measured neighborhood or school effects may be due to variation *between* cities rather than *within* them. As Sampson (2001, p. 39) points out: "neighborhoods are not islands unto themselves. Rather, they are embedded in a higher level context that generates measurable outcomes within them.... To properly nest neighborhoods in these large domains – and ultimately to separate the effects of the two – we need to move from single-city to multicity studies." To date, researchers have largely neglected these higher level ecological effects, focusing exclusively on school and neighborhood effects. I will argue in this chapter that the higher level contextual effects have important implications for our understanding of the mechanisms through which context influences children's development.

How does context influence children's outcomes?

In a review of the neighborhood effects literature, Jencks and Mayer (1990) outlined several mechanisms through which neighborhood context might be expected to influence children and young adults. The most simple of these mechanisms imply a direct, positive correlation between neighborhood quality and desirable children's outcomes: *Contagion* models suggest that children who are exposed to antisocial peer behavior are more likely to engage in these behaviors themselves. While these models draw attention to the negative implications of "bad" neighborhoods, *socialization* models point to the positive influence of growing up in a "good" neighborhood, focusing on adult role models and the social control that they can exercise. *Institutional* models take a third approach, arguing that neighborhoods matter because the quality of schooling and the availability of other important institutional resources vary from place to place.

But Jencks and Mayer caution that cross-cutting contextual effects may complicate the relationship between neighborhood quality and children's success. *Relative deprivation* theory, for example, suggests that poor children who grow up surrounded by the high-achieving children of affluent families may be worse off than they would be in poorer neighborhoods. In contexts in which inequality is pronounced, poor children may be more aware of their relative disadvantages, and more likely to develop deviant subcultures. Furthermore, in the *competition* for scarce resources, students with even small family disadvantages may face substantial setbacks.

Sorting out the relative importance of these mechanisms has been the central focus of recent research on contextual effects. Brooks-Gunn, Duncan, Klebanov, and

Sealand (1993) provided a starting point for this inquiry, arguing that by comparing the relative importance of several distinct measures of neighborhood quality, researchers can separate out the influence of these theoretical mechanisms. The authors focused particularly on the distinction between contagion and socialization effects. They maintained that contagion theory suggests a strong association between neighborhood poverty and problem behaviors like teen-aged pregnancy and dropping out of high school. Socialization theory, meanwhile, suggests that the presence of affluent neighbors (as opposed to the presence of poor neighbors) is a more salient predictor of children's behavior. Their multivariate analyses show that the proportion of neighborhood households with relatively high incomes is a better predictor of teen pregnancy and high school dropout, while neighborhood poverty rates have no independent effect. This finding lends empirical support to the idea that socialization is the mechanism that connects neighborhood quality with children's learning.

Ainsworth (2002) uses a similar technique, focusing on the role of ecological variables in predicting children's educational outcomes, and the mechanisms through which these ecological effects occur. In models predicting the amount of time high school students spend on homework and their test scores in standardized math and reading achievement tests, Ainsworth finds that characteristics of the ZIP codes in which students reside explain nearly as much variance as traditional family status measures explain. The ecological effects that Ainsworth uncovers using traditional regression analyses are somewhat larger than the effects reported in earlier analyses using similar techniques and covariates, including Brooks-Gunn, Duncan, Klebanov, and Sealand (1993). The presence of high status neighbors is the most important

contextual predictor in Ainsworth's models, a concept that combines the proportion of adults who have a BA degree or higher with the proportion of adults who are employed in professional or managerial occupations. By contrast, local economic deprivation (measured as the proportion of ZIP-code residents unemployed or living below the poverty line) does not independently predict either of the educational outcomes that Ainsworth studies.

Following Brooks-Gunn et al., Ainsworth argues that this finding suggests that collective socialization is the key mechanism through which context influences children's educational trajectories. Ainsworth takes this line of research one step further by demonstrating that young adults' educational expectations, their assessment of the educational atmosphere in their schools, and the student/teacher ratio in their schools all mediate the effect of neighborhood characteristics on children's educational achievement. He interprets these findings to suggest, once again, that context influences children primarily via collective socialization. It should be noted, however, that Ainsworth's measurement of mediating mechanisms are individual-level variables rather than ecological. As Sampson, Morenoff, and Gannon-Rowley (2002) point out, these individual-level measures are imperfect proxies for ecological mechanisms, and introduce a large measure of measurement error. While several researchers have begun developing more direct, ecological measures of these mechanisms, data on these measures are not yet widely available, and the existing research using these measures has been focused on the relationship between context and youth criminal activity. (For an exhaustive review of this literature, see Sampson, Morenoff, and Gannon-Rowley, 2002.)

Where does context influence children's educational outcomes?

A related issue in the analysis and interpretation of contextual effects involves the level of aggregation at which these effects are best measured. Individuals are situated in a variety of nested and overlapping social contexts, from the family, to the school, to the neighborhood, to the municipality, and so on. Ecological researchers have typically zeroed in on the closest of these contexts, and most of the contextual effects literature has focused on school-level and neighborhood-level effects. The bulk of the neighborhood effects literature has matched individual-level data with data describing subjects' census tracts (a unit of aggregation designed by the Census Bureau including 5,000-8,000 residents). Other researchers have attempted to utilize more finely-grained definitions of neighborhoods, including block groups (Sampson, Morenoff, and Gannon-Rowley 2002).

In this regard, the Ainsworth (2002) article described above is an exception. The National Education Longitudinal Study data that Ainsworth uses suppresses detailed census tract and block group identifiers, providing instead higher-level ZIP code identifiers. As a result, Ainsworth's analyses of ecological effects necessarily take place at a higher level of aggregation than most of the studies in the ecological effects literature. Ainsworth regards this as a short-coming of his study, but it is possible that analyzing ecological effects at a higher level of aggregation than is typically done in the neighborhoods and school effects literature may explain, in part, why Ainsworth observes ecological effects that are more pronounced than other researchers have observed. (Indeed, Brooks-Gunn et al. (1993) report that substituting ZIP characteristics for neighborhood characteristics produces stronger neighborhood

effects in their analyses of dropping out of high school, although they do not provide a detailed description of this analysis.)

The fact that contextual effects are more pronounced at higher levels of aggregation may shed new light on the question of *how* context influences children. Many of the ideas associated with the contextual effects literature hinge upon the face-to-face relationships that children and young adults experience in their everyday lives. Notions such as contagion, social control, role modeling, and relative deprivation all draw attention to social interactions between youths and their peers and the adults they encounter at school and in their neighborhoods. If these interactions influence children's development, it seems likely that they will result in contextual effects that are best measured at the most local levels. The quality of role models that children are exposed to is likely highly responsive to the number of high status adults in their immediate neighborhood. Likewise, the peer influences to which children are exposed likely vary primarily at the level of the school and the neighborhood.

But as Jencks and Mayer point out, these face-to-face relationships are not the only ways in which context can influence children's development. Institutional theories point to the relevance of factors that transcend children's immediate social environment: The quality of their schools and other institutional resources is likely more responsive to political forces and economic resources at the level of the school district or the municipality.

We know, for example, that clear funding disparities exist between school districts. In a national study of school finance disparities, the Education Trust

demonstrates that the state and local funding available to the nation's most affluent school districts is approximately \$800 per pupil higher than the funding available in districts with the highest poverty rates (Education Trust 2004).²⁵ While reliable school-level funding data are harder to come by nationally, local studies suggest that funding disparities *within districts* are smaller. Condrón and Roscigno's (2003) analysis of school finance patterns in Columbus, Ohio suggest that inequalities in state and local funding do exist between schools within the same district, but that federal Title I funds largely level out these inequalities. This is a dispiriting finding, because Title I funds are intended to provide funding boosts for schools with high levels of need, not to reconcile gaps in state and local financing. Nonetheless, Condrón and Roscigno's analysis suggests that inequalities in the availability of publicly-financed educational resources are greater between school districts than they are within them.

My preliminary research using the National Center for Education Statistics Common Core of Data (CCD) suggests that inequalities in school financing and resources are closely linked to county demographics. For instance, local per-pupil school financing correlates with county-level concentration of college graduates at .501. This correlation is slightly higher than the correlation between local school funding and county mean income or county unemployment.

In addition to funding inequalities, hard-to-measure policy differences between districts, municipalities and counties could influence children's educational

²⁵ The Education Trust's figures include state and local financing only. The comparison is between districts in where the local poverty is in the bottom quartile nationally versus districts where the poverty rate is in the top quartile. Similar gaps exist between districts with large minority populations and those with small minority populations.

trajectories. Furthermore, these between-place inequalities in educational opportunities may not be limited solely to the public schools – the private sector is also likely to provide more high-quality institutional resources (such as schools, day-care centers, and extracurricular opportunities) in affluent and educationally-oriented communities.

When Ainsworth finds that the proportion of high status adults in a children's ZIP code is a very important predictor of educational success, therefore, it is possible that this finding points not to the importance of face-to-face role modeling, but instead to the relevance of school finance and other institutional mechanisms. If so, the ecological unit of the ZIP code should not be understood as a proxy for the neighborhood, but rather as a proxy for the political units through which the institutions that shape children's lives are funded and managed, such as the school district, municipality, or the county.

Data and Methods:

This chapter will estimate ecological effects at two distinct levels of aggregation – the census tract and the county – using longitudinal data from the Mother-Child sample of the National Longitudinal Survey of Youth 1979 (NLSY79).²⁶

The NLSY79 began collecting data on the family background, labor market experience, and educational history of a sample of 12,686 American young adults

²⁶ The NLSY79 is sponsored by the U.S. Department of Labor's Bureau of Labor Statistics, and administered with collaboration from the Center for Human Resource Research at The Ohio State University and the National Opinion Research Center at the University of Chicago.

who were between the ages of 14-22 when the first round of data was collected in 1979. Annual follow-up surveys tracked the school-to-work transition of this original cohort, and in 1986, the NLSY79 initiated a mother-child sample, gathering information on the children of female NSLY79 respondents. In addition to surveying mothers and children about their family, friends, and schooling, the NLSY79 has administered a battery of cognitive and socioemotional assessments to the children biannually (Baker, Keck, Mott, and Quinlan 1993; U.S. Department of Labor 2001).

The NLSY has geocoded respondents' residential addresses as of each survey round, providing repeated identifiers for the census tracts and counties in which respondents and their children lived. These geocoded files are available to data users via a restricted data license. The Bureau of Labor Statistics considers the census-tract level identifiers to be confidential data, and does not allow these data to be viewed or analyzed outside of their Washington, DC offices. By matching respondents' census tracts and counties with data from the U.S. Department of the Census decennial SF-3 files, I used these ecological identifiers to generate a multilevel profile of the places in which the children of the NLSY grew up. (For a detailed description of the process utilized to geocode NLSY data, see Holloway and Mulherin 2004.)

This chapter presents estimations of the effect of tract-level and county-level ecological predictors on children's educational and behavioral development, using traditional regression models, as well as counterfactual models based on propensity score matching. As noted earlier, each of these techniques has merits and shortcomings: Regression models may not sufficiently address selection effects, and in so doing, overestimate contextual effects. However, the multivariate regression

models allow simultaneous estimations of the net effects of several different ecological factors, making it possible to compare the independent effects of neighborhood poverty, for example, with those of county educational concentration. This capacity is invaluable for an understanding of the mechanisms through which context influences children's development. The counterfactual models, on the other hand, address the issue of selection, and generate more conservative (and presumably more accurate) estimations of the contextual effects.

