Does Diversity Matter?:
Evidence from the Relationship Between an Institution's Diversity and the Salaries of its Graduates

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ABSTRACT

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Affirmative Action in college admissions has been a source of controversy since its inception. Historically, the argument has been framed as a cost benefit analysis between the consequences to Whites denied admission to an institution because of Affirmative Action policies versus the benefits to historically underrepresented minorities admitted in their stead. This dissertation furthers the conversation by introducing a theoretical model grounded in the literature that explains why employers might seek college graduates who have been exposed to more diversity and then empirically explores the benefits to graduates who attend more racially and ethnically diverse institutions. It posits a parabolic empirical relationship between an institution's racial and ethnic diversity and the salaries of its graduates, with too much diversity being as undesirable as too little diversity. It does not assume that the benefits to diversity are necessarily academic but may be another set of skills—a "cosmopolitan" skill set—that employers value.

Using the Bachelor & Beyond Database (BB: 93), U.S. News Rankings, and the College Board's Annual survey of colleges, the empirical work looks at 8,054 college graduates from 466 colleges. The empirical work uses three models: Ordinary Least Square with Controls, Hierarchical Linear Modeling, and Propensity Score Matching. All models control for both individual and institutional variables the literature has found to impact salaries of college graduates. The three models use two continuous variables as the variables of interest in terms of

institutional diversity—percent Black and percent minority—as well as dummy variables for percent Black and percent minority.

The findings were modest but consistent across the models, suggesting first that there is a parabolic effect and that modest racial and ethnic institutional diversity is beneficial to White graduates but has no benefit to Hispanic or Black graduates. The benefits in terms of percent increase of earnings for White students ranged from 4.6% using an OLS model for students at non-selective institutions to 10.5% percent increase in earnings for White graduates of more diverse institutions using the propensity score matching model at selective institutions.

The findings suggest that for individual White students, there is an economic benefit to attending a slightly more diverse institution, but not for minorities, who should simply attend the most selective institution to which they are admitted. For institutions, it suggests that if their goal is to maximize earnings of their graduates, they should build a diverse cohort of students. For policymakers, the findings suggest that eliminating Affirmative Action may penalize White students more than any other racial or ethnic group.

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Chapter I

INTRODUCTION AND STATEMENT OF THE PROBLEM

Introduction

Affirmative Action in college admissions has gone from being challenged in state courts and by ballot measures to a U.S. Supreme Court ruling. The Court ruled in late June of 2003 that race can be a factor in admissions, but that it cannot be the overriding factor in an admissions program. This decision was the culmination of a significant debate. The Court's split decision on the ruling, and the narrowly defined scope of the decision, indicates a great deal about the values our society places on diversity. However, as the debate has been framed, its focus has rested squarely within the notion that the fundamental issue is a moral dilemma—how to achieve fairness, justice, and individual rights while still protecting the rights of under-represented groups of people. The debate surrounding this dilemma is important (and by many accounts far from over) and should in no way be minimized. Truly, as a society we must grapple with what we collectively believe to be the right thing to do.

However, beyond the issue of fairness and rights, universities' abilities to use Affirmative Action as an admissions tool may have consequences that are not presently being debated, and this is the focus of this paper. Specifically, the loss of a school's ability to build a diverse cohort of students could have enormous economic consequences for our society. There have been some studies that suggest that there are problems with alternatives to Affirmative Action programs (e.g., Tienda, 2003). In very pragmatic terms, education is one of the fundamental elements of the American dream: Very early on, we are taught that if we work hard and get a good education, economic opportunity is available. It is also a cornerstone of our strategy as a country to compete in a global market. Thomas Friedman (2005) has called this the "age of talent." In this way,

Affirmative Action becomes a world issue because, if colleges are unable to put together the most effective cohorts, it impacts our ability to serve and compete globally. Given that we are also the world's largest exporter of higher education, our ability to continue to deliver "quality" to the world matters to both our trade balance and our economy.

According to Adam Liptak (2011) in a recent *New York Times* article, the diversity argument is the last hope for keeping Affirmative Action in college admissions in place, and given the current make-up of the Supreme Court, the chances of its being repealed is quite high. With court cases such as the Ricci v. DeStefano, which challenged New Haven's decision to discard tests that suggested that minority firefighters were not qualified for advancement, it is only a matter of time before another case is brought before the Supreme Court.

This paper explores a related question that, if answered affirmatively, seems to fly in the face of most arguments put forth by opponents of race-conscious decisions in admissions: Will the elimination of using such race-conscious admission policies adversely affect all of a given institution's alumni in the marketplace? Groups like the Center for Individual Rights have argued that no matter how heinous past transgressions were against a group of people, it is unconstitutional to penalize an individual to right a former wrong. However, if it turns out that campus diversity provides all of an institution's graduates with an edge in the marketplace, then eliminating Affirmative Action policies may penalize not only the traditionally underrepresented students who would not be able to matriculate but also the "majority" students who do not benefit from the exposure to the diverse cohort.

This is the major focus of this paper. This paper explores whether there may be a plausible explanation for employers wanting students from institutions that are more diverse, namely, that colleges are key players in facilitating the implementation of diversity in the workplace, which has been identified by most employers as a competitive advantage in the "flat world" of the 21st century.

Statement of the Problem

As mentioned in the introduction, Affirmative Action has been controversial since its initial application in the college admissions process. There have been both legislative actions and court cases limiting the discretion of college admission professionals, with the rationale that it is unjust to penalize one group within a society in order to correct a historical transgression, an argument that I will review in greater detail shortly. There have been equally passionate advocates for college diversity. Most such advocates have framed the question in terms of society's benefiting from underrepresented minorities attending selective institutions (e.g., Bowen & Bok, 1998). This paper focuses on the effects that diversity has on the earnings of college graduates—all graduates, not just minorities. Clearly if everyone benefits from diversity, then from a pragmatic perspective, there should be more support for promoting diversity in college.

At the center of this argument will be a quantitative analytical study that estimates the effects of institutional characteristics on samples of students. Specifically, controlling for other factors known to influence starting salaries, I explore whether an institution's racial and ethnic diversity statistically is related to the earnings of its graduates—not just minority students but majority students as well. If it turns out that there is a statistically significant relationship, then barring diversity-conscious decisions may adversely affect recent college graduates' income. The thesis presented in this paper is that there may be a positive relationship between institutional diversity and graduates' salaries. The question of whether such a relation exists is derived from a series of logical deductions explained in the review of related literature. The literature review presented in this paper demonstrates why the question is reasonable to explore, so that when the analytical part is framed, the appropriate theoretical context for the question will have been presented. Furthermore, existing literature will be examined for implications with respect to the host of empirical issues associated with examining the relationship between diversity in academic institutions and graduate income, as well as with regard to where the gaps are in the

literature. The methodology and the data used for this piece of research are also discussed. Finally, I present the findings and discuss the implications for colleges.

A Review of the History of Affirmative Action

The United States is a diverse society and has been since its inception. However, while the country has explicit ideals when it comes to fairness and equality, historically it rarely manifested those ideals, with barriers such as the Jim Crow Laws. The emergence of the civil rights movement in the 1960s began a process whereby the United States started to address the curtailed rights and access to resources of women, Blacks and other minorities, and other historically disenfranchised groups.

One manifestation of this desire to "right former wrongs" became know as Affirmative Action, where institutions were encouraged to adopt policies to have their institutions better reflect American society. In higher education, this began to manifest itself in colleges giving preferential treatment in the admission process to these historically underrepresented minorities. Bill Bowen and Derek Bok (1998) provide an excellent summary of the history of these race-sensitive admissions policies in the first chapter of *The Shape of the River*. For the purpose of this paper, I will use the term "diversity"—while it can be broadly construed to mean almost any difference—to refer to ethnic and racial diversity in college student bodies and "Affirmative Action" to refer to the policy of colleges to give consideration to race and ethnicity in the admission process. This is important because my conceptual argument could be applied to any sort of institutional diversity, and I elected—given the controversy around Affirmative Action—to apply the concept empirically to racial and ethnic diversity. According to Bowen and Bok, by the time of the ruling by the Supreme Court in Bakke in 1978, which allowed for some consideration of race, public universities were being mandated by federal officials to execute Affirmative Action plans (p. 8).