Dependent variable

The OLS and propensity matched models summarized in this chapter consider the role that contextual characteristics play in influencing children's scores on the Peabody Individual Achievement Test (PIAT). This standardized test is designed to measure children's academic achievement (Dunn and Markwardt 1970). The overall composite score utilized in these analyses is the mean of the child's age-standardized percentile score on subtests in mathematics, reading recognition, and reading comprehension, each of which consist of 84 multiple choice items.²⁷ These three subtests have high reliability, and correlate closely with a variety of other cognitive measures.²⁸ The PIAT was administered repeatedly to the children of the NLSY,

²⁷ In models that I have not reported here, I analyzed the three PIAT subtests separately, returning findings that are substantively similar to the summary findings reported here.

²⁸ One-month test-retest reliabilities vary between the three PIAT subtests, ranging from .64 for the reading comprehension subtest to .74 for the mathematics subtest and .89 for the reading recognition subtest (Dunn and Markwardt 1970; Baker *et al.* 1993). The three subtests scale well with one another – for the 2000 subtests, Cronbach's alpha=.83.

beginning when they were 5 years old. The analyses reported here focus on PIAT scores measured when children were 5-7 years old.

Ecological predictors

This study is unique in the ecological effects literature in that it simultaneously measures ecological effects at several different levels of aggregation.

The tract-level measures are as follows:

- Percent of tract residents aged 25 or above who have a BA degree or higher,
- Percent of tract residents are black or Hispanic,
- Percent of tract households with total household income below the poverty line, and

- Percent of tract households with total household income greater or equal to four times the poverty line.

As noted elsewhere in this dissertation, the census tract is a unit of analysis designed by the Bureau of the Census to approximate extended neighborhoods. Census tracts include 5,000-8,000 residents and their borders follow major roads, bodies of water, and other important social and natural boundaries.

In addition, the effects of three county-level predictors are estimated:

- Percent of county residents aged 25 or above who have a BA degree or higher, and
- County unemployment rate.

While counties vary dramatically in geographical size and population, and their borders often bear little relevance to people's day-to-day social lives, they are useful

in these analyses since they are political units. As a result, institutional policy and funding patterns typically follow county lines.

These contextual measures refer to the census tracts and counties that children lived in when they were 5 years old, before the outcomes used in this chapter were measured. The contextual variables are drawn from the nearest decennial Census SF-3 file. If a child's neighborhood location was collected between 1986 and 1994, contextual data from the 1990 Census are used; for younger children whose neighborhood location was collected between 1996 and 2000, 2000 Census data are used.

Like Brooks-Gunn, Duncan, Klebanov, and Sealand (1993), I consider an association between tract-level poverty and children's outcomes to be evidence of contagion; and I consider an association between tract-level affluence and children's outcomes to be indicative of the importance of role-modeling and social capital. I argue that county-level effects point primarily to the importance of institutional resources. Ideally these resources would be measured more directly (instead of via county-level demographics), but district-level school finance data have only recently become available nationwide (via the National Center for Education Statistics' Common Core of Data). But these data are still unavailable for many of the nation's largest school districts (including the New York City Public Schools) I did not use them in this study.

Control variables

Both the OLS regression models and the propensity models utilize a broad set of control variables in an attempt to separate the direct effects of context from

influence of correlated family characteristics. Each of these background predictors was measured in the years prior to the measurement of the dependent variables and the contextual variables. The following background factors are utilized in the models that follow:

- race/gender dummies (for which white females are the reference categories)
- family income-to-needs ratio (household income divided by the poverty level for the family size, average across all available years between child's birth and age 5)
 - family net worth (total value of all family assets, minus debts)
 - mother's highest degree completed, as of child's 5th birthday
 - father's highest degree completed, as of child's 5th birthday
 - mother's occupational complexity (imputed for mothers who are unemployed)
 - mother's spouse or partner's occupational complexity (imputed for households with no working spouse or partner)
 - mother's personal earnings in the year before her first child was born (inflation adjusted)
 - dummy, mother ever collected welfare between child's birth and age 5
 - dummy, mother has spouse or partner in the household
 - mother's intelligence, measured by the Armed Force Qualification Test administered to all NLSY respondents in 1980
 - mother's GPA in high school academic courses

- mother's self-esteem, measured by the Rosenberg Self Esteem Scale administered to all NLSY respondents in 1980

- mother's self-mastery, measured by the Pearling Self Mastery Scale administered to all NLSY respondents in 1980

- mother's age at child's birth

- child's age (as of 2000)

- number of siblings or other children's in child's house at age 5

- region dummies, West is the reference

- rural/urban dummies, suburban is the reference.

Table 5.1 summarizes descriptive statistics for the outcome, the ecological predictors, and the control variables. Missing data on the control variables are imputed using the Amelia program for multiple imputation. Missing data are not imputed on the dependent variables or on the ecological predictors. Therefore, children who do not have an early PIAT assessment, as well as children for whom geocoded data is unavailable are excluded from these analyses.

Counterfactual models

After considering the regression models, I reanalyze the significant ecological effects using propensity-matched counterfactual models. These matched models provide a more conservative estimate of the true effect of ecological predictors, since they more effectively control for the selection effects that potentially contaminate regression estimates.

Propensity models require a dichotomized treatment, so the first step of this counterfactual analysis is to split the continuous ecological variables into dummy

variables. This is not a trivial step. Epidemic theory (Crane 1991) suggests that contextual effects are most pronounced in the neighborhoods in which poverty is highly concentrated. If this is the case, a counterfactual analysis comparing children who grew in neighborhoods with higher than average poverty rates with those who grew up in neighborhoods with lower than average poverty rates may return weak

Table 5.1: Descriptive statistics of variables included in the analyses.
 Missing data in control variables filled using Amelia multiple imputation, all other
 missing cases excluded from analysis. (N=2240)

	Minimum	Maximum	Mean	Standard Deviation
Dependent variable:				
Standardized PIAT, age 5-7	-1.993	2.201	0	1
Tract characteristics:				
% BA or higher	0	.9421	.1913	.1518
% black/Hispanic	0	1.000	.2093	.2828
% below poverty line	0	1.000	.1456	.1320
% affluent	0	.9633	.2783	.1977
County characteristics:				
% BA or higher	.0399	.4990	.1709	.0681
% unemployed	.0150	.1820	.0650	.0282
Controls:				
Black female	0	1	.1473	.3544
Black male	0	1	.1473	.3544
Hispanic female	0	1	.0834	.2765
Hispanic male	0	1	.0917	.2886
White male	0	1	.2694	.4437
Family income-to-poverty ratio	-1.609	3.292	.7194	.8006
Family net worth	-\$500,000	\$500,000	\$70,516.97	\$126,222.9
Mother's highest degree	0	6	2.792	1.569
Father's highest degree	0	6	2.464	1.351
Mother's occ. complexity	-2.647	3.497	.0298	.7233
Father's occ. complexity	-2.922	2.525	.0317	.6830
Mother's personal earnings	0	78,000	10,078.27	10,876.36
Dummy, mother on welfare	0	1	.0928	.3108
Dummy, two-parent family	0	1	.7478	.4343
Mother's AFQT				
Mother's high school GPA				
Mother's self-esteem				
Mother's self-mastery				
Mother's SES origins	-2.154	2.011	0	1
Mother's age				
Child's age (2000)	5	15	10.539	2.670
Number of siblings	0	4	1.830	1.120
Region: Northeast	0	1	.1530	.3600
Region: North-central	0	1	.2822	.4501
Region: South	0	1	.3799	.4854
Lived in urban area	0	1	.2698	.4439
Lived in rural area	0	1	.1804	.3845

SOURCE: Author's analyses of restricted geocoded National Longitudinal Survey of Youth, 1979 Mother-Child file and U.S. Census Summary File 3, 1990 and 2000.

contextual effects, while an analysis in which the treatment compared children in extremely high poverty neighborhoods with children in average neighborhoods would return stronger contextual effects.

The counterfactual analyses reported in this chapter follow the same procedure as the propensity matched models reported in Chapter 3. First, I predict children's propensity to receive the treatment in question using a logistic regression model. Each of the control variables utilized in the earlier regression models are included in these logistic regression models, along with several interaction and quadratic terms. In the second step, I match children who received the treatment with a control group of children who did not receive the treatment but were equally likely to, based on the propensity scores estimated in the first step. The independent effects of the treatment are then estimated by comparing the children in the treatment group with those in the matched control group on the outcomes of interest.

The standard biases for these matched models, which are reported in Appendix B, suggest that the matched treatment and control groups in each of these analyses are well balanced on the covariates.

Findings

Table 5.2 summarizes the results of several OLS regression models predicting children's scores on the PIAT achievement tests. In the first model, several characteristics of childhood census *tracts* are analyzed, without other individual-level controls. This model suggests that achievement test scores are related to two neighborhood characteristics: Children who live in neighborhoods with high concentrations of college graduates tend to score higher on the PIAT test, and children who live in neighborhoods with high concentrations of poverty tend to score lower. These effects are similar in magnitude – in both cases, a one standard deviation shift in neighborhood quality is associated with an approximately .16 standard

Table 5.2: Standardized coefficients. Effect of contextual characteristics on children's Peabody Individual Achievement Test scores, measured at age 5-7

	Model 1	Model 2	Model 3	Model 4	Model 5
Tract characteristics:					
% BA or higher	.1599***	.1092**	.0006	--	--
% black/Hispanic	-.0283	-.0577	.0640	--	--
% below poverty line	-.1568***	-.1390***	-.1053***	-.0757**	-.0572**
% below poverty squared	--	--	--	--	-.0290*
% affluent	.0418	.0416	.0143	--	--
County characteristics:					
% BA or higher		.0609*	.0670*	.0837****	.0643**
% BA or higher squared		--	--	--	.0222
% unemployed		-.0788***	-.0121	--	--
Controls:					
Black female			-.0391	-.0173	-.0209
Black male			-.1092***	-.0843**	-.0903**
Hispanic female			-.0821**	-.0616**	-.0734**
Hispanic male			-.0963***	-.0735**	-.0886***
White male			-.0883***	-.0819***	-.0889***
Family income-to-poverty ratio			-.0242	-.0165	-.0152
Family net worth			.0232	.0205	.0251
Mother's highest degree			.0782**	.0776**	.0766**
Father's highest degree			.0781**	.0770**	.0777**
Mother's occ. complexity			-.0228	-.0204	-.0220
Father's occ. complexity			.0191	.0198	.0202
Mother's personal earnings			.0355	.0393	.0390
Dummy, mother on welfare			.0236	.0236	.0249
Dummy, two-parent family			.0652**	.0575*	.0629*
Mother's AFQT			.1658***	.1574***	.1646***
Mother's high school GPA			.0332	.0272	.0311
Mother's self-esteem			-.0446*	-.0354	-.0442
Mother's self-mastery			.0134	.0133	.0141
Mother's SES origins			.0157	.0228	.0146
Mother's age			-.0409	-.0415	-.0413
Child's age (2000)			-.1347***	-.1428***	-.1407***
Number of siblings			-.0855***	-.0820***	-.0853***
Region: Northeast			.0530*	.0720**	.0539*
Region: North-central			-.0134	.0029	-.0109
Region: South			-.0098	.0103	-.0093
Lived in urban area			.0501*	.0462*	.0539*
Lived in rural area			.0320	.0268	.0147
R-square	.1098	.1201	.2397	.2347	.2392
	N=2240	N=2240	N=2240	N=2240	N=2240

SOURCE: Author's analyses of restricted geocoded National Longitudinal Survey of Youth, 1979 Mother-Child file and U.S. Census Summary File 3, 1990 and 2000.

deviation shift in test scores. Contrary to earlier research, this model suggests that neighborhood racial composition and affluence are not related to children's outcomes, net of human capital and poverty concentration. BA concentration and the concentration of affluence at the census tract level are fairly highly correlated – in the NLSY, the correlation between these two neighborhood variables is .68 – so it is not surprising that the two variables cancel one another out in a multivariate context. However, given the emphasis that earlier researchers have placed on the concentration of affluent role models, it is notable that the neighborhood concentration of college graduates is more salient to children's academic achievement than the neighborhood concentration of affluent households.

The second model in Table 5.2 adds controls for *county-level* characteristics. It suggests that county context has an effect on children's achievement test scores that is distinct from the more local census tract level effects. A one standard deviation increase in county-level BA concentration is associated with a .06 standard deviation increase children's test scores. Meanwhile, county unemployment rates are negatively associated with children's test scores. A one standard deviation increase in county unemployment is associated with a .08 decrease in test scores.

Of course, the significant associations that these first two models reveal between census tract and county-level predictor and children's PIAT scores do not necessarily point to genuine ecological effects. If families sort into neighborhoods and counties on the basis of factors that predict educational success, then the observed correlation between neighborhood characteristics and children's PIAT scores may be spurious. Model 3 examines this possibility by estimating the effect of children's

county and census tract characteristics after controlling for an extensive set of family background characteristics. This model points to two ecological characteristics that continue to predict children's achievement test scores: The concentration of poverty at the census tract level and the concentration of human capital at the county level predict children's PIAT scores, even after controlling for family background characteristics.

In the fourth model of Table 5.2, the effects of these two significant ecological predictors are re-estimated, without the statistical noise introduced by including the other, nonsignificant, census tract and county variables. The standardized coefficients reported in this revised model suggest that the independent effects of neighborhood poverty and county human capital concentration are approximately equivalent in magnitude. After controlling for family background factors, a one standard deviation increase in neighborhood poverty (the difference, for example, between an average neighborhood in which 15% of the households are in poverty and a high poverty neighborhood where 28% of the households are in poverty) decreases children's PIAT scores by approximately .08 standard deviations. A one standard deviation increase in county BA concentration (for example, from an average county in which 19% of adults have a BA or higher to a county in which 34% of adults are college graduates) increases children's PIAT scores by .08 standard deviations.

These effect sizes are not inconsequential. The magnitude of either of these ecological factors is roughly equivalent to the impact of a one standard deviation shift in either maternal or paternal educational attainment. In other words, a child who grows up in a low poverty neighborhood situated in a county where the concentration

of college graduates is high enjoys approximately the same advantage relative to a child in an average neighborhood and county as does a child in a family with two BA parents relative to a child whose parents both left college without earning a degree.

The fifth and final column of Table 5.2 adds quadratic terms to model nonlinear ecological effects. The statistically significant tract poverty squared term suggests that the negative effects of neighborhood poverty are most pronounced in the neighborhoods in which poverty is most highly concentrated. This finding is consistent with epidemic theories, which suggest that distinctive social mores and achievement ideologies that are inconsistent with wider social norms develop in neighborhoods in which the poor are isolated. As such, it lends further support to the notion that contagion is an important mechanism through which contexts influence children's development. The squared county-level human capital concentration term, however, is not statistically significant. This suggests that the benefits associated with the concentration of college graduates accrue in a more or less linear fashion across the educational landscape.

These findings suggest that context influences children's academic development in more than one way. The negative relationship between neighborhood poverty and children's PIAT scores is suggestive of a neighborhood contagion effect. The significant effect of the neighborhood poverty squared term further supports this analysis, suggesting that the detrimental effects of neighborhood poverty are most pronounced in the poorest neighborhoods. The disruptions associated with growing up in high poverty neighborhood exert a drag on children's achievement test scores, even relatively early in life. But these analyses suggest that context can also have a

positive effect on children's educational development. The association between county BA concentration and children's PIAT scores is strong and positive. Typically, researchers have argued that positive links such as this one point to the relevance of neighborhood role models in children's lives. However, my analyses uncover the positive link between BA concentration and children's educational success occurs at the *county level*, and not at the more local census tract level. These analyses suggest broader, county-level contextual effects outweigh neighborhood socialization effects. They imply that context influences children via impersonal institutional factors, rather than face-to-face role modeling.

Further confirmation of these findings comes in Table 5.3. In the analyses summarized here, I reestimate the ecological effects that emerged as statistically significant in the regression analyses outlined in Table 2, using counterfactual propensity score matched models. As noted earlier, this modeling technique typically produces more conservative estimates of treatment effect sizes than traditional regression models do. This is the case for two reasons. First, since propensity score matched models require a dichotomous treatment, the continuous ecological predictors modeled in Table 2 must be split into dummy variables for these models. In the process, important variation is inevitably lost. More importantly, however, these propensity matched models are more conservative since they control for unmeasured selection effects more effectively than do traditional regression models. Therefore, these models provide an estimate of the effect of ecological factors that is uncontaminated by the difficult-to-measure selection processes that help to determine where families choose to raise their children. It is striking, therefore, to note that both

Table 5.3: Bivariate, OLS regression, and propensity matched estimates of ecological effects on children’s standardized Peabody Individual Achievement Test scores, ages 5-7

	Bivariate	OLS Regression	Propensity Matched
Treatment: Child lived at age 5 in a “high poverty” census tract (all children in sample, tract % poverty dichotomized at the median, 14%)	-.380***	-.102**	-.081
Treatment: Child lived at age 5 in an “underclass” census tract (Children in tracts in more poverty rate is greater than 40% vs. children in tracts in which poverty rate is less than 14%)	-.600***	-.242**	-.252*
Treatment: Child lived at age 5 in a high human capital county (all children in sample, county % BA dichotomized at the median, 15%)	.274***	.106***	.141***

SOURCE: Author’s analyses of restricted geocoded National Longitudinal Survey of

Youth, 1979 Mother-Child file and U.S. Census Summary File 3, 1990 and 2000.

census tract poverty concentration and county human capital concentration remain statistically significant in these propensity models.

The first two rows of Table 5.3 consider the effect of neighborhood poverty concentration on children’s early PIAT test scores. While the analyses summarized in the first row suggest that the effects of neighborhood poverty are relatively muted overall; the analyses summarized in the second row suggest that living in an “underclass” neighborhood, in which poverty is highly concentrated has strong negative consequences for children.

In Table 5.3’s first model, census tract poverty is dichotomized at the population median. The comparison in this model is between children who lived in a census tract in which more than 14% of households were below the poverty line versus children who lived in a census tract in which less than 14% of households lived below the poverty line. In the table’s second model, the neighborhood poverty treatment is reconceptualized to compare children in “underclass” neighborhoods

where more than 40% of the households are living in poverty with children in neighborhoods where fewer than 14% of households are living in poverty. As the first column reveals, children in relatively high poverty tracts do worse, on average, on the PIAT exam than do children in low poverty tracts. This is particularly true of children in underclass neighborhoods, where the average PIAT score is more than half a standard deviation below the average score for children in relatively low poverty neighborhoods. The negative effects of neighborhood poverty remain statistically significant in the regression models, which utilized the same controls as the models outlined in Table 5.2.

The propensity matched model considering the effect of the first neighborhood poverty treatment suggests that children who grow up in tracts with poverty levels that are greater than the national median do no worse than matched children in tracts with poverty levels that are less than the national median. However, the propensity matched model considering the effects of growing up in an underclass neighborhood return a substantial negative effect. These results are consistent with the nonlinear effects of neighborhood poverty revealed in Table 5.2's regression analyses, suggesting that the extreme concentration of poverty has serious negative effects on children's educational prospects.

The final row of analyses in Table 5.3 reconsiders the effect of county-level BA concentration on children's educational prospects. Again, these analyses point to significant ecological effects, even using the most conservative propensity matched estimation techniques. For these analyses, the continuous variable measuring the percent of adults who had a BA or higher in the county in which children resided at

age 5 was dichotomized at the national median, 15%. On average, children who grew up in counties in which the percent of college graduates was above the national median scored approximately one-fourth of a standard deviation higher the PIAT exam than children in counties with lower concentrations of college graduates. The regression and matched models suggest that this educational advantage was not simply a function of selection effects and the characteristics of families that settle in human capital hubs. According to the propensity matched model, children growing up in counties where the proportion of college graduates is relatively high score approximately .14 standard deviations higher than their matched peers in counties with lower concentrations of college graduates.

Conclusion

This chapter has demonstrated that two ecological factors – the concentration of poverty in children’s census tracts and the concentration of college graduates in their counties – independently and additively predict children’s achievement test scores. These ecological effects are robust, appearing both in traditional regression analyses and in propensity matched models. Furthermore, they are not trivial in magnitude. The regression models suggest that a one standard deviation change in neighborhood poverty or county educational concentration has an effect on children’s test scores as a one standard deviation shift in either maternal or paternal educational attainment.

This chapter’s findings regarding the importance of neighborhood poverty contradict recent research that suggests that neighborhood affluence is more

important than neighborhood poverty in influencing children's educational trajectories (*cf.* Brooks-Funn, Duncan, Klebanov, and Sealand 1993; Ainsworth 2002). However, it is consistent with neighborhood effects theory and research emphasizing contagion effects.

More surprisingly, this chapter demonstrates that the concentration of college graduates in the counties that children grow up is an independent predictor of children's educational success, even after controlling for ecological effects at the level of census tracts. The effects of educational concentration on children's educational success remains statistically significant even in propensity score matched models, which control for selection effects and provide a conservative test of true ecological effects.

As I have argued, this county-level effect suggests that context influences children in a way that has largely been overlooked in recent neighborhood and school effects research. In the past, researchers who are interested in contextual effects have typically focused on the most local levels of aggregation, assuming that ecological effects occur via face-to-face social mechanisms such as contagion or socialization. But the fact that county-level educational concentration exercises an independent influence on children's educational achievement suggests that institutional factors may be another important mechanism through which context influences children.

In sum, this chapter suggests that educational segregation is increasing educational inequality in the United States. Children who grow up in places with high concentrations of college graduates enjoy greater educational resources than those who grow up in places with lower educational concentrations. As a result, children in

highly educated communities enjoy distinct educational advantages, regardless of their own parents' educational attainment.

Chapter 6:

Beyond Red States and Blue States: Educational concentration and ecological predictors of voter preferences

In recent years, rivers of ink have been spilled in the attempt to explain the 2000 and 2004 presidential elections' red and blue Electoral College maps. These maps depict a nation in which political boundary lines are clearly defined and stable. In each of these elections, Democratic blue was concentrated in a narrow band of Eastern, upper-Midwestern, and West Coast states, while Republican red covered vast stretches of the American interior and South. Furthermore, between 2000 and 2004, only three states flipped between red and blue. As a result of these maps, pundits and political analysts regularly refer to the conflict between red America and blue America.

In popular discussion, references to the geographic organization of the American electorate have become shorthand for the presumed ideological polarization of American politics. Typically, the political divide between red states and blue states is understood as a reflection of deep cultural divisions in American life. On the one hand, the red states of the South, Great Plains, and the Mountain West are associated with evangelical religion, traditional values and cultural conservatism. On the other, the blue states are associated with secularism, pluralism, and liberalism.

By confounding ideological polarization with geographical polarization, descriptions of the gap between red and blue America confuse two issues that are

only tangentially related. Commentary on the “two Americas” may point to important divides in American politics, but it does little to advance our understanding of why these political divides follow such clearly demarcated geographic lines. For example, the title of Frank’s recent book asks *What’s the Matter With Kansas?*, drawing attention to the correlation between place and politics in middle America. But the book itself focuses on the spread of cultural conservatism, without attempting to explain why this movement took hold in Kansas, rather than in Massachusetts or California. Similarly, geography plays an important role in Brooks’ description of the American political scene – to study Red Americans, Brooks traveled from the “blue” confines of suburban Maryland to “red” rural Pennsylvania. But, again, this analysis is limited to the differences between the two Americas, rather than the role that geography plays in this split.