The Bakke decision opened the door for a series of judicial decisions and the opinion known as Hopwood (the name of the plaintiff in a discrimination lawsuit), which began in 1995, and which changed college admissions policies in Texas. This was followed by the Banneker Scholarships decision in Maryland in 1995, and in 1996 by the Proposition 209 voter referendum in California, which did away with that state's Affirmative Action law. In late 2001, the two lawsuits involving the University of Michigan were argued before the Sixth Circuit Appeals Court, and unlike in the other appellate courts, a narrow ruling (5-4) in favor of race-conscious admission policies ensued. In its decision, the appeals court overturned an earlier ruling by a federal judge regarding the University of Michigan's right to use such policies to create a diverse class of incoming students. The majority opinion concluded that affirming educational diversity is a compelling reason to have race as a "plus" factor in the University of Michigan's law school admissions policies (Steinberg, 2002, p. A16). In August 2002, the Supreme Court agreed to hear the University of Michigan case. The petition noted that the federal appeals courts were divided on the issue. In addition to the pro-Affirmative Action decision in the Sixth Circuit, the Ninth Circuit Court had also ruled in favor of the University of Washington's law school. And as noted before, in the Georgia and Texas cases, the Fifth and Eleventh Circuit Courts had ruled against Affirmative Action (Schmidt, 2003, p. A25).

Collectively, educational administrators viewed these events as an attack on long-standing Affirmative Action programs. In each case, excepting to date the Michigan case, despite the best efforts by the admissions offices in the public universities in the respective states, admissions policies were changed to reflect the decisions, basically ceasing to use diversity as a criterion for admission and no longer giving additional weight to representatives of groups that have been traditionally underrepresented in higher education. Not surprisingly, institutional diversity subsequently declined. Educational policymakers should expect this trend to continue despite the Supreme Court ruling. A 2003 poll shows that a majority of Americans are opposed to race-conscious decisions in admissions (Schmidt, 2003, p. A23), and subsequently to Michigan, other states have passed referendums limiting Affirmative Action in admissions.

While colleges argued their cases within the federal court system, both the University of California (Selingo, 2001, p. A23) and the University of Texas (Selingo, 2002, p. A29), after a couple of years with disastrous results, put into place what admission systems critics contended were just ways of creating proxies to the race-conscious admissions policies that had been banned; an example of which is the ten percent rule adopted in Texas. According to an article by Gary Engelgau (1998), who was executive director of Admissions and Records at Texas A&M University between 1996 and 1997, in the first year after the Hopwood decision, African American and Hispanic freshman applications to Texas A&M decreased 13% and 9%, respectively (p. 5). Engelgau also noted that the yield (the percent of admitted students who enrolled) dropped to historic lows for the freshman class as a whole and for African American and Hispanic applicants in particular. He argued that Hopwood was a cause of this decreased yield.

Since Engelgau's article (1998), the enrollment statistics have only gotten worse. In a 2003 analysis focusing on three states that had tried to create "back door" policies to increase diversity after anti-Affirmative Action policies (Texas, California, and Florida), the *Chronicle of Higher Education* (Hebel, 2003, p. A25) indicated that the attempts to increase diversity in each state had not been the least bit successful. They noted that since Hopwood, at Texas A&M, the percentage of Blacks who matriculated had fallen by some 30%, and Hispanic enrollments were down almost 20% (p. A25). In the U.S. Department of Education survey of more than 3,000 colleges, the acceptance rate at 4-year institutions has dropped dramatically for minorities since 1985. Black acceptance rates were down 18%, while American Indian acceptance rates were down 8%, and those for Hispanics were down 9% (Trends, 2000).

These admissions results have repeatedly caught university administrators unaware. In each case, administrators responded by arguing about the gross inequalities in the United States that exist and the overall power of education to open doors for the country's marginalized peoples. As good an example as any is Tony Carnevale's (2000) paper, "The Opportunity Gap: Campus Diversity and the New Economy." He argued that, in order to be competitive, we need a

diverse workforce and that, in order to achieve a diverse workforce, we need diverse colleges. He noted that some 41% of African Americans and 33% of Hispanics live in households with incomes "below the minimum but adequate level set by the U.S. Department of Labor" (p. 10). He then went on to note that in 1995, “more than 62% of both men and women in the economy's most elite jobs … had bachelor's degrees and another 23 percent had associates degrees" (p. 10). He further argued that if the same distribution for college education that exists in the White community were available to African American and Hispanic communities, the subsequent higher incomes would substantially raise the standard of living of minority families (p. 10).

Perhaps a more famous example of the current thinking among education professionals is the impressive book already referenced, Derek Bok and Bill Bowen's (1998) *The Shape of the River: Long-Term Consequences of Considering Race in College and University Admissions*. Educators hail the book as the most comprehensive look ever at how students who benefited from racial preferences have fared both during and after college. The authors make a persuasive case for the success of higher education for African American students by arguing that, without Affirmative Action, these students would not have been given the opportunity to succeed. Educators hoped that because of the book's dense and rigorous research, based on a study of 45,184 students who entered 28 selective colleges in the fall of 1976 and the fall of 1989, the work would provide the empirical evidence needed to convince skeptics of Affirmative Action policies in our country's institutions of higher education that diversity is valuable.

Educators present these arguments to make a case of the power of American education to right former wrongs and to open doors for minorities to succeed. However, it is more important to note that the lower courts have soundly rejected these types of arguments in their briefs, and even the Supreme Court hedged its decision by limiting the use of the policy among admissions officers.

In an effort to create a more "empirical" defense of raced-based admissions policies, the University of Michigan’s case (technically, *Gratz v. Bollinger*) heard by the Supreme Court used the Bok/Bowen research as the basis of its defense. It was hoped by the admissions community

that this approach would stem the legal tide against Affirmative Action. Since the Supreme Court decided in favor of Michigan's use of Affirmative Action, we may therefore deduce that empirical research seems to hold more sway than philosophical arguments in the context of American Affirmative Action discussion. Nonetheless, the Bok/Bowen research still focused on the "underserved" minorities as opposed to considering potential benefits to all students or to the institutions themselves. It also focused solely on graduates of highly selective colleges.

Rather than silencing the debate surrounding Affirmative Action and admissions, the Michigan decision seems to have fueled the debate. As mentioned in the first paragraph of this paper, there is every indication that the debate will continue, as colleges and universities work toward implementing the details of the Court's decision, and as Affirmative Action opponents broaden the focus of their legal and political attacks.

What This Research Contributes to the Debate

As noted, the debate has largely been focused on how Affirmative Action impacts minorities, and the courts have consistently accepted the notion that it is problematic as public policy to deny majority students access to higher education in order to benefit minorities. My work explores the impact of Affirmative Action on the White students who attend college as well as the minority students. I first use the literature to present a solid theoretical basis to examine the research question at hand. My discussion is the only work I could find that proposes a theoretical chain of events that might explain why it makes sense to investigate the relationship between a college's student body diversity and the salaries of its alumni. I tie employer needs—particularly of employees who have "cosmopolitan" skill sets—to salaries of employees and conceptually and empirically link them to the colleges that are producing these employees. I then put forward a reasoned hypothesis that diversity may be a technology that certain firms (colleges) employ to produce these "cosmopolitan" graduates.

Empirical studies that investigate relationships between institutional characteristics and earnings, which I also discuss in this paper, back this context. While a host of methodological issues exist and must be contended with, studies are also widely accepted in the literature. Unfortunately, there has been very little work done linking the idea of diversity as an institutional characteristic and its relationship to earnings. Sanders (2004) looks at law school admissions and pass rates for the bar and focuses solely on minorities. There are only two studies that look at the relationship between institutional diversity and income, and both explore that question as an ancillary part of the study. Kermit, Black, and Smith (2001) primarily look at the benefits of diversity programs and then also look at the benefits to all students. Rumberger and Thomas (1993) only note the finding of diversity as a predictor of wages in their footnotes.

In each of the court cases involving challenges to Affirmative Action, institutions of higher education, in addition to focusing almost exclusively on the benefits of higher education to the minority community, may have made another fundamental error—ignoring the peer effect in education, which argues that students, in addition to being consumers of education, are also inputs. This argument is supported by research. This being the case, if it can be demonstrated that a diverse student body improves the education of all of its students, one could convincingly argue that not allowing admissions offices to use several diversity-seeking criteria puts the institution at a competitive disadvantage, because the institution cannot use the best available inputs to maximize the production of learning on its campus. Secondly, it would penalize minority and non-minority students alike by not affording them the highest education possible, due to the lack of diversity, though White students who would then be admitted to the college of their choice might benefit more. That said, from the institution's perspective, it would be less able to produce the best cohort of graduates. Indeed, in the Hopwood opinion cited in the introduction, it was noted that allowing admission to an individual who can run fast was acceptable. If helping the football team allows for different admissions standards, then improving the salary of an institution's graduates might also warrant different admissions standards.

Furthermore, this research builds on the body of knowledge in that it includes measures of diversity in the measures of institutional characteristics. I also consider diversity in measuring peer effects. My work differs from Kermit et al. and Rumberger and Thomas in that it looks at several measures of diversity and uses three different ways to estimate the parameters related to the relationship between institutional diversity and salaries of alumni. Cook and Frank (1993) argue, when discussing student quality, that the distribution of students among colleges affects the ability of individual colleges to produce learning. Since I find that earnings are related to a college's diversity, then perhaps part of the reason is that peer effects impact the production of a set of skills valued by employers (what I call "cosmopolitan skills"). Rothschild and White (1995) argue that a competitive price system will achieve diversity only with great difficulty. If it turns out that "diversity matters," then price discounts in the form of financial aid to increase diversity may make some sense in addition to Affirmative Action in admissions.

The purpose of this research presupposes that understanding the importance of a college's diversity in relationship to its graduates' earnings may have important policy implications both for individual institutions (e.g., financial aid and admission standards) and for government. If limiting the ability of individual colleges to set their own standards proves detrimental to the quality of education, then government should have an interest in deregulating admissions policies as they pertain to improving diversity.

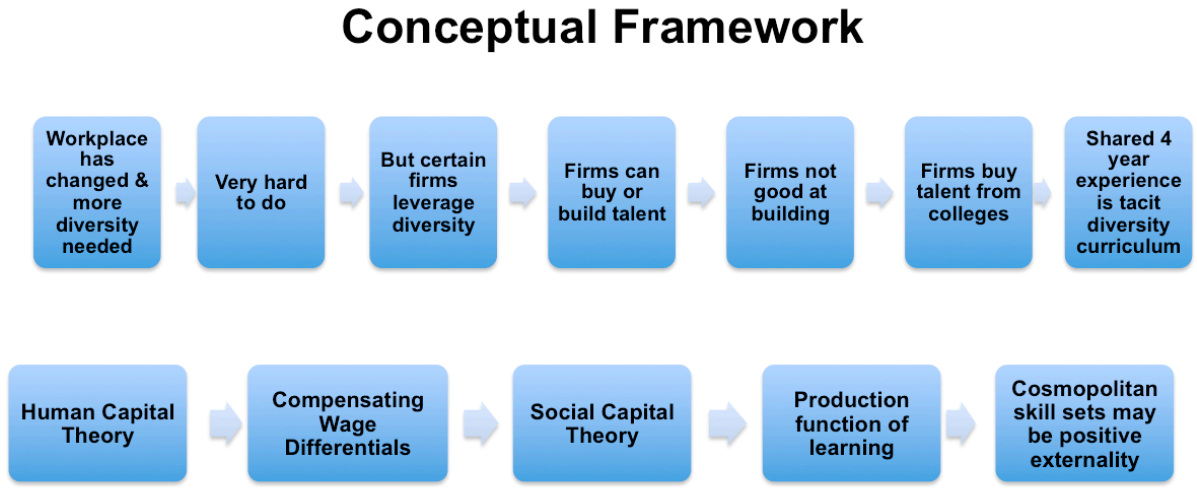
Chapter II

THEORETICAL FRAMEWORK AND LITERATURE REVIEW

A Conceptual Framework Grounded in the Literature

Despite the focus in the courts and the press surrounding Affirmative Action policies in college admissions, there has been surprisingly little research on the topic. Most is either normative, advocating Affirmative Action or attacking it, or purely empirical, positing no reasoned hypothesis as to why there might be a relationship between the diversity of a college's student body and the salaries of its graduates. In addition, the work has always focused on whether Affirmative Action benefits minorities. Therefore, this literature review will serve two purposes. It will first use a diverse literature to reason through a conceptual framework that explains why one might find a relationship between a college's diversity and its alumni's salaries, and then it will discuss how one might explore that relationship empirically, including some of the challenges that such empirical questions pose methodologically. In the figure below I illustrate the conceptual model I have developed and discuss in this chapter.

Figure 1. *Conceptual Model of Why Employers Pay a Premium for Graduates of More Diverse Institutions*



One interesting facet of this exploration is that the problem repeats itself across scale. The same notion advocated within the academic community—"diversity is good for universities"—has been advocated within the business community, and it follows a similar history, evolving from the social justice/mandated context of the 1960s following Title VII of the 1964 Civil Rights Act to making a "business case" for diversity starting in the 1990s (Kochan et al., 2003). The emergence of a business case stems largely from changes in the market and changes in the workplace. These changes include: increased intensity of both domestic and international competition, a proliferation of products and services, accelerated product and process innovation, and general uncertainty (Berryman & Bailey, 1992; Friedman 2005). Berryman and Bailey suggest that the changes—both internal and external—that organizations are facing require shifts in the nature of work and "the skills and educational needs of that work." They suggest that there are two broad production approaches—a "robust" production system that can be viewed as akin to mass production and a "flatter" system that has less hierarchy and more flexibility (Berryman & Bailey, 1992).

The resulting evolution of the internal and external environment has resulted in diversity being perceived as a competitive advantage by employers. This has led to an articulation of a "business case" for diversity that tends to contain at least one of the following six arguments described by Cox and Blake (1991) below:

(1) *Cost*. As organizations become more diverse simply because of the demographic make-up of the labor market, companies will de facto need to diversify their workforce, and there will be an increased cost associated with discrimination. Blau and Ferber (1998) discuss the arguments, building on Becker's work, that frame discrimination in terms of tastes against associating with different groups of people. The argument is that with changing demographics, companies that cannot integrate will be at a cost disadvantage.

(2) *Attracting Talent*. Companies that are viewed as great places for women and minorities will attract the best talent. One empirical example of this is a recent study

by Edmans (2008) that used diversity as a component of an employee satisfaction measure and found that this measure was significantly correlated with shareholder return. Diversity is also one important factor considered when deciding whether a firm is one of the 100 Best Companies to Work For in America.

(3) *Ability to Market*. In Friedman's (2005) "flat world," having cultural insight—whether to particular communities in the U.S. or abroad—provides a competitive advantage to selling one's services.

(4) *Increased Creativity*. Diversity of perspectives and less emphasis on conformity will improve creativity within an organization.

(5) *Ability to Solve Problems*. Different perspectives and tolerance for diverse ideas increase the ability to solve problems and mitigate against "group think."

(6) *Flexibility*. Cox and Blake (1991) summarize the popular argument as follows: "The system will be less determinant, less standardized, and therefore more fluid. The increased fluidity should create greater flexibility to react to environmental changes" (p. 51).

The six arguments above, while summarized by Cox and Blake and illustrated by other references, are iterated by a large number of researchers (e.g., Dunphy, 2004, Esser, 1998, Larkey, 1996, Milikin & Martins, 1996, etc.). One can surmise that, like the academy, when it comes to Affirmative Action, the business community has embraced the notion of diversity as being an admirable goal. A typography has emerged that has a hierarchyfrom "monolithic" to "pluralistic" to "multicultural," which is the apex and to which all companies ought to aspire (Cox, 1991). This provides the first plausible link—business believes that diversity is good for business.

Ottaviano and Peri (2006), in undertaking an analysis of the economic value of diversity, find that a more "multicultural urban environment makes US-born citizens more productive." (p. 39). However, their study focused on cities rather than individual businesses. The fact is that the business case articulated above suffers from the same criticisms posited to the University of

Michigan when it was advocating Affirmative Action in the admissions process, namely, that there was a lack of evidence to support the case. It also begs the question, assuming that companies largely exist to maximize profits, that if there is a good business case, the market would adopt any strategy that succeeds, but since there is still evidence that things like "glass ceilings" and other barriers exist, it stands to reason that there is something that prevents every business from becoming more diverse and more competitive (Blau & Ferber, 1998). It turns out that the empirical evidence complicates matters and provides the second link, namely, that achieving diversity poses challenges to businesses.

In 1996, an initiative called "Business Opportunities for Leadership Diversity" was instigated to help American corporations by leveraging their diversity for competitive advantage. Kochan et al. (2003) commissioned a study from teams of some top-ranked business schools to assess the diversity-performance link. The study manifested as four independent mixed method studies of some 20 Fortune 100 companies that were then analyzed. The results when taken out of context are surprisingly underwhelming. The overarching finding was that "there are few direct effects of diversity on performance—either positive or negative" (p. 10).

The same study went on to note that "there appear to be some conditions under which diversity, if managed well, enhances performance" (Kochan et al., 2003, p. 18). The fundamental problem is one that sports teams and music groups have long encountered—bringing together talent alone does not ensure success. The five best individual players may not constitute the best team, which win the most games. The study suggests that organizations that have in place processes that allow for constructive conflict resolution and communication significantly outperform other companies, especially when their workforces are diverse. The study goes on to recommend that organizations develop strategic training programs to develop those skill sets among employees.