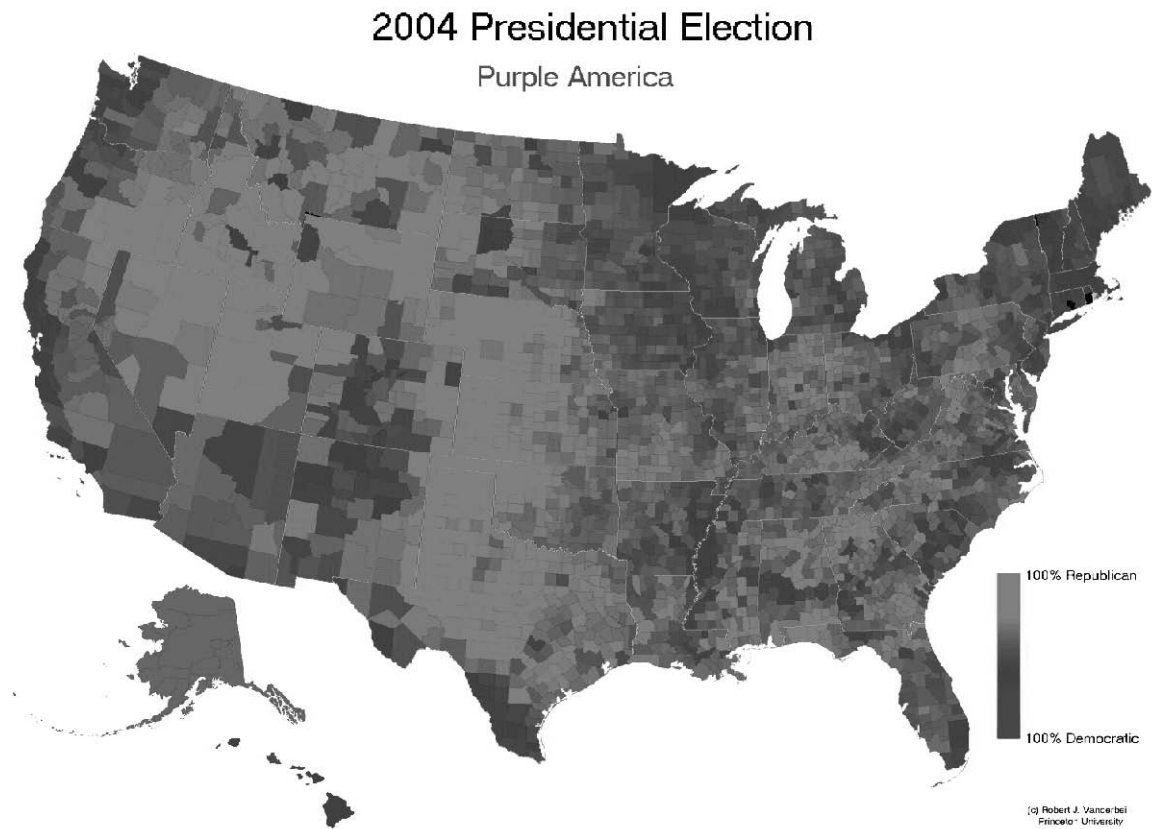
In focusing on ideological, rather than geographical, polarization these analysts have drawn attention to a trend whose very existence is suspect. Studying data from the General Social Survey and the National Election Studies between the early 1970s and the early 1990s, DiMaggio, Evans, and Bryson (1996) find that ideological polarization on many important issues has declined the American public. DiMaggio et al. argue that the U.S. electorate has become more polarized on only one issue – the admittedly important area of abortion rights. Using more recent data, Fiorina, Abrams, and Pope (2004) argue that even on divisive issues such as abortion and homosexuality, popular American views are nuanced, rather than polarized. Recent research suggests that the parties and political elites– not the American public

– that have led American politics to become increasingly contentious (Abramowitz and Saunders 1998; Fiorina, Abrams, and Pope 2004; Hacker and Pierson 2005).

While it is not at all clear that the American electorate has become more politically polarized over the last several decades, it is clear that the spatial organization of the American electorate has changed dramatically. This chapter will argue that the polarization of the American electorate that has occurred recently is not attitudinal, but geographical. The red-state/blue-state maps of the 2000 and 2004 presidential election are distinctive not because they point to a deep ideological divide in American life, but because the divide that they point to is so clearly reflected in the nation's geography. While the national electorate may be split evenly between the Democrats and the Republicans, at the local level, politics tend to be much less balanced. In voting for the House of Representatives in 2000, 2002, and 2004, more than four-fifths of all elections were won by majorities of 55 percent or greater.

Of course, regional fissures are nothing new in American politics. During the century between the Civil War to the Civil Rights movement, the split between the Democratic South and the Republican North remained a perennial divide in American politics. Nonetheless, the contemporary organization of American politics is distinctive for two reasons: First, the North/South gap of old has, in large part, been supplanted by a gap between the coasts and the interior. But perhaps more importantly, the spatial organization of American politics has become increasingly heterogeneous within regions. Figure 6.1 maps the results of the 2004 presidential election at a greater level of detail than the well-known red state/blue state maps, showing election results for U.S. counties. This map suggests that the geographic

Figure 6.1: 2004 Presidential Election returns by county.



Source: Robert Vanderbei, Princeton University,

<http://www.princeton.edu/~rvdb/JAVA/election2004>.

fault-lines emerging in American political and social life are even more pronounced than the better-known state election maps suggest. Rather than red states and blue, the American political landscape consists of a scattering of Democratic blue counties over a great expanse of Republican red.

In this chapter, I will analyze the sources of the geographical polarization of American political life, looking in particular at the relationship between community characteristics and individual voting behavior in presidential elections between 1960 and 2004. This chapter will seek to address four questions: First, how are the places that comprise red America different from the places in blue America? Put more precisely, what are the characteristics of places that vote Republican, and how do these places differ from places that vote for Democrats? Second, are these differences between red and blue America simply the sum of the differences between the people who live in these places, or is there a true ecological effect at work in American political life? Third, have these political dynamics changed over time? And fourth, what is the relationship between geographical polarization in American politics and ideological polarization?

LITERATURE REVIEW

Ecological Effects in Voter Preference Research

Since the 1950s, when the first scientific election surveys became available, sociologists and political scientists have dedicated considerable attention to understanding the social determinants voting behavior. The bulk of this research has focused on the relationship between individual-level characteristics and individual voting decisions. The classic study *The American Voter* emphasizes the influence of

social-psychological factors such as information about issues and candidates and party loyalty on voting behavior (Campbell, Converse, Miller, and Stokes 1960). This social psychological perspective remains influential today, particularly in contemporary debates regarding party identification and loyalty. By contrast, the sociological tradition emphasizes the role that structural factors such as socioeconomic status, race and ethnicity, and religion play in voter decisions (c.f. Lazarsfeld, Berelson, and Gaudet 1948; Lipset 1981). The contemporary heirs to this structural tradition are diverse, ranging from the economic and rational choice perspectives to researchers who study the changing role of race, ethnicity, and religion in electoral politics. (See Brooks, Manza, and Bolzendahl 2003 for a review of recent voter preference research.)

Throughout this debate, a relatively small stream of research has concerned itself with the role of contextual community factors in influencing voter behavior. In the late 1950s, for example, V.O. Key, Jr. noted that community voting patterns are strikingly consistent over time, arguing that community political traditions exert an influence on individual electoral decisions that is independent of such individual-level influences as class and ethnicity (1958; Key and Munger 1959). Robert Putnam (1966), meanwhile, demonstrated that the more highly involved a citizen is in local community organizations, the higher his or her likelihood to subscribe to the political views that prevail in the county in which he or she lives. According to Putnam, this finding points to the important role that social networks play in perpetuating local political cultures and influencing individual voting behavior. More recently, researchers have analyzed the role that social networks play in influencing the

development of political views (c.f. Huckfeldt and Sprague 1995; Huckfeldt, Beck, Dalton, and Levin 1995) and the relationship between the size and structure of local polities and the extent of individual political engagement (c.f. Oliver 2001).

However, these studies represent a distinct minority in the study of voting behavior. In large part, this may be due to scholars' concerns about the ecological fallacy, which warns against drawing inferences on individual behavior from aggregated data (Robinson 1950). Most scholars of voting behavior avoid the ecological fallacy by utilizing surveys like the American National Election Study (NES) and the General Social Survey (GSS), which provide rich individual-level data on voting preferences, as well as relevant covariates (Brooks, Manza, and Bolzendahl 2003; Wright 1989). These datasets are extraordinarily useful for understanding the relationship between voting behaviors and individual-level characteristics like race, class, education, and religious affiliation. Their individual-level data is clearly better suited to drawing conclusions about individuals than aggregated data is. However, on their own, these datasets preclude inquiry into ecological effects.

To effectively study ecological effects using individual-level survey data, one must match respondents with data regarding the communities in which they reside. This strategy is not without precedent in the sociological literature. In recent years, for example, several scholars have used this strategy to study the relationship between the racial composition of communities and individual racial attitudes. Much of this literature is inspired by social psychological "group threat" theories, which hypothesize that majority groups find it easy to tolerate small minorities, since they present little threat of competition for scarce social, political, or economic resources.

As minority groups grow, however, the threat of competition grows. Accordingly, group threat theory suggests that large minority groups experience much higher levels of intolerance from majority group members than members of small majority groups do. Quillian (1996) and Taylor (1998) link GSS data with Census data to test group threat theories by analyzing the relationship between the concentration of African-Americans and the racial attitudes of whites. Both find that levels of racial intolerance are higher in places with large African-American populations.

Baumer, Messner, and Rosenfeld (2003) expand group threat theory to analyze spatial variation in popular opinion regarding the death penalty. While support for the death penalty is strong nationwide, the authors show that opinions vary substantially between communities. Based on multilevel models that demonstrate that support for the death penalty is higher in counties with large black populations, the authors argue that group threat explains a proportion of the spatial variation in the opinions toward capital punishment. In addition, Baumer, Messner, and Rosenfeld point to other contextual factors that influence individual opinions about the death penalty. People who live in places with high murder rates view the death penalty more favorably than those who live in places where murder is relatively rare. Furthermore, the authors argue that local political climates influence views of the death penalty. Regardless of their own politics, people living in conservative areas are more likely to favor capital punishment than people living in communities where the prevailing politics are relatively liberal.

The group threat research literature is relevant to this study in two regards. First, it suggests a model for analyzing ecological effects on voting behavior without

committing the ecological fallacy. Quillian, Taylor, and Baumer, Messner, and Rosenfeld all match aggregated Census data to geocoded individual-level data. They then analyze the effect of contextual variables on the attitudes and behaviors of individuals, after controlling for individual-level predictors. This chapter will utilize a similar strategy to assess the effects of contextual factors on individual voting behavior.

Hypotheses Regarding Ecological Predictors of Electoral Behavior

The second way in which the group threat literature informs this chapter is by suggesting a mechanism through which contextual factors may influence voting behavior. Support for capital punishment and opposition to anti-discrimination measures are positions associated with the Republican Party. As a result, group threat theory suggests that after controlling for individual characteristics, white voters who live in places with large African-American populations are more likely to vote Republican and white voters living in places with small African-American populations should lean Democratic. (For an application of group threat theory to local electoral politics, see Carsey, 1995.)

While group threat theory suggests that ecological racial composition should predict voting patterns, recent accounts of the “two Americas” phenomenon by journalists, political operatives, and social scientists suggest other ways in which ecological factors may influence voter behavior.

Sperling, Helburn, George, Morris, and Hunt (2004) portray the divide between red and blue America as an urban/rural divide. According to these authors, living in diverse urban environments creates a cultural liberalism that orients voters

toward the Democratic Party. Meanwhile Republican political messages resonate with the conservative, isolationist political values fostered in rural areas. While other commentators on the “two Americas” such as Brooks, Frank, and Lebedoff do not explicitly make this case, their descriptions of red and blue America suggest a clash between urban cosmopolitanism and rural provincialism.