A very nice treatment of the concept is provided by Page (2007), who defines diversity in a much more complex way than I address within the confines of this study, and it is a broader definition than the courts have dealt with (p. 85). That said, he does an elegant job exploring how

diversity enhances robustness in complex systems through responsiveness, synergies, and the construction of collective knowledge (p. 182). The author also offers interesting insights on how diversity increases accuracy in prediction (pp. 224-227). We now have the second link, that there is some set of skills that certain organizations possess that allows them to perform well as diverse organizations and capture the benefits made by the business case. We can also infer that these skill sets may be learnable based on the study's recommendation to develop training programs. But why might certain people have these skills and others not, even when they come from the same racial/ethnic background? Social capital theory may help explain the answer.

According to Ronald Burt (2004), social capital is the contextual complement to human capital. Certain people are connected to others, and these connections can be assets. Burt quotes Bourdieu: "Social capital is the sum of the resources, actual or virtual, that accrue to an individual or group by virtue of possessing a durable network of more or less institutionalized relationships" (p. 351). He also notes that, like other forms of capital, social capital is productive (p. 351).

One can think of this social capital manifesting itself in social networks made of individuals that are interdependent. Research has shown that social networks play a critical role in determining the way problems are solved, organizations are run, and the degree to which individuals succeed in achieving their goals (Linn, 2001).

The more closed or homogeneous the network is, the more efficiently it functions but the less likely it is to accept new ideas or opportunities. In other words, a group of employees who all have the same background, values, and experiences share the same knowledge and opportunities and are less likely to have access to a wider range of information (Granoveter, 1983).

Among these networks are "structural holes." Burt (2001) argues that these structural holes create opportunities for brokerage. These holes are the source of innovation and new opportunities for organizations. Individuals who can fill these holes are very valued because of

their ability to create these opportunities for innovation (Burt 2001). Consequently, cultivating or identifying people with these skill sets would be important to employers.

Sociologist Elijah Anderson (2004) observes that our environment is more racially, ethnically, and socially diverse than ever. Social distance and tension, as expressed by wariness of strangers, appear to be the order of the day. In this environment, most people are what he calls “particularistic” and tend to interact with those people who are like them. However, there is another group of individuals who are fundamentally different, he calls them “cosmopolitan,” people who can and will interact with people who are unlike them. This group of people creates a "cosmopolitan canopy," offering a respite and an opportunity for diverse peoples to come together to do their business and also to engage in "folk ethnography," which serves as a cognitive and cultural base (Anderson, 2004). I posit that it is this group that is the elixir for those organizations that seem to effectively leverage diversity and outperform the competition.

In more general terms, there is a large literature that articulates both sets of skills that employers seek across occupations. These skills include things such as problem solving, thinking critically, and working in teams (e.g., Coplin, 2012, Stasz, 2001). And there have been some studies that suggest that employers perceive that the workforce largely lacks these skills (ASTD, 2006, Casner-Lotto, Barrington, & Wright, 2006).

I would suggest that the reason is that these cosmopolitan people are able to fill the structural holes to help companies get their diverse teams to function effectively and address the sorts of skills mentioned above. Consequently, they are the major source of innovation, and they are the ones who turn diverse groups of individuals into high-performing teams that capture the business case made by business leaders for diversity. We now have several pieces of the puzzle. Companies want diversity, successfully instituting diversity is difficult, and there are these “cosmopolitan people” who are able to make these diverse teams high-performing.

This concept manifests itself in the generally accepted notion in neoclassical economics of compensating wage differentials, whereby there is a market for talent, the wages paid reflect the demand employers have in terms of the work needed to be done, and where the wage offered

reflects the marginal value added by a particular employee. The supply of labor and the wage accepted are a manifestation of the types of jobs and the relative desirability of one job over another in both wages and other benefits and reflects the individual preferences of employees. Perhaps the most cogent discussion of the non-randomness of the distribution of wages can be found in A.D. Roy's (1951) reasoned essay, " Some Thoughts on the Distribution of Earnings." T.W. Schultz's (1963) *The Economic Value of Education* also makes powerful arguments supporting economic returns to education that are generally accepted. The empirical work supporting the concept of economic returns to education goes back at least several decades as well (e.g., Becker, 1975; Mincer, 1970).

To illustrate, we can use as a conceptual model the work by Blau and Ferber (1998) in which they use compensating wage differentials to tease out a discrimination coefficient that amounts to the tax a firm is willing to pay in order to not have to associate with people not like them. One can think of a similar cosmopolitan coefficient that would work in a similar way but would have a positive rather than a negative sign and would manifest itself in a wage premium paid (as opposed to the Blau and Ferber model, it amounts to a wage gap/differential for the same work). One can even envision competing coefficients (e.g., uncomfortableness with others versus wanting a high-performing team). The conceptual model can become quite complicated; Rosen (1986) discusses the various parts that go into any wage/labor transaction, and one can think of all sorts of other externalities that either the firm or the individual would pay (in the case of the employee, the "pay" would manifest as a discounted wage). One example is the one already referenced in certain organizations being "great places to work" as a result of effectively leveraging their diversity; on the employer side, this might lead to less cost to retain, and so employers would pay a premium to cosmopolitan workers because they would help retain other workers. The argument basically boils down to what Rosen would call a firm choice of a technology, where diversity becomes a technology, and then the firm needs to hire workers with the cosmopolitan "skill set."

Therefore, the organization that wants diversity and wants these cosmopolitan people will pay a wage premium to get them. The next question is where one would find such cosmopolitan people, and the answer, to paraphrase Peter Cappelli (2008), is for the employer to either "buy it" or "build it."

The literature does suggest that we need to be cautious and not overemphasize the benefits of diversity. Negative influences of diversity have also been argued. Lau and Murnighan (2005) found that it may trigger group fragmentation, and the organizational behavior literature suggests that diverse teams may be less cohesive than homogeneous teams, and the lack of cohesiveness may hamper the performance benefits of diversity (Flache & Mas, 2008).

That said, the evidence from literature suggests that training employees to be "cosmopolitan" is not something that organizations do well. Indeed, in all the studies, training was listed as the single biggest reason as to why diversity initiatives failed (e.g., Allen, 2001; Dunphy, 2004; Kochan et al., 2003, Ng & Turn, 1998). Most of the training programs described were characterized as "diversity awareness" programs as opposed to the best universities, which foster an environment that promotes learning from diversity (I will make the case subsequently).

Regardless of whether the organization decides to buy or build a set of employees who have these cosmopolitan skill sets, the underlying model is a human capital framework that relates education to earning and builds on similar research that relates the characteristics of education to workers' earnings. This allows us to make the link between the business need and why one might look "upstream" at colleges to see if they are producing these cosmopolitan employees. The basic premise is that investing in education leads to higher productivity in the form of these cosmopolitan traits, which may be measured in terms of higher earnings. The rationale behind this is that wages are determined based on a worker's contribution to the revenues of the employer; more productive workers earn more, other things being equal. This concept is generally accepted by economists and traces its theoretical roots to the very beginning of economics as a discipline, with economists such as Smith (1952) and von Thünen (1968) accepting the premise.

There are more modern economists who provide additional theoretical and empirical evidence to support my hypothesis. Human capital theory assumes that educated laborers receive additional compensation due to their superior cognitive skills. Bowles, Gintis, and Osborne (2001) challenge this assumption and developed a model to test for the "noncognitive component of the returns to schooling" (p. 1149). In one function, the determinants of income (y) include schooling (*s*), parental socioeconomic background (*b*), cognitive skill level (*c*), and a dummy variable (ε) to account for the residual factors uncorrelated with the explanatory variables (p. 1148):

$$y = \beta_s s + \beta_b b + \beta_c c + \varepsilon$$

Bowles et al. developed a second function that does not include the cognitive skill level (*c*) variable. Instead, cognitive skill development is assumed to be incorporated into the measure of the individual's schooling (*s'*):

$$y' = \beta'_s s + \beta'_b b + \varepsilon'$$

Bowles et al. then took the beta coefficients for schooling from each of the models and compared them to determine the non-cognitive affects of schooling on income, represented in the equation below as alpha (α):

$$\alpha = \frac{\beta_s}{\beta'_s}$$

The alpha (α) variable could fall within a range of 0 to 1. α = 0 signifies that the only effect of schooling on earnings is through cognitive skill development. On the other hand, α = 1 suggests that the effect of schooling on earnings is uncorrelated with cognitive skills. After running their regressions, Bowles et al. found the mean value of α was 0.82, while the median value was 0.84. "This suggests that a substantial portion of the returns to schooling are generated by effects or correlates of schooling substantially unrelated to the cognitive capacities measured on the available tests" (pp. 1149-1150). The conclusions reached by Bowles et al. corroborates the previous findings of Huang (1996) and Taber (1997).