John Judis and Ruy Teixeira (2002), on the other hand, link the geographic polarization of the American electorate (and, the fate of the Democratic Party) to the spread of the postindustrial economy. “Democrats,” they argue, “are strongest in areas where the production of ideas and services has either redefined or replaced assembly-line manufacturing.... Republicans are strongest in states like Mississippi, Wyoming, and South Carolina (as well as in former Democratic enclaves like Kentucky) where the transition to postindustrial society has lagged (p. 71).” They argue that highly educated professionals and service workers with low skills have become increasingly clustered in postindustrial economic areas – distinct communities that they call “ideopolises.” According to Judis and Teixeira, the spatial concentration of these two groups breeds a distinctive, Democratic, political culture. As this dissertation has shown, one of the key correlates of post-industrialization is the increasing spatial concentration of human capital. Judis and Teixeira’s “ideopolis” theory suggests that people living in places where college graduates make up a relatively large proportion of the population are more likely to vote for Democrats than they would be if they lived elsewhere.

Group threat theory provides a coherent theoretical mechanism to link an ecological predictor – the proportion of blacks and Hispanics living in a place – with

individual voter preferences. But if the ecological divides in American political life are really between rural places and urban places, or if they are between postindustrial human capital hubs and brain drain communities, this theory of racial anxiety does not apply. What else might explain these spatial divides? The analyses in this chapter are focused on isolating contextual effects in American politics and explaining the ways in which they have changed over time. But nonetheless, I hypothesize that there are two mechanisms that may explain non-racial contextual effects: First, it is possible that Americans are sorting themselves politically, moving to areas in which the prevailing political culture matches their own views. Second, it is possible that communities develop distinct political cultures which exert an independent influence on voter behaviors.

The work of demographer William Frey (2001) suggests the spatial polarization of the American electorate is the result of selective migration patterns. Frey argues that older, conservative suburbanites are increasingly moving away from metropolitan areas on the East and West Coasts where rates of immigration and taxation are high and into newer, smaller communities on the interior. This explanation suggests that observed contextual effects occur because people of an ideological feather flock together, choosing their residences on the basis of local political conditions.

On the other hand, a growing body of research on the influence of social networks on the formation of political views suggests that opinions are developed in discussion with close associates and less intimate acquaintances (c.f. Huckfeldt and Sprague 1991, 1995; Huckfeldt, Beck, Dalton, and Levine 1995). Since the

information available to voters varies from place to place, this research suggests that distinctive local political cultures may have an independent influence on individual voting behavior.

DATA AND METHODS

This paper begins with an analysis of county-level returns in the 2004 presidential election. Included in this analysis are each of the 3091 counties in the continental U.S. and Hawaii.²⁹ The dependent variable is the proportion of all votes cast in the November general election that were for President Bush. The independent variables are drawn from the county-level 2000 U.S. Census Survey File 3, and include measures of county urbanicity, region, racial, age, economic, and educational composition. Since counties vary widely in population size, these data are likely heteroskedastic. That is, the distribution of the residuals is likely to be systematically associated with county size, violating one of the central assumptions of statistical analysis. To address the issue of heteroskedasticity, the data in these analyses are weighted by voting population, so that counties in which large numbers of votes were cast are weighted more heavily than counties in which few votes were cast.³⁰

The ecological fallacy cautions against drawing individual-level conclusions from aggregated analyses like this one. But the reverse is also true. Using county-level data, it is difficult to distinguish between individual-level effects and ecological effects. Nonetheless, analysis of county-level election returns provides a preliminary approximation of the differences between the communities that make up red America and those that make up blue America.

³⁰ This weight was created by dividing the number of votes cast in the county by the mean number of votes for all U.S. counties.

The rest of this paper examines these differences more systematically, by estimating the extent to which the differences between red America and blue America simply reflect differences between individual Democratic and Republican voters and the extent to which they reflect community-level processes. Do community characteristics influence individual voting behavior? And if so, which community characteristics are most important? This paper answers these questions by linking individual-level data from the American National Election Study (NES) cumulative data file with ecological data from the decennial U.S. Census Survey File 3.

The NES is a repeated cross-sectional study. In each survey round, a new nationally representative sample is drawn using a multi-stage area probability design. In the first sampling stage, the NES and the University of Michigan's Survey Research Sampling Center select 84 geographically-defined sampling units. These primary sampling units, which are either metropolitan statistical areas (SMSAs) or nonmetropolitan counties, are randomly drawn from the four U.S. Census regions in the continental United States with probability proportionate to their total number of occupied housing units. Within these primary sampling areas, smaller second-stage sampling units are selected. Within these second-stage sampling units, respondents are randomly selected. As a result of this multi-stage sampling design, respondents in each of the NES survey rounds are clustered in a relatively small number of communities, rather than scattered across the entire United States.

This design facilitates the study of ecological effects on voting behavior. For each of the survey rounds between 1960 and 1996, the NES cumulative data file provides state and county codes for each respondent's residence. These codes are

blocked in the 2000 and 2004 public-use data, but are available via a restricted data license. Using these restricted state and county codes I linked NES data with county-level data from the nearest decennial Census to study the effects of county characteristics on individual voting behavior, over and above individual characteristics. NES data from 1960 and 1964 are linked to county-level Census SF-3 data from 1960; NES data from 1968 and 1972 are linked to 1970 Census data; NES data from 1976, 1980, and 1984 are linked to county-level data from the 1980 Census; NES data from 1988 and 1992 are linked to 1990 Census data; and NES data from 1996, 2000, and 2004 are linked to 2000 Census SF-3 data.

While the NES survey design is cross-sectional, in that a new sample is drawn with each survey round, many questions are repeated from one election to the next. As a result, this dataset makes it possible to study the ways in which voter preferences have changed over time. In this paper, I use NES data from 1960 to 2004. This pooled dataset provides a sample of 13,599 voters spread over 11 presidential elections. In each of these election years, respondents were interviewed face-to-face immediately after the November general election.³¹

To understand the role that ecological factors play in influencing presidential election votes and how that role has changed over time, I have conducted a series of logistic regression analyses. The first of these analyses indicate which ecological factors currently influence voting behavior and are run on data from the 2000 and 2004 presidential elections. Later, these analyses are replicated on pooled 1960-2004 data to provide estimates of how these ecological effects have shifted over time. The

³¹ The NES experimented with telephone interviews in 2000, but in this year most surveys administered as face-to-face interviews, as were all surveys in all other years.

dependent variable in these analyses is coded “1” for respondents who voted for the Republican presidential candidate in the general election and “0” for respondents who voted for the Democrat or for a third-party candidate (where such votes were possible.)³² The significance levels reported in these logistic regression models correct for design effects by adjusting standard errors to reflect the clustering of respondents in primary sampling areas, and are computed using the “cluster” subcommand in the Stata statistical analysis package. It should be noted that many of the NES primary sampling areas are small. As a result, these data are not amenable to multilevel data analysis, since a high proportion of primary sampling areas have few respondents in them. Like multilevel modeling techniques, the “cluster” subcommand acknowledges that cases within counties were not sampled independently and it corrects for the correlations that occur among counties. Unlike multilevel modeling techniques, however, it does not allow the intercept and the slope of the regression models to vary from community to community.

Among the independent variables included in these regression models are a wide variety of individual-level and county-level predictors. These predictors, along with their mean values, the number of valid cases, and value range are listed in Table 6.1. The individual-level predictors included in the analysis are: age, gender, a series of race dummies (for which white is the reference category), a series of educational attainment dummies (for which high school graduate is the reference), family income

³² This coding is suboptimal, since it includes conservative George Wallace; moderate Ross Perot; and Green Ralph Nader into the same category as the Democratic candidate. However, because of the ideological diversity of third party candidates, it is difficult to imagine an alternative strategy. Furthermore, the results reported here are not sensitive to the coding of third party votes. Analyses excluding third party voters, as well as analyses that combine Republican and third party votes return the same substantive results.

Table 6.1: Descriptive statistics, variables included in 2000, 2004, and pooled 1960-2004 presidential election voter-preference analyses (weighted)

	2000		2004		1960-2004 pooled		
	Mean	Actual N	Mean	Actual N	Mean	Actual N	Range
<i>Individual-level predictors</i>							
Age (in years)	48.49	1117	47.71	808	46.77	13268	18-99
Male	.444	1120	.481	810	.451	13305	0-1
Black	.112	1120	.138	810	.097	13305	0-1
Hispanic	.048	1120	.060	810	.028	13305	0-1
Other	.100	1120	.044	810	.050	13305	0-1
High school dropout	.090	1120	.099	810	.230	13305	0-1
Some college/AA	.089	1120	.300	810	.207	13305	0-1
BA	.209	1120	.189	810	.150	13305	0-1
MA or higher	.104	1120	.127	810	.069	13305	0-1
Family income (quartiles)	3.01	942	3.28	728	3.07	12461	1-5
Parents foreign born	.151	1117	.152	809	.193	13180	0-1
Never married	.160	1120	.186	810	.119	13305	0-1
Divorced/separated	.103	1120	.120	810	.091	13305	0-1
Widow	.067	1120	.056	810	.099	13305	0-1
Union member	.164	1115	.211	806	.230	13234	0-1
Unemployed	.065	1120	.027	810	.051	13305	0-1
White evangelical	.275	991	.228	801	.348	12749	0-1
Black evangelical	.079	991	.108	801	.065	12749	0-1
Catholic	.336	991	.250	801	.261	12911	0-1
Jewish	.031	991	.030	801	.028	12911	0-1
Other religion	.036	991	.034	801	.030	12911	0-1
No religion	.003	991	.149	801	.041	12911	0-1
<i>County-level predictors</i>							
Large metro area (pop > 1M)	.495	1118	.526	810	.448	13224	0-1
Small metro area (pop < 1M)	.324	1118	.314	810	.310	13224	0-1
Remote nonmetro area	.053	1118	.018	810	.097	13224	0-1
Northeast region	.204	1118	.184	810	.218	13300	0-1
North-central region	.267	1118	.277	810	.230	13300	0-1
West region	.183	1118	.212	810	.182	13300	0-1
County % black or Hispanic	22.91	1118	24.28	810	17.01	13295	0-88.9
County % unemployed	5.68	1118	5.89	810	5.56	13295	1-17
County mean income	57192	1118	57018	810	50712	13295	0-108755
County % 65 and up	.127	1118	.126	810	.115	13295	.018-.303
County % BA	24.84	1118	25.13	810	20.33	13295	5-60.2

Source: Author's analysis of National Election Studies Cumulative File; National Election Studies 2004 pre-and post-election surveys; National Election Studies geocode files 2000, 2004.

quintiles, immigrant status, a series of marital status dummies (for which currently married is the reference), and a series of religious dummies (for which mainline protestant is the reference). The county-level predictors in the analysis are: community size and urbanicity (measured as a series of dummies with

nonmetropolitan areas that border metropolitan areas as the reference), region dummies (South is the reference category), percent of county population black or Hispanic, county unemployment rate, county mean household income, percent of county residents 65 years of age or older, and percent of county residents aged 65 or higher who have earned a BA degree or higher.

Significant coefficients for the ecological predictors in this paper's logistic regression models suggest that ecological factors influence the voting behavior of individuals, regardless of the individual's personal characteristics.

FINDINGS

Table 6.2 provides a preliminary look at the relationship between county-level characteristics and the percent of county voters who voted for Bush in 2004. Contrary to the predictions of the "group threat" theory, this model suggests that counties with a high concentration of African-Americans and Latinos were less, not more, likely to vote for the Republican candidate in 2004. This negative association is relatively strong, and statistically significant, even after controlling for several other ecological covariates. However, to dismiss group threat theory on the basis of this finding would be to commit a variant of the ecological fallacy: The analyses that follow reveal that this county-level finding is simply a reflection of the individual-level relationship between race and voting behavior, rather than an ecological effect.

The regression models summarized in Table 6.2 point to a rural/urban divide in American voting patterns. Net of other compositional factors, metropolitan counties tended to vote for Kerry in 2004, while sparsely populated and remote nonmetropolitan counties voted disproportionately for Bush. There were also strong

Table 6.2: Standardized OLS Coefficients, the effect of county demographic characteristics on the percent of county votes cast for Bush in 2004

	Model 1	Model 2	Model 3
Region: Northeast	-.157***	-.158***	-.140***
Region: North-central	-.156***	-.135***	-.107***
Region: South	.147***	.159***	.167***
Dummy: Metro area > 1 million residents	-.140***	-.180***	-.151***
Dummy: Metro area with < 1 million residents	-.018	-.051**	-.042*
Dummy: Frontier nonmetro area	.033*	.039**	.041*
Percent Black/Hispanic (2000)	-.381***	-.430***	-.452***
Percent unemployed or out of labor force (2000)	-.105***	.073**	-.087**
Mean household income (2000)	.344***	.386***	.374***
Percent 65 or older (2000)	-.138***	-.152***	-.119***
Percent foreign-born (2000)	-.133***	-.152***	-.175***
Percent relocated from another county (2000)	.189***	.211	.236***
Percent with less than HS (2000)	.060*	.151***	.192***
Percent with BA or higher (2000)	-.598***	-.482***	-.340***
Percent with BA or higher (2000) squared	--	-.134***	-.160***
Mean income change 1990-2000	--	--	.043
Change in percent with BA or higher 1990-2000	--	--	-.174***
Adjusted R ²	.585	.594	.604
N	3091	3091	3091

Source: Author's analysis of 2004 county-level election returns.

regional effects in the 2004 presidential election. Net of other ecological factors, southern counties lent strong support to President Bush, while counties in the Northeast and North-central regions supported Senator Kerry.

But the most striking of the results that emerge from this analysis of county-level election results from the 2004 presidential election involve the strong association between the proportion of college graduates living in a community and its voting behavior, after controlling for urbanicity and region. These regression models lend preliminary empirical support to the Judis and Teixeira hypothesis, demonstrating that the concentration of college graduates was the single most salient ecological predictor of voting behavior in the 2004 presidential election. The first of these Ordinary Least Squares regression models demonstrates that the association

between county human capital and voting behavior is very strong, and clearly not spurious. The higher a county's concentration of BA graduates, the lower the proportion of county votes went to Bush, even after controlling for an exhaustive set of demographic characteristics. Put more concretely, this result suggests that net of other ecological characteristics, a 10 percent shift in educational concentration is associated with a 9 percent shift in voting behavior. All else held constant, Kerry won 9 percent more of the votes cast in counties in which 30 percent of the population were college graduates than he did in similar counties in which college graduates accounted for 20 percent of the population.

Table 6.2's second model demonstrates that the strong negative association between educational concentration and voting for Bush is curvilinear. The negative and statistically significant coefficient for the squared percent BA or higher variable suggests that as a county's college-educated population increases, the tendency to vote Republican decreases exponentially. The third model in Table 6.2 demonstrates that demographic change over time has an independent effect on county voting patterns, over and above the compositional effects revealed in the first two models. Counties with growing college-graduate populations voted more solidly Democratic in 2004 than otherwise similar counties that were not experiencing human capital growth. Furthermore, this model reveals that this negative county-level association between college-graduate population growth and Republican votes is not simply a function of the correlation between human capital growth and income growth.

As noted previously, these preliminary county-level analyses cannot effectively distinguish between county-level and individual-level effects. However,

exit polls conducted by Edison Media Research and Mitofsky International suggest that Bush and Kerry evenly split the college-graduate vote, with each candidate earning 49 percent of the votes cast by BA holders. If these data are correct and there truly is no individual-level relationship between educational attainment and 2004 presidential voting, it seems quite likely that the relationship between county educational concentration and county election returns is an ecological effect, rather than an individual effect.

Finally, it should be noted that other ecological characteristics besides educational concentration are associated with county voting patterns. Table 6.2 reveals that affluent counties tended to vote Republican, as did counties in which residential mobility was high (as measured by the proportion of residents who moved from another county since 1995). On the other hand, counties with large immigrant populations and counties with large concentrations of older adults tended to vote Democratic.

The next analyses in Table 6.3 are designed to determine the extent to which the differences between communities that voted Republican in the 2000 and 2004 presidential elections are due to ecological effects and the extent to which ecological differences are simply reflections of the differences between individual voters. Data from the 2000 and 2004 NES are studied separately, with two logistic regression models analyzed in each: In the first step, individual respondents' presidential votes are regressed on a set of individual-level characteristics. In the second step, county-level predictors are added to the model to determine whether these community

Table 6.3: Logistic regression coefficients, predictors of voting Republican in presidential elections, 2000-2004. (Corrected for clustering within state and county)

	2000		2004	
	Model 1	Model 2	Model 1	Model 2
Age (in years)	-.012	-.010	-.002	-.003
Male	.436**	.431*	.612**	.590**
Black	-3.24**	-3.34**	-2.09**	-1.93**
Hispanic	.267	.240	-1.18*	-1.24**
Other	-.533	-.597+	.066	.075
High school dropout	-.630	-.757+	-.162	-.024
Some college/AA	-.340	-.369	-.000	.032
BA	-.135	-.222	-.134	-.067
MA or higher	-.359	-.357	-.731*	-.708
Family income	.127	.141	.158*	.178*
Parents foreign born	-.476	-.476	-.139	-.157
Never married	-.332	-.293	-.280	-.147
Divorced/separated	-.397	-.575	-.406	-.368
Widow	.062	.206	-.475	-.525+
Union member	-.867**	-.747**	-.858***	-.936***
Unemployed	-.706+	-.734+	-1.53*	-1.512*
White evangelical	.809**	.695**	.318	.272
Black evangelical	1.12	.875	-1.14	-1.38*
Catholic	-.120	-.116	-.614*	-.639*
Jewish	-2.42**	-2.43**	-1.72**	-1.63**
Other religion	.054	-.076	-.441	-.375
No religion	.003	.581	-.661*	-.618+
Large metro area (pop > 1M)	--	.339	--	.152
Small metro area (pop < 1M)	--	.025	--	.214
Remote nonmetro area	--	-.134	--	-.023
Northeast region	--	-.391	--	-.390
North-central region	--	-.719*	--	-.574
West region	--	-.965**	--	-.861+
County % black or Hispanic (standardized)	--	-.109	--	-.442+
County % unemployed (standardized)	--	.046	--	.594*
County mean income (standardized)	--	.055	--	.660*
County % 65 and up (standardized)	--	-.360*	--	-.1327
County % BA (standardized)	--	-.290+	--	-.500**
Constant	.508	1.03+	.370	-.738
R-square	.1501	.1761	.1864	.2053
	N=822	N=822	N=718	N=718

+p<.10 *p<.05 **p<.01 ***p<.001

Source: Author's analysis of National Election Studies Cumulative File; National Election Studies 2004 pre-and post-election surveys; National Election Studies geocode files 2000, 2004.

characteristics predict individual voting behavior over and above individual characteristics.

The results reported in Table 6.3's first and third columns suggest that several individual-level variables were significant predictors of presidential voting behavior

in both the 2000 and the 2004 elections. The most important individual-level predictors of presidential voting behavior in 2000 and 2004 were gender, race, union membership, employment status, and religion. In both of the two most recent presidential elections, men were more likely to vote for President Bush than women were. African-Americans were substantially more likely to vote Democratic in both 2000 and 2004. In 2004, Hispanics also leaned significantly Democratic, net of controls. Net of other factors, union membership and unemployment predicted and individual's Democratic voting in 2000 and 2004. Finally, the multivariate analyses summarized in Table 6.3 suggest that religion was related to voting behavior in both elections. In 2000, white evangelicals were significantly more likely to vote for Bush than mainline Protestants, while Jews were significantly more likely to vote for Gore. In 2004, the multivariate association between white evangelicals and Republican voting was statistically insignificant, but Jews, Catholics, and voters with no religious affiliation were all significantly more likely to vote for Kerry than mainline Protestants. (The shifts that occurred between 2000 and 2004 in the relationship between religious affiliation are not statistically significant and are likely the result of measurement error, rather than meaningful social changes.)

The Model 2 results reported in the second and fourth columns of this table suggest that many of the significant relationships between county characteristics and election returns reported in Table 6.2 were, indeed, spurious. Nonetheless, two county-level predictors were significantly related to voter preference in 2000 and 2004, even after controlling for these and other individual-level covariates. In both elections, county-level educational concentration predicted voting behavior, even

after controlling for individual characteristics. While this relationship is particularly pronounced in the 2004 data, it is on the margins of significance in 2000, with $p=.081$. Furthermore, in both elections, voters residing in the West were less likely to vote Republican than demographically-similar voters in the South.

This analysis lends support to the argument advanced by Judis and Teixeira, since it suggests a true ecological correlation between educational concentration and voting behavior. These multivariate models reveal a weak association between individual-level educational attainment and voting behavior. In the 2000 election, high school dropouts were marginally less likely to vote Republicans than high school graduates. Multivariate analysis of the 2004 election reveals a negative relationship between post-graduate degree holding and Republican votes, controlling for other factors. Rather than an individual-level relationship between education and voting, these models point to a county level effect. Voters in counties that have high concentrations of college graduates are more likely to vote Democratic than voters in counties where the concentration of human capital is lower, regardless of their own educational attainment.

The single-election analyses presented in Table 6.3 are based on relatively small sample sizes, and are therefore subject to large degrees of measurement error and statistical noise (Firebaugh 2001). The 2000 sample includes survey data from 822 voters, while the 2004 sample includes data from 718 voters. While the significant findings derived from these samples are likely to be robust, it is possible that these analyses have returned statistically insignificant associations for important predictors of election behavior simply because the samples lack statistical power. In

Table 6.4: Pooled logistic regression coefficients, predictors of voting Republican in presidential elections, 1960-2004. (Corrected for clustering within state and county)

	Model 1	Model 2	Model 3
Age (in years)	.004*	.004*	.003*
Male	.213*	.214***	.218***
Black	-2.81***	-2.81***	-2.84***
Hispanic	-.428*	-.443*	-.533**
Other	-.319+	-.315+	-.322+
High school dropout	-.258***	-.245***	-.250***
Some college/AA	.251***	.251***	.251***
BA	.261***	.264***	.255***
MA or higher	-.177+	-.164+	-.165+
Family income	.204***	.204***	.207***
Parents foreign born	-.121+	-.128*	-.119+
Never married	-.125	-.118	-.134+
Divorced/separated	-.019	-.022	-.007
Widow	.113	.107	.110
Union member	-.681***	-.681***	-.679***
Unemployed	-.270*	-.273*	-.262*
White evangelical	.065	.067	.129+
Black evangelical	.177	.175	.204
Catholic	-.733***	-.733***	-.671***
Jewish	-2.17***	-2.17***	-2.11***
Other religion	-.376**	-.378**	-.347**
No religion	-1.22***	-1.21***	-2.15*
Large metro area (pop > 1M)	.161	.165	.178
Small metro area (pop < 1M)	.192	.186	.197
Remote nonmetro area	.111	.146	.143
Northeast region	.240*	.245*	.210+
North-central region	.074	.067	.023
West region	.036	.024	.013
County % black or Hispanic (standardized)	-.015	-.015	-.019
County % unemployed (standardized)	-.057	-.066	-.076+
County mean income (standardized)	-.061	-.046	-.046
County % 65 and up (standardized)	-.103	-.109	-.115
County % BA (standardized)	-.091*	-.107*	-.120*
Year (standardized)	.082+	.102*	-.078
Interaction: % BA * Year	--	-.065*	-.058*
Interaction: White evangelical * Year			.301***
Interaction: Black evangelical * Year			.062
Interaction: Catholic * Year			.469***
Interaction: Jewish * Year			.389*
Interaction: Other religion * Year			.087
Interaction: No religion * Year			.145
Interaction: Northeast region * Year			-.142
Interaction: North-central region * Year			-.089
Interaction: West region * Year			-.103
Constant	.2843	.2731	.2865
R-square	.1340	0.1347	.1400
	N=11914	N=11914	N=11914

+p<.10

*p<.05

**p<.01

***p<.001

Source: Author's analysis of National Election Studies Cumulative File; National Election Studies 2004 pre-and post-election surveys; National Election Studies geocode files 2000, 2004.