Bowles and Gintis (2002) contend that there are unobservable characteristics, beyond cognitive ability, that are developed through education and rewarded in the labor market. These unobservable characteristics are referred to as "behavioral traits" due to their non-productive nature (p. 11). One could think of my notion of "cosmopolitanism" as one of these behavioral traits.

Enrico Moretti (2004) provides another theoretical support to my hypothesis and bolsters it with empirical evidence. If one thinks of the production of learning as occurring to an individual, then one can reason that any benefit or cost accrued to others is an externality. Moretti names this notion the external return to education. He posits and finds some evidence that if there were only private returns to education, then the number of college graduates in a town should not impact the average wages above what one would expect from the aggregate private returns. However, if there is a social return to education, then the external return (the combination of the social and private) would be greater than the private return alone. Using both NLSY and Census data, and controlling for unobservability across individuals and across cities, Moretti finds consistently that there seems to be an external benefit to the city for all workers that cannot be attributed to private returns. He ends this paper with a nice illustration comparing two towns:

> Compare a city like El Paso, TX, a poor border community, with San Jose, CA, which lies in the heart of Silicon Valley. The former, with the eighth lowest average education level in the US, experienced virtually no increase in the proportion of college graduates in the 1980s. The latter, with one of the highest levels of average education, witnessed a 5.1% increase in the proportion of college graduates. Findings in this paper suggest that in San Jose the external return to education may have accounted for wage increases among high-school graduates and college graduates of 8% and 2%, respectively. These increases occurred over the ten year period between 1980 and1990. No wage increase was caused by the external return to education in El Paso. (p. 209)

Once can think of "cosmopolitanism" as an externality outside the cognitive component of the production function. This externality would manifest itself in several ways—the individual would accrue the skill sets of being able to navigate in diverse settings, the college would see a relative benefit in terms of its ability to produce graduates who earn more money, and firms who

hire such graduates would see benefits relative to hiring graduates with similar cognitive abilities but without the skill sets gained by prolonged exposure to students with different backgrounds.

We have now developed a plausible theory as to why a firm might pay a premium for one of these cosmopolitan employees. I must now make the case conceptually as to why diverse colleges might be a good source of these cosmopolitan employees. To facilitate an understanding of this, in this paper I rely on the education production function. The production function represents the process by which students can transform inputs into outputs. The transformation occurs in an academic environment, and as such, learning can be viewed as a technology. The argument I will make is two-fold. First, that a cohort—a particular student's peers—is an important part of the production of learning, and that the technology of more diverse colleges differs from the technology of more homogenous colleges' students. Basically, diversity matters if one wants to produce these sorts of cosmopolitan students. To "produce" an academic outcome, even one that may be unobservable in itself but is reflected in the income an employer pays, economists typically employ an education production function, which models the relationship between various college inputs and the ultimate increased perceived productivity of the worker as reflected in their salary. In this regard, academic outcomes are comparable to learning as a technology (e.g., Hanushek, 1979; Summers & Wolfe, 1977). I posit that institutional diversity is an input vector.

Based on the above description, there are two production functions in the current higher education system. Both student types may have a similar vector of outputs, comprised of college-degree attainment, stable employment, and higher salary, than the counterfactual of not attending a post-secondary institution, but the one who went to the diverse college, other things being equal, will have benefitted from this exposure and have become "cosmopolitan." Thus, it is in the inputs where the distinction is made between the two, namely, that the quality of one's peers, and in particular their backgrounds, matters. Belfield (2000), in discussing the use of production function in higher education, notes, "More desirable students are simply those who are better as inputs at generating the output of human capital. Hence they should get a better income or larger

financial scholarships" (p. 89). In this framework, if one accepts the premise that students of a particular background enhance an institution's ability to produce cosmopolitan students, then one would expect to see more financial aid allocated to traditionally underrepresented groups in order to increase diversity, which is exactly what happens.

To understand the concept, we must examine whether the peer effect has any influence on an individual's productivity, then explain whether diversity is an "innovation" within the peer effect that enhances this productivity, and finally make the argument that this innovation is the ability to produce cosmopolitan workers. There is some evidence to support the notion of the peer effect influencing learning outcomes. In a working paper for the National Bureau of Economic Research, Caroline Hoxby (1997) begins to make the case for thinking of students and their peers as inputs. She writes,

> The quality of a college is partly determined by the peers with whom a prospective student would be educated. Students, therefore, are inputs into the production of college education as well as consumers of it. Furthermore, students must be inputs at the same college where they consume. (p. 18)

Hoxby's claim is further supported by work done by Gordon Winston (1999), who also supported the idea of students as inputs to education (p. 18). In general terms, Winston argues that the goal of higher education institutions is to maintain or improve the quality of the educational services they supply. This goal is measured relative to other academic institutions (p. 16). If this is the case, a factor to note is that if the value of diversity in learning outcomes is accepted, then combined with the limited pool of minority college applicants, one would expect colleges to pay a premium to get these students to apply and enroll.

Robert Hauser (1988) conducted a study that found when one controlled for social background characteristics and academic performance, Hispanic and African Americans seemed to have a net advantage over Whites in college admissions (p. 102). This notion is further supported by work done by Hoxby (1997). Namely, because students are both consumers and inputs simultaneously, net tuition combines the gross tuition plus the income paid as an input, which, it could be argued, manifests itself as financial aid. Hoxby goes on to note that if a

college makes an investment in quality, it will achieve expanded returns through the improved quality of peers (p. 20). In other words, because students are inputs into the educational process and if diversity is valued, then institutions ought to be willing to pay premiums to get these students. This logic is supported by these two studies, Hauser (1988) and Hoxby (1997). The economic motivation by the college to garner a "premium input" constitutes an important and different way to think about financial aid, which again was argued by Belfield (2000). Traditional thinking focuses on financial aid to manage yield or increase access for purely moral reasons.

There is surprisingly little empirical, non-attitudinal literature when it comes to exploring the effect of peers in educational outcomes. I note this because in the vast majority of the literature peer effect is simply implied as a given. Perhaps this is because the grandfathers of pedagogy, such as Piaget, talked in philosophical terms about the influence of peers. However, most published literature on the subject deals with "how to" achieve a positive peer effect rather than whether it is impactful. I will, therefore, spend a fair amount of time exploring this issue. I will first explain the two major theories of cooperative learning—Piaget's cognitive theory and Vygotsky's socio-cultural theory—to provide the reader with the theoretical framework to understand how cooperative-learning structures might create the peer effect. I will then outline current research that supports or refutes these theories of learning and compare this research to the current research in economics that suggests a peer effect in education.

Piaget (1972) outlines various mechanisms to explain how children acquire cognitive abilities. Central to his theory is the use of prior knowledge to either build on or reconstruct what a child has believed to be true. As a child encounters differing experiences, one of two things occurs: the new experiences either maintain or disrupt the balance (*equilibrium*) of what the child thought to be true. If the activity is repeated and consistent with prior knowledge, it fits in easily with that prior knowledge (*assimilation*). If the experience is new or different from what the child experienced before, then the child experiences a sense of *disequilibrium*; the child is forced either to alter or reorganize his/her cognitive structure to accommodate the new information. In

this case, the child either fits the information in where it is most appropriate (*assimilation)* or must create a new cognitive structure in the case of completely new information (*accommodation)*.

Piaget (1932) distinguishes between two social interactions that give rise to this shift in thinking: *constraint* and *cooperation*. In his observations of family interactions, Piaget notes that relationships defined by *constraint* tend to have one person who is the authority and another who is the novice. In this relationship, the authority figure is permitted to dictate terms, and the novice obeys these terms without question. This relationship is defined with one person being in a position of privilege and power and the other in the position of a submissive pawn. Piaget contrasts this relationship with one based on *cooperation*, where each member of the relationship has mutual respect for the other party. Piaget contends that children's knowledge based on cooperative relationships appears later and is more advanced than those concepts acquired through constraint relationships (Piaget, 1932; De Lisi, 2002).

Piaget (1985) defines knowledge as a relationship between the child's current cognitive domain and the specific object, task, or problem at hand. This relationship can occur alone or within a group context. De Lisi (2002) points out that when a child works alone on a task, the child's cognitive system is only minimally or superficially engaged. While children engaged in such a way might be aware of some misconceptions in their thinking, their own interpretations tend to be overly personal and egocentric. In this context, children are less likely to come in contact with ideas or concepts that challenge their thinking, making it less likely that they will advance in their cognitive abilities. Thus, De Lisi argues that when students work together on a task, they are more likely to engage with learning material more deeply.