Table 6.4, I have attempted to address this problem by pooling several decades worth of NES presidential election survey data into a single dataset.

The first logistic regression model summarized in this table considers the individual and county-level predictors of Republican votes in each of the presidential elections between 1960 and 2004. In addition, it includes a counter variable (labeled as “Year”) to measure whether voting behavior has shifted, in the aggregate, over time. This pooled regression suggests that the so-called “New Deal Coalition” continued to predict presidential voting behavior between 1960 and 2004. During this period minorities (and particularly African-Americans) were significantly more likely to vote for Democratic presidential candidates than whites. The affluent tend to vote Republican, while union members and the unemployed tend to vote for Democrats. Finally, Catholics, Jews, and people who affiliate with other religions or no religions were more likely to vote Democratic than mainline Protestants. Among Protestants, these pooled data shows no significant difference between the voting behavior of evangelicals and members of mainline churches.

In addition, this pooled regression shows that voter age is related to voting behavior, with older voters showing higher odds of voting Republican. Furthermore, it shows that men are significantly more likely to vote for Republicans than women. Model 1 of Table 6.4 reveals a significant association between individual-level education and voting behavior. In general, higher levels of educational attainment are associated with higher odds of voting Republican: High school dropouts are more likely to vote for Democrats than high school graduates, while college-goers show a

higher tendency to vote Republican than high school graduates. However this pooled analysis shows that this relationship is curvilinear at the top of the educational distribution, and voters with post-graduate degrees are marginally more likely to vote Democratic than high school graduates are.

Two ecological variables predict presidential voting behavior between 1960 and 2004. First, this pooled logistic regression model suggests that residents of the Northeast were significantly more likely to vote Republican over the course of this period than residents of other regions. Secondly, this model suggests that people living in counties where the concentration of college graduates is high are significantly more likely to vote Democratic than demographically similar people living in less highly-educated communities.

Judis and Teixeira argue that as economies become increasingly dependent on high-tech and service industries, they develop distinctive political cultures. This theory suggests that voters in communities with high concentrations of college graduates should be less likely to vote Republican than voters in communities where the proportion of college graduates is lower, even after controlling for individual-level predictors. Furthermore, this theory suggests that the negative association between human capital concentration and Republican voting should be growing over time, since the process of economic postindustrialization that Judis and Teixeira describe is a recent and ongoing phenomenon.

The significant and negative “% BA * year” interaction term in model 2 of Table 4 suggests that this is indeed the case. This interaction term indicates that the ecological influence of county-level human capital on individual voting behavior has

increased significantly between 1960 and 2004. Put more simply, people living in high-human capital counties are much more likely to vote Democratic today than they were in the recent past, irrespective of their own educational attainment. Table 6.5 presents a series of predicted probabilities designed to illustrate this point. In this table, predicted probabilities of voting Republican in the 1960 and 2004 presidential election are calculated for voters at different educational levels and whose counties have differing levels of human capital concentration, but whose values on all other predictor variables are held constant. This table suggests that the relationship between county-level educational attainment and individual-level voting changed dramatically between 1960 and 2004. In 1960, an average voter in a county with a high concentration of college graduates was approximately 10 percent *more* likely to vote Republican than an identical voter in a county with a low concentration of college graduates. Over the next several decades, the relationship between county-level educational concentration and voting behavior reversed and grew considerably: In 2004, an average voter in a county with a high concentration of college graduates was approximately 25 percent *less* likely to vote Republican than an identical voter in a county with a low concentration of college graduates.

During the same period in which county-level educational concentration has become an increasingly important predictor of voter preferences, several important changes occurred in the relationship between religion and political behavior. As has been demonstrated elsewhere, Catholics and evangelical Christians have become increasingly loyal Republican voters, while mainline Protestants have gravitated toward the Democratic Party (Brooks and Manza 2004; Layman 2001; Manza and

Table 6.5: Predicted probability of voting Republican by educational attainment and county % BA with all other factors held constant at population mean, 1960 and 2004

	County % BA 1 SD below national mean	County % BA At national mean	County % BA 1 SD above national mean
1960			
High school dropout	.40	.45	.51
High school graduate	.43	.48	.53
BA graduate	.43	.48	.54
MA graduate	.61	.66	.71
2004			
High school dropout	.61	.47	.34
High school graduate	.69	.56	.42
BA graduate	.71	.58	.44
MA graduate	.55	.41	.29

Source: Author's analysis of National Election Studies Cumulative File; National Election Studies 2004 pre-and post-election surveys; National Election Studies geocode files 2000, 2004.

Brooks 1997). While I know of no research linking county-level educational concentration with religious affiliation, it is possible that the growing relationship between county-level educational concentration and individual voting behavior could be an artifact of these religious realignments. To assess this possibility, Model 3 in Table 6.4 adds a series of interaction terms measuring the changes in the relationship between dominational affiliation and Republican voting between 1960 and 2004.

This model returns findings that are consistent with the previous literature on recent religious realignments, suggesting that white evangelicals and Catholics have moved toward the Republican Party over the course of this period. This model also suggests that Jews have begun to move toward the Republican Party, a finding that is consistent with some of the literature on religious realignment. However, it very clearly demonstrates that the strengthening ecological education effect on voting behavior is independent of these changes in religious voting patterns. Even after controlling for the change in the in the relationship between religion and voting,

respondents who live in counties that have a high proportion of college graduates are significantly less likely to vote for Republican candidates and this relationship has become more pronounced in recent years.

CONCLUSION

This chapter empirically demonstrates something that popular commentators on America's red state/blue state divide take for granted, but that social scientists have largely neglected: Namely, that ecological factors influence individual voting behavior.

Rhetoric about the "two America's" may exaggerate the extent to which polarized positions on key ideological issues divide the American electorate. Nonetheless, the geographical stratification that the red state/blue state maps point to does deserve careful consideration by social scientists. Without controlling for individual-level characteristics, several differences emerge between those counties that voted for Bush in 2004 and those that voted for Kerry. Southern counties, as well as counties that were outside of large metropolitan areas tended to lean Republican; while counties in large metropolitan areas, as well as counties in the Northeast and North-central regions tended to lean Democratic. But the most important predictor of county voting in the 2004 presidential election was the proportion of adult county residents who held BA degrees or higher. The higher the proportion of college graduates in a county, the more Democratic the county's voting patterns in 2004.

Analyses linking individual-level NES data with ecological data suggest that relationship between county-level educational composition and individual-level voting behavior is a true ecological effect. Even after controlling for a spectrum of

individual-level characteristics, voters who live in counties with a high concentration of college graduates are significantly more likely to vote for Democratic candidates than voters who live in counties where college graduates are relatively scarce. Furthermore, pooled time-series analyses suggest that county-level educational concentration became an increasingly salient predictor of voter behavior between 1960 and 2004.

All of these findings lend strong support to Judis and Teixeira's thinking regarding the political implications of postindustrialization. Judis and Teixeira argue that a distinctively Democratic political culture favoring social tolerance and economic liberalism is emerging in places where technological, managerial, and service industries have taken hold. Meanwhile, in places where extractive and productive industries predominate, the political culture increasingly favors the Republicans. This paper shows that Judis and Teixeira's theory accurately describes the spatial dynamics at play in recent presidential elections. Residents in communities where human capital levels are high have a pronounced – and growing – propensity to vote for Democratic candidates, regardless of their own individual characteristics. Meanwhile, in places where college graduates are rare, all residents are increasingly likely to vote for Republicans.

Epilogue: Addressing educational segregation

America is, as the pundits have repeatedly told us, a nation divided. The idea of the two Americas springs from the maps of the 2000 and 2004 presidential election returns. But this geographical divide is widely understood as a chasm that transcends partisan politics. As one of the divide's earliest chroniclers, David Brooks, describes it, the gap between red America and blue America "has to do with sensibility, not class or culture." Brooks writes (p. 54): "If I had to describe the differences between the two sensibilities in a single phrase, it would be conception of the self... In Red America the self is small... In Blue America the self is more commonly large."

A well-known attack ad which ran in Iowa in the run-up to the 2004 presidential primary election vividly encapsulates this divide in more concrete terms. In the television commercial, a down-home Iowa farm couple told Vermont governor and Democratic Presidential candidate Howard Dean "to take his tax-hiking, government-expanding, latte-drinking, sushi-eating, Volvo-driving, New York Times-reading ... Hollywood-loving, left-wing freak show back to Vermont, where it belongs." Characterizations coming from the other side of the red state/blue state divide are often no more subtle: In the weeks following the reelection of George Bush in 2004, a widely circulated – and easily discredited – email message claimed to prove that the average IQ in blue states was higher than the average IQ in red states.

These caricatures suggest that there are two kinds of places in the United States: Places that are either "traditional" or "backward" (depending on which side one takes in the dispute); and places that are "progressive" or "godless." Although the notion of red and blue America has been widely abused, this dissertation suggests that

very real demographic changes underpin the image of the two Americas. The famous red and blue maps of recent presidential elections reflect an emerging geographic divide in American life. The key geographical division in America today is not between the North and South, the coasts and the interior, or the cities and the country – although it overlaps to some extent with each of these. Rather, the important spatial gap in the U.S. today is educational: As this dissertation has demonstrated, the American landscape is becoming increasingly divided with human capital hubs on one side, and places where college graduates are rare and brain drain is endemic on the other.

As a social problem, educational segregation is very different from racial segregation. There is no reason to believe that it is the result of discriminatory practices or prejudicial attitudes. Rather, individual residential preferences and changing labor markets have driven the brain drain and brain gain migration patterns that lie behind rising educational segregation. But, as the analyses presented here have made clear, rising educational segregation has wide-ranging consequences for American life. Since the spatial concentration of human capital stimulates economic growth, rising educational segregation means broadening inequalities between the opportunities available to people living in highly educated communities and those living in places with relatively few college graduates. In addition, I have demonstrated that the implications of educational segregation spill out over the generations. Children who are born in highly educated communities experience important educational advantages, regardless of their own parents' educational attainment. Finally, my analyses suggest that educational segregation lies behind the

geographical polarization of the American electorate, with brain drain communities voting overwhelmingly Republican and human capital hubs voting overwhelmingly Democratic.

Intensifying educational segregation points to the dramatic implications that the expansion of higher education and economic post-industrialization have had on American social life. The rise of electronic communications technologies, the increasingly global dispersion of production processes, the deepening occupational specialization made possible by mass postsecondary schooling, and the expansion of international exchange have all contributed to a new, postindustrial, geography. While industrial production has become increasingly dispersed, the human-capital intensive financial, research, and service sectors have become increasingly spatially concentrated. The result, as we have seen, is increasing educational segregation, both between places and within human capital hubs.

Unanswered questions:

This dissertation is intended as a starting point in the study of educational segregation. It is my hope that further research will shed more light on this new demographic trend and its implications, and will help design effective policies to respond to it.

One important question that this dissertation has left unanswered has to do with the relationship between educational segregation and racial segregation. The segregation indices presented in Chapter 1 show two forms of segregation have been moving in opposition directions over time: Even as America's cities and towns have

become less racially segregated, segregation along educational lines has risen steadily. While the analyses presented here do not directly touch on this subject, it seems possible that the correspondence between these trends could be more than a coincidence. Wilson's theory of the underclass suggests that expanding access to higher education has allowed African-American elites to leave segregated inner-city neighborhoods. According to this theory, black brain drain decreases racial segregation, even as it increases the social and economic isolation of poor blacks. But this is not the only way in which the forces driving educational segregation may diminish racial segregation. Gentrification, or the movement of diverse groups of college graduates into urban neighborhoods may stimulate racial integration in previously homogenous racial and ethnic enclaves.

Educational segregation may also have consequences for patterns of marriage and childbirth in the United States. Over the last several decades, the city of Portland, Oregon has experienced a minor population boom, fueled largely by the in-migration of highly educated young adults and retirees. Between 1970 and 2000, the proportion of college graduates in Portland increased by two and a half times, from 12% to 31%. But Portland's rapidly growing college-educated population is virtually childless. Although there were more than 75,000 more residents in Portland's Multnomah County in 2000 than in 1990, the number of school aged children in the county remained constant during the 1990s. In the coming years, the Portland public schools anticipate dramatic enrollment losses, and several city schools are slated for closing (Egan 2005). Other human capital hubs – including San Francisco, Minneapolis, and Austin, Texas – are facing similar demographic challenges.

While community activists and local officials attribute low birth rates in these communities to high housing costs, it is possible that they are result of educational concentration. Demographic research has consistently shown that highly educated women tend to have fewer children and to have them later in life than women who have not been exposed to higher education (c.f. McLanahan 2004). These effects of educational attainment may multiply when women live in places where college graduates are plentiful, since the social norms and occupational pressures that link educational attainment to low birth rates are likely particularly pronounced in human capital hubs.

In addition to addressing these and other unanswered questions, ground-level research is needed to better understand why and how educational segregation is occurring. This dissertation has used quantitative and demographic techniques to chart the rise of educational segregation and understand its consequences; with this knowledge in mind, research using other methodological perspectives could yield important new insights into the phenomenon. Case studies could be particularly helpful in formulating a policy response to educational segregation. While multivariate models suggested that the communities that experienced human capital concentration over the second half of the 20th Century tended to be places with high initial concentrations of college graduates, Portland, Oregon and a handful of other communities experienced rapid growth in college graduate population, despite beginning the period with relatively few college graduates. The experiences of these communities could be informative for local policy makers who are interested in raising the human capital concentration in their own communities.

Policy implications:

Educational segregation is a trend with deep roots in recent economic, political, and demographic developments. As a result, reversing contemporary brain drain and brain gain migration patterns is a tall order. In Chapter 2, I reviewed a handful of policies that federal and state policymakers have considered to arrest educational segregation trends. In several states, legislators have attempted to improve local stores of human capital by encouraging more students to enroll in college and improve college graduation rates. In other places, community leaders and policy-makers have attempted to lure college graduates to brain drain communities with financial incentives such as federal and state income tax reductions and student loan excuse policies.

Neither of these approaches is likely to have a substantial effect on contemporary educational segregation trends. As the analyses presented in Chapter 2 clearly suggest, educational segregation is not the result of inequalities between places in the production of college graduates; but rather the result of educationally-selective migration trends. If all of the college graduates from America's least highly educated communities moved back to their hometowns after finishing their schooling, educational segregation would have declined over the past several decades. Instead, as we have seen, it has skyrocketed.

Rather than stimulating local economic growth, educational investments in communities that are on the losing end of educational segregation may subsidize economic growth in far-away human capital hubs. Table C.1 ranks the 50 American

states by their per capita funding for higher education, revealing that many of the states that have made the greatest financial commitments to higher education are

Table C.1: State funding for higher education, and its relation to demographic change

	Per capita higher ed funding, 1995	% of adults with BA, 2000	Population change, 1990- 2000	Change in % of adults with BA, 1990- 2000	Annual net BA migration rate, 2001- 04 ³³
1. Hawaii	0.345	0.229	+9.3%	+3.3	-0.002
2. Alaska	0.312	0.230	+13.7%	+1.4	-0.107
3. New Mexico	0.289	0.204	+20.1%	+3.0	0.029
4. Wyoming	0.285	0.188	+8.9%	+3.1	-0.061
5. North Carolina	0.260	0.174	+21.4%	+5.1	0.007
6. Alabama	0.254	0.157	+10.1%	+3.4	-0.003
7. Mississippi	0.240	0.147	+10.5%	+2.2	-0.017
8. Minnesota	0.236	0.218	+12.4%	+5.6	0.015
9. Nebraska	0.234	0.189	+8.4%	+4.8	-0.020
10. Utah	0.232	0.222	+29.6%	+3.9	-0.028
11. Iowa	0.231	0.169	+5.4%	+4.4	-0.007
12. North Dakota	0.227	0.181	+0.5%	+3.9	-0.043
13. Idaho	0.226	0.177	+28.5%	+4.0	-0.022
14. Delaware	0.206	0.214	+17.6%	+3.6	0.001
15. Kansas	0.205	0.211	+8.5%	+4.7	0.003
16. Wisconsin	0.200	0.177	+9.6%	+4.7	-0.014
17. Washington	0.194	0.229	+21.1%	+4.8	0.020
18. South Carolina	0.187	0.166	+15.1%	+3.8	-0.010
19. Arkansas	0.182	0.133	+13.7%	+3.3	-0.003
20. Texas	0.182	0.203	+22.8%	+2.9	0.014
21. Arizona	0.182	0.203	+40.0%	+3.2	0.015
22. Tennessee	0.180	0.160	+16.7%	+3.6	0.028
23. Kentucky	0.178	0.136	+9.7%	+3.5	0.011
24. New York	0.178	0.231	+5.5%	+4.2	0.002
25. Georgia	0.174	0.193	+26.4%	+5.0	0.023
26. Michigan	0.173	0.174	+6.9%	+4.4	-0.001
27. Oklahoma	0.172	0.178	+9.7%	+2.5	-0.026
28. West Virginia	0.169	0.123	+8.3%	+2.5	-0.017
29. Indiana	0.167	0.156	+9.7%	+3.8	-0.007
30. Illinois	0.166	0.210	+8.6%	+5.0	-0.001

³³ BA migration rate equals the difference between number of college graduates migrating into a state and number of college graduates migrating out, divided by total number of BA holders.

31. Colorado	0.165	0.270	+30.6%	+5.7	0.027
32. New Jersey	0.165	0.249	+8.9%	+4.9	0.006
33. Maryland	0.165	0.265	+10.8%	+5.0	0.012
34. California	0.163	0.234	+13.8%	+3.3	0.010
35. South Dakota	0.162	0.172	+8.5%	+4.3	-0.066
36. Nevada	0.162	0.153	+66.3%	+2.9	0.009
37. Virginia	0.156	0.245	+14.5%	+5.0	0.031
38. Montana	0.154	0.198	+12.9%	+4.6	0.004
39. Oregon	0.153	0.206	+20.4	+4.5	0.008
40. Connecticut	0.152	0.272	+3.6	+4.2	0.020
41. Ohio	0.142	0.170	+4.7	+4.1	-0.008
42. Maine	0.142	0.188	+3.8	+4.1	-0.014
43. Louisiana	0.140	0.161	+5.9	+2.6	-0.003
44. Pennsylvania	0.133	0.179	+3.4	+4.4	0.002
45. Florida	0.132	0.183	+21.1	+1.1	0.018
46. Rhode Island	0.127	0.213	+4.5	+4.3	-0.018
47. Massachusetts	0.124	0.272	+5.5	+6.0	0.010
48. Missouri	0.123	0.178	+9.3	+3.8	0.031
49. Vermont	0.095	0.243	+8.2	+5.1	0.029
50. New Hampshire	0.077	0.244	+11.4	+4.3	0.007

Source: James C. Palmer, "Grapevine: An Annual Compilation of Data on State Tax Appropriations for the General Operation of Higher Education." Center for the Study of Education Policy, Illinois State University; author's analysis of U.S. Department of the Census, summary file-3, 1990 and 2000; and author's analysis of Current Population Survey, 2001-2004 March Demographic supplements.

states that have low concentrations of college graduates and relatively high rates of brain drain outmigration. This table reveals that the relationship between state higher education funding is weak and unpredictable. In states like North Carolina and Minnesota, generous higher education funding corresponded with human capital concentration. However, the state in which the growth of college graduates between 1990 and 2000 was most pronounced was Massachusetts, a state that ranked 47th nationally in higher education spending. But most disconcerting are states like Alaska, Wyoming, Alabama, Mississippi, and Nebraska, where the proportion of the

population with a college degree remains low and brain drain migration is pronounced, despite relatively generous public support for higher education. For these states, educational segregation could introduce a perverse disincentive against maintaining high levels of higher education funding – when local college graduates leave to live and work elsewhere, states lose out on many of the social benefits associated with their investments in higher education.

Nor are programs that use financial incentives to lure and retain college graduates likely to be met with great success. Educational segregation is closely related to emerging economic inequalities. College graduates tend to flock in communities that are rich in economic opportunities; and in the process of doing so, they create new opportunities. But, as this dissertation has demonstrated, brain drain and brain gain migration trends do not respond exclusively to economic incentives. While relatively affluent places tend to have large, and growing, concentrations of college graduates, cultural factors also play a decisive role in determining where highly educated workers settle. Furthermore, Chapter 3's analyses suggest that the economic incentives associated with brain drain migration are modest, and are typically offset by the higher costs of living in places with high concentrations of college graduates. It is by no means clear that brain drain migration is actually an economically rational behavior; therefore, there is little reason to expect that small-scale economic incentives can exert a substantial influence on educationally-selective migration trends.

While less amenable to large-scale policy activity, cultural approaches may present a more promising solution to brain drain and the problems that it creates.

With consultation from the economist Richard Florida, the city of Memphis, Tennessee has planned a large-scale revitalization program, designed to attract highly educated “creative class” workers to the city in an attempt to stimulate economic growth (Memphis Talent Magnet Project 2005). The proposals emerging from this effort are wide-ranging, including local arts and culture festivals, marketing and press-relationship initiatives, and public arts projects, as well as relatively simple ideas, such as revising regulations regarding sidewalk seating at downtown restaurants.

On a still smaller scale, a handful of small towns suffering from brain drain and depopulation have begun to organize community foundations, which work to recruit highly educated migrants and to help establish them in the community. The non-profit Valley County Economic Development Board, for example, has lured 10 young, college-educated couples to the 2,200-resident town of Ord, Nebraska in the past year (Stier 2005). While these foundations provide start-up funds for small businesses, much of their success comes from their use of family and kinship networks to locate potential migrants and to ease their moves. The community group in Ord, for example, recruited a recent dental school graduate who grew up in a nearby county to inherit the practice of the town’s retiring dentist. It remains to be seen, however, whether these less formal approaches can reach a large enough scale to have a substantial impact on educational segregation patterns nationwide.

Short of reversing educational segregation, many policies could be undertaken to minimize its negative impacts. For example, Chapter 5 demonstrated that rising educational segregation creates new spatial inequalities in school finance and other

institutional resources that impact children's life chances. This is one of the most disturbing consequences of educational segregation, but it is by no means inevitable. If the federal government took a greater responsibility for educational policy and school finance, rising educational segregation would be not associated with rising spatial inequalities in the educational resources made available to children.

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