It is useful to consider Piaget's (1972) model of socio-cognitive conflict and learning when considering both the benefits and limitations of peer learning. In this context, students working in groups may find differences between what they thought previously and what they eventually believe to be true. This tension between old and new ideas generally leads students to recognize that their conceptualizations are different from others', to challenge viewpoints that differ from

their own, and to try out new ideas posed by other students in their group. To deal with the discrepancies between their own thinking and that of their peers, students might even seek new information to help them understand alternative points of view. All of these options promote learning (Brown & Palincsar, 1989; Johnson & Johnson, 1979).

According to Vygotsky (1978), all children naturally develop *lower* mental capacities, such as concrete perceptions and involuntary action, but it is only through interactive social activities with more advanced peers and adults that children are able to develop *higher* mental functions, such as language, counting, and problem solving. The *lower* mental functions do not disappear; rather, they are reorganized through social processes into more sophisticated, *higher* mental functions. Vygotsky believes that these transformations occur in a social setting where learners engage with others who expose them to new concepts, behaviors, or stances. Eventually, Vygotsky contends, the learner internalizes these experiences so that they become part of their own mental capacities.

Vygotsky (1978) argues that there is a potential learning difference between what children can accomplish individually and what they can do when they interact with others. If children remain alone while learning new concepts, their mental capacities remain on the lower end of the learning potential spectrum. If children engage with other, more experienced learners, they are able to accomplish more and move toward the higher end of the learning potential spectrum. A central tenet of this theory of cognitive development is his theoretical concept of the zone of proximal development. It is this central tenet that lends support for a peer effect in learning theories. Vygotsky defines the zone of proximal development as the distance between the actual development as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more knowledgeable others. The zone of proximal development applies to both the child's learning process and the child's cognitive development (Doolittle, 1997). Vygotsky (1978) writes, "The zone of proximal development defines those functions that have not yet matured but

are in the process of maturation, functions that will mature tomorrow but are currently in an embryonic state" (p. 86).

One important factor in the peer effect is the notion of peers as co-learners and co-teachers (Piaget, 1932; Vygostsky, 1978). Research has demonstrated that peers can assist each other in understanding and learning the material through group discussion, sharing of resources, modeling academic skills, and interpreting and clarifying the tasks for each other (Schunk, 1987; Schunk & Zimmerman, 1997; Sieber, 1979). When individuals work collaboratively, they work together to build new knowledge, skills, and understanding that they did not have before engaging in the social learning activity (Damon & Phelps, 1989). Such interactions also enhance the quality of analytic reasoning around a topic because students are forced to justify and articulate their reasons for understanding and, if necessary, to defend their positions (Joiner & Jones, 2003). These interactions also engage students in the learning process so that they remain motivated and focused.

While it is useful to have a theoretical understanding of why learning with others leads to deeper understanding of the material, the term *peer effect* has a slightly different meaning. Generally, most researchers use the term *peer effect* to describe the influence students have on one another during a particular interaction. According to Winston and Zimmerman (2003), the people involved must be "equals." When researchers suggest a *peer effect* occurs, focus on the effect is directed toward interactions among students, not among faculty and administrators.

The difference between cognitive theories of learning and economic theories suggests that different research studies and knowledge inform those theories. Several economists studying peer effects in higher education point to their importance to educational output, since students provide the input critical to their production. If a college or university accepts students who, through their interactions, will influence the academic achievement and social decisions of others, then this will in turn affect the academic and social reputation of the institution. It is important to keep in mind, however, that this influence is not always positive. So that students who enter will have a positive influence and together raise the achievement and learning capacity

of the entering class, the soundness of the admissions process becomes vital to the success of the university.

Unfortunately, research on how peer effect influences learning in higher education has not been given much attention. This is relatively understandable since many institutions of higher education are run by private, rather than public, sectors, and these institutions receive less government funding than their primary and secondary counterparts. However, peer effects might actually have a great impact on the economic success of an institution, since college and university-bound students "shop" for their top choice in schools. If the types of students the college or university admits actually positively influence the type of output the school produces, then the school should be focusing its efforts on maximizing the quality of its incoming cohorts.

The first major study on peer effects was the Coleman (1966) report entitled, *Equality of Educational Opportunity.* Coleman attempted to study the features of a school that led to differences in student achievement. He used over half a million students and pulled from over 3,000 elementary and secondary schools. As noted in Goethals, Winston, and Zimmerman (1999), Coleman's research found that "a pupil's achievement is strongly related to the educational backgrounds and aspirations of other students in the school" (p. 8). In subsequent years, this study has been criticized for exaggerating the influences that peer effects have on student achievement, because Coleman did not control for variables that have profound influences on student achievement, such as parental influences, school choice, and neighborhood demographics.

As Cheslock and Hilmer (2001) point out, higher education institutions actually have a rare ability to select the type of students who may positively or negatively affect the academic achievement of the student body. Some examples of these decisions include: Should more recruiting and aid dollars be spent to secure high ability students? Should high-ability students be placed in an honors track, or does the institution benefit from their participation in all classes? How can the institution support those students who are not performing well in their courses? The admissions process not only influences students' academic success while in school, but also

impacts how future employers view the school, since the past and present student productivity shapes employers' opinions regarding the types of student the school produces.

Hanushek, Kain, Markman, and Rivkin (2003) and McEwan (2003) point out that measures of peer effects may serve as an alternative explanation for arbitrary or misunderstood factors that affect individual achievement, leading to biased results that tend to exaggerate peer effects. It is also important to recognize that a student in a learning environment both is affected by and affects his/her peers during this interaction. Learners could be the cause or effect of academic achievement as a result of social interaction. The simultaneous nature of this interaction is extremely difficult to isolate at a given instance, and randomization does not help because it is difficult to understand whether a student is learning through the process of teaching other students or if it is because they are working with students.

What is known is that that learning does not happen in a vacuum. Rather, learners build a foundation of knowledge and then move to higher ordered skills; thus, Hanushek et al. (2003) argue that it is important to look at how history might impact achievement. The authors argue that, since students have a history of learning within their families, their schools, and their neighborhoods, it is important to factor these variables into a peer effect study. First of all, families have a profound impact on student achievement, especially during the years of K-12 schooling. Two students at the same K-12 school most likely are from families with similar demographics, socioeconomic status, and educational and employment achievement. However, if research studies do not account for family differences at the college level, they might inadvertently attribute student achievement to peer effect instead of family involvement. Second, since funding for public schools in the United States is correlated with neighborhood income level, researchers might be attributing a peer effect to learning when increases in student achievement are actually due to program changes, qualification of teachers, and resources, all of which are related to funding.

For researchers studying higher education, a major methodological challenge in assessing the extent to which peer effect exists is that students with similar abilities and interests tend to

attend similarly tiered institutions. Once at these institutions, people generally gravitate toward those who share similar academic behaviors and social beliefs, especially beyond the freshman year (Zimmerman, 1999). This makes it difficult to determine to what extent peers actually affect behavior, since the cause could be a peer effect or simply that a person has chosen to associate with those who would influence a certain type of behavior. Researchers run the risk of attributing a peer effect when, in fact, one does not exist. This challenge makes it difficult to set up an experimental situation where researchers could randomly assign people to differing peer environments and then measure their effect on educational achievement. For that reason, researchers have used randomly assigned freshman roommates to determine the influence students have on one another's academic achievement (Hoover, 2003).

Hanushek et al. (2003) conducted a study of the Texas Assessment of Academic Skills (TAS), which is administered to children in grades 3 through 8. The tests are criterion-referenced, and they test the student's mastery of mathematics and reading learning. The study focused on the math portion of the test, since research shows that schools have a much larger impact on math skills than reading in grades 4 through 6 (Hanushek et al., 2003). This test was ideal for their study because each student was provided with a unique student ID number that was linked to school data that detailed information on individual teachers, including grade and subject taught, class size, years of experience, and student population served. This also provided researchers with a way to use Federal Title I compensatory education programs for low-income children to evaluate the premise that low-income families lead to low achievement in children, as the 1966 Coleman study suggests. The authors acknowledged that this control can be inconclusive, since Federal Title I subsidies can be "noisy" (p. 537). The study found that peer average achievement has a significant effect on individual achievement, with lower average peer achievement pulling down individual achievement and higher average peer achievement positively impacting individual achievement. However, they found little or no evidence that heterogeneous classes had a significant impact on achievement.

Zimmerman (1999) studied peer effects at Williams College, a small, highly selective liberal arts college. This quasi-experimental study used assigned freshman roommates to try to tease out biases normally found when studying peer effects, arguing that there would be less bias in the selection of roommates. Before entering the college, students filled out a housing preference sheet indicating whether they had health conditions, smoked, enjoyed frequent visitors, had sleeping preferences, and so forth. While this study still allowed students to choose roommates somewhat based on preferences, no questions regarding ethnicity, prior academic achievement, or athletic affiliations were mentioned. Zimmerman contends that the factors would lead to a "problematic selection bias." Yet, his study does reveal biases in the questions asked by the housing office. He states that smokers, on average, have SAT scores 193 points lower than non-smokers, which is statistically significant. Thus, smokers who live together might exhibit lower academic achievement, whether or not a peer effect exists. Another significant statistic is that those who study in silence generally score 237 points higher on their SATs than those who do not. So those who choose to live with others who study in silence might exhibit greater academic achievement than those who do not, regardless of a peer effect. After conducting several sets of multiple regressions, Zimmerman contends that most of the student housing variables are not statistically significant for grades, even though they are for SAT scores.

Zimmerman (1999) finds that peer effects are more strongly linked with verbal SAT scores than they are with math SAT scores. A 100-point increase in a roommate's verbal SAT score translated into a slight increase (.043 increase) in grade-point average over a student's four years at Williams, which is about 15% of a 100 point increase in the student's own SAT score. Students in the middle of the SAT distribution tend to perform lower academically if they are paired with someone who is in the bottom 15% of the verbal distribution, while students in the top tier of the SAT distribution are least affected by peers. The peer effect found by Zimmerman is not large, but it is significantly statistic, suggesting that it exists.

Sacerdote (2001) studied peer effect at Dartmouth College using a similar roommate-based approach as Zimmerman (1999) to determine the peer influence of a student on his/her

roommate's grade point average, as well as on participation in fraternities and choice of college majors. The results suggested a non-linear relationship, with weaker students experiencing better academic achievement when paired with a roommate in the top 25% of the SAT distribution. Furthermore, Sacerdote (2001) found significant peer effect on fraternity participation, but not in the choice of college major. However, Dartmouth, like Williams, is a highly selective university, so it is difficult to determine whether selectivity influenced these results.

Hoover (2003) cites a Stinebrickner and Stinebrickner (2000) study of peer effects at Berea College. This study provides a useful contrast to the previous studies because Berea College targets low-income students (capping family income at about $65,000). This study is also unique because it does not pull from a highly selective college, which allows for a more heterogeneous data set. The analysis revealed no correlation between a student's ACT scores and a roommate's first-semester grades, but Stinebrickner and Stinebrickner (2000) noted that a long-term study might yield different results. The study did find evidence that, for women, a roommate's family income had a positive impact on grades and retention.

We can therefore surmise that there is some reason to accept the notion of a student's peers impacting her learning. The next logical step is to investigate whether the diversity of the cohort matters. Some work has been done on the impact of diversity on learning. One example comes from a series of papers sponsored by the American Council on Education and the American Association of University Professors collectively, and is entitled *Does Diversity Make a Difference?* One of the studies, by Roxane Gudeman (2000), looks at student outcomes as they relate to the college mission and its commitment to diversity. In her analysis of mission statements of the most selective and highly ranked liberal arts colleges, she found that 61% have an explicit commitment to diversity, which she argued implies that they perceive some educational value to a diverse campus (p. 43), though there are other plausible explanations, such as an institutional commitment to social justice. Gudeman then reports a case study she conducted at Macalaster College. She reports, "Faculty members who teach content related to diversity found that students in racially and ethnically diverse classes developed a heightened

capacity to think critically" (p. 45). While she is not explicit in her findings or in her methodology, what is implied is that exposing students to the concept of diversity allows them to see different perspectives and therefore think more critically. Gudeman concludes her paper by stating:

> The debate about Affirmative Action and current legal cases have deflected public discourse away from consideration of the range of qualities that makes individuals potentially valued participants in a learning community. It has ignored the educational value of a diverse learning environment to all students—a value attested to even by expert scholar/teachers who themselves do not teach about diversity in their class. (p. 53)

The final paper in the collection, by Patricia Martin (2000), is a qualitative study of the educational value of multi-racial, multi-ethnic classrooms. The study had three major findings: (1) racial and ethnic diversity is necessary but not sufficient for creating the most effective educational environment; (2) racial and ethnic diversity increases the educational possibilities of the classroom; and (3) multi-racial and multi-ethnic classes enhance educational outcomes (p. 61).

Another paper that may present evidence of the value of diversity in learning is from a chapter of the Report of the American Educational Research Association (AERA) Panel on Racial Dynamics in Colleges and Universities. Jeff Milem's (2003) paper is a literature review of the findings of the benefits of diversity. Milem argues that the literature suggests that a strong case can be made for both institutional and societal benefits of having diverse campuses. Most important for my argument is his focus on the individual benefits for students. Milem notes that "research evidence regarding individual benefits of diversity suggests that diversity enhances student growth and development in the cognitive, affective and interpersonal domains" (p. 4). He goes on to write:

> There are also a number of ways in which the learning outcomes of students are enhanced by their interaction with diversity in college. Students who engaged in more interactions with diversity while in college show greater relative gains in critical thinking and active thinking. They are also more likely to show evidence of greater intellectual engagement and academic motivation. (p. 15)

Milem goes on to mention an uncited study, writing: "In a study of the impact of college ‘quality’ on men's wages, the findings indicate that white and black men who attended more racially diverse institutions were likely to earn more money than their peers who attended less diverse ‘high quality’ institutions” (p. 12). Milem cites another study that suggests that this benefit is particularly true for White students (p. 15). He concludes by noting that "an emerging body of research suggests that students who attend more diverse colleges are likely to enjoy greater material benefits than their peers who attend less diverse institutions; this is particularly true for students who attend highly selective institutions" (p. 15).

The University of Michigan court case (*Gratz et al.* v. *Bollinger*) revolving around Affirmative Action policies presented perhaps the best work with respect to exploring the educational value of diversity. During the trial, the lead expert witness for Michigan, Patricia Gurin, presented research in the form of a report in which she argued that diversity has a vital educational value within the classroom and on campus. Gurin, a professor of psychology at the University of Michigan, proposed that diversity allows students to learn better and think in a more complex manner. She drew upon identity psychology, the notion of "discontinuity" in cognitive-developmental psychology, and many other fields to state the case for the value of diversity in the sphere of higher education. Connecting the debate into the broader social sphere, she claimed: "Education plays a foundational role in a democracy by equipping students for meaningful participation. Students educated in diverse settings are better able to participate in a pluralistic democracy” (Gurin, 1999, p. 45).

A study by Terenzini, Cabrera, Colbeck, Bjorklund, and Parente (2001) found that the racial/ethnic composition of a classroom might be related to the development of students' problem-solving and group skills. However, the authors found the nature of the effect to be curvilinear (p. 526). Scholars such as Alexander Astin (1977), in his classic study *Four Critical Years: Effects of College on Beliefs, Attitudes, and Knowledge*, have used previous empirical studies on student development in college to argue for the benefits of diversity. For example, Astin's (1993a) book, *What Matters in College: Four Critical Years Revisited*, is a revised

version of the original and argues that exposure to diversity in the classroom results in higher affective and cognitive development. This study, which supplements Astin's original work on the issue, provides findings that point to evidence that students exposed to diversity-related activities in their college experiences perceive gains in affective and cognitive development.

Astin (1993b) also conducted a rather extensive longitudinal survey (with some 146 input variables that characterize the entering students, 192 environmental variables relating to institutional and faculty characteristics, and 82 outcome variables) of 25,000 students from 1985 to 1989. The results suggested that an emphasis on diversity is beneficial to student development (p. 47). A study by Chang (1999) that surveyed faculty about their perceptions of diversity and its benefits suggested that a racially diverse student body has a positive effect on educational outcomes through its effects on diversity-oriented student activities and experiences (p. 384).

The preceding literature is a critical selection of studies and reports that are of interest regarding the issue of the educational benefit of diversity. It by no means constitutes a complete survey of the topic, but rather reflects a wide range of approaches to the issue in order to give a general idea of the different directions in which these studies can lead. Most of the works mentioned above are heavily cited in current reports on the educational benefits of diversity. The sample represented here ranges from theoretical and empirical work on cooperative learning in elementary school to statistics-based surveys of students on campuses, indicating the multitude of directions a researcher may take when investigating the value of diversity. While a clear body of evidence in one discipline has yet to emerge, this sample indicates that there has been disparate research in a number of fields that seems to suggest that there is merit in exploring the question economically. We know that it has been argued that college represents a distinctive developmental stage and that substantial changes occur both in what is valued and how one thinks (Astin, 1993a). Critical to this process is what the theorists call "dissonance" (Astin 1993a, Erikson, 1946). Astin also argues there is a vast literature that supports the importance of peers. I will cover the empirical literature around this later in this literature review. However, the crux theoretically is housed within Piaget (1972).

I explain my theory linking salaries to a college's institutional diversity by making a case for a business need for diversity, then argue that diverse workplaces tend to underperform unless there are these "cosmopolitan" employees that bridge the structural holes. I then use neoclassical economics to argue that it is reasonable for firms to pay for the cosmopolitan skill set and that human capital theory says that one can see the manifestation of the premium because of having developed the skill set. I then make the argument that it is reasonable for employers to look to colleges as a source of these cosmopolitan employees because development in general is not a core competency of business and diversity-training programs in general tend to fail because of their design. I then suggest that colleges may be ideally suited to develop people with these skill sets. I first argue that if we think about learning as a production function, then we can think about peers as an input and a diverse peer group as a technology, examining the literature to bolster the argument. This brings us to the final piece in the puzzle, and we return to the notion of the fractal, namely, that colleges have a very similar interest in diversity and can make a "business case" for it. Luckily, though, there has been a little more thought put into what it is that the diverse cohort teaches all of its students, and it finishes the theoretical mosaic nicely.

A fundamental difference is that there is teleology to the college experience that is different. It is akin to "trial by ordeal" in that the students all want to get through and have to work together to succeed; it results in a prolonged shared experience that in some ways forces students to learn how to navigate. This may overcome the initial tendency to stay within homogenous groups. There has been some work done in this area: Transactional Stress and Coping (Lazarus & Folkman, 1984), Uncertainty Anxiety Management Theory (UAM) (Gudykunst, 1995, 2005), and Critical Race Theory (e.g., Stevenson, 2008). Stevenson has been working on the issue of racially anxious encounters and applying how this plays out in learning.

Stevenson's (2008) fundamental argument is that individuals who are fearful of making mistakes in racially anxious encounters do so as a function of their threat appraisal (Is this a threat or a challenge?) and their self-efficacy appraisal (Can I manage the threat or challenge?). Coping strategies flow from these appraisals (Lazarus & Folkman, 1984). The UAM theory

suggests that people who are uncertain about what to do in dealing with strangers will have more anxiety, and that will lead to more mistakes. They fear that they may say something that will offend someone or something inappropriate. These theories did not target racial or ethnic diversity per se, but Stevenson (2008) has been integrating it into the area of learning and race.

This brings up, however, the importance of processes that either help individuals to reappraise the threat as a mountain to be climbed rather than a tidal wave of mass destruction (according to Stevenson, 2008, often the reaction Whites or others unexposed or inexperienced, say, in predominantly White settings where their lack of knowledge and skill in diversity has never been tested) and/or increase the skill level (thus increasing one's sense of control or self-efficacy with racial encounters). Moreover, according to UAM, mindfulness actually reduces uncertainty and anxiety. If one is more mindful, he or she is more focused and less likely to make errors, missteps, or inappropriate remarks. Stevenson argues that this is the importance of racial socialization in that mindfulness does not come simply from concentration, being a good person, having one close best Black friend. It only comes from explicit engagement with the thing that most people are afraid of within a racially anxious encounter. Without some direction or exposure and experience, but mostly directed practice on this, mindfulness of racially anxious encounters will not come. Stevenson posits that bringing folks together for, say, a 4-year undergraduate experience can result in exactly the sort of mindfulness that will slowly teach all of them to learn how to better assess and navigate interactions with people who are different from them. He notes that, in general, it is an American pastime to avoid these encounters. In essence, students who have been within diverse environments may be more mindful or skilled at managing these stressful racial encounters and are more likely to listen, not overreact, over-punish, and may be more likely to problem-solve with colleagues or subordinates of color because they are less anxious because of their exposure and experience—the crux of what Anderson (2004) terms people who are "cosmopolitan."

An argument has now been presented that organizations value diversity for business reasons but that, in the absence of these cosmopolitan employees, diversity initiatives largely

fail. I have then suggested that organizations will pay a premium for these employees, and while employers can develop employees with these skill sets, it is more effective for employers to look upstream to colleges that produce them. I then argued that certain colleges have a technological advantage in their "production" of learning in that they have more diverse student cohorts. The result is a cohort of cosmopolitan potential employees. The development of cosmopolitan employees is something that the racially and ethnically diverse college does by affirming in its recruitment of a diverse student body and bringing this diverse group of students together on campus—students who are at an age where they are ready to experience this cognitive dissonance and who learn not only how to cope with this heterogeneous environment but to value it and leverage it. And it is this ability to leverage, to fill these structural holes created by disparate groups, that leads to innovation and that the employer places a premium on. In her expert report for the University of Michigan, Patricia Gurin (1999) argued that given the diversity in which our country functions, people need to be able to forge alliances that respect competing perspectives. Consequently people need to be able to work in heterogeneous environments. She went on to posit that skills that make people successful in this environment include the capacity to find commonalities among differences, acceptance of differences, and interest in the wider social world. She noted that students often arrive at college without these skills and can only acquire them if the college environment reflects the diversity of society. What Gurin posited is the basis of my hypothesis and does not emerge out of left field. For example, diversity carries value in complex social and biological systems. Indeed, as Ottaviano and Peri (2006) note, "diversity over several dimensions has been considered by economists as valuable both in consumption and production" (p. 10).

If one buys the arguments of Thomas Friedman (2003), the world today is even more heterogeneous and more interconnected, and in that world, what he calls "talent" is paramount. According to a report commissioned by the president of Carnegie Mellon University, global corporations are beginning to explicitly demand employees that have been exposed to diverse ideas, perspectives, and interactions (Ambrose, 2004). Derek Bok argues eloquently that a firm's

productivity in a global economy is largely dependent on whether it has people who are comfortable working across lines of race and ethnicity (Bowen, Bok, & Burkhart, 1999).

An Empirical Framework for Investigating Relationships Between Institutional Characteristics and Income

We have seen that there is existing theory that posits that it is reasonable to look at income as an indicator of productivity, that one can think about education as a production function with various inputs, and that college students are poised psychologically to benefit from exposure to peers, particularly peers who are different. We also know that companies are saying they value students with these experiences. We can now look into the empirical world and examine how economists have looked at these sorts of relationships.

Methodologically, this paper is an extension of the work others have done on exploring the relationship between institutional characteristics and earnings. Consequently, a review of the literature and models used by economists in such attempts is warranted.

Feldman and Newcomb (1994) did an exhaustive review of the literature surrounding how college impacts students, focusing on the idea of accentuation and how college increases traits and behaviors already existing in students. The book extensively reviews various empirical findings. In addition to the more overt findings, such as how major or college characteristics such as culture impact students, peer groups are found to impact students in a variety of ways measured sociologically and psychologically through various survey instruments. They devote a chapter discussing college culture and how it impacts a student. Of particular note is their review of a host of findings that suggest "the college peer group can provide for the student an occasion of and practice in getting along with people whose background, interests, and orientations are different than their own" (pp. 236-237).

In another section, Feldman and Newcomb (1994) discuss issues of openness and how this unobservable variable may impact students' opting for particular institutions. As an example,

they note that students who are already liberal tend to opt for colleges they perceive as liberal and then are more likely to become even more liberal (pp. 295-299).

The literature reveals that many researchers have asked questions surrounding college quality and future earnings (e.g., Behrman, Constantine, Kletzer, McPerson, & Schapiro, 1996; Brewer, Eide, & Ehrenberg, 1998; Dale & Krueger, 2002; James, Alsalam, Conaty, & To, 1989). In general, the studies estimate endogenous human capital investment choices, such as time in college, college characteristics, pre-college educational attainment, work experience, and so forth, attempting to sort based on various measures for quality and controlling for individual characteristics, using a variety of economic methods. In general, most studies find some evidence that quality matters, though the proxy for quality varies widely. To give one example, Brewer et al. (1998) recognize that if some sort of quality is supposed to be an indicator of expected returns, i.e., that students pay because they expect a great economic payoff in the form of higher income, then college type cannot be an exogenous determinant of earnings.

Dale and Krueger (2002) attempt to distinguish between the earnings achieved by students of similar intellectual capability with and without having attended a highly selective college. They use the average SAT score of all schools to which the student was accepted to get at unobserved qualities of student ability. In addition to matching average SAT scores of the schools to which the student was accepted, the authors also look at the highest average SAT score of the school to which the student applied in order to get at the unobserved quality.

These results suggest that highly selective schools have the most impact on students' social and cultural capital and access to certain jobs for *low-income* students. Interestingly, the amount of school tuition also seemed to have an impact on future earnings in Dale and Krueger's (2002) analysis. The authors speculated that this impact was related to overall school spending and quality of teaching.

Incorporating Dale and Kruger's (2002) paper into a research framework is useful in several ways. First, rather than taking a route that creates a derivative proxy for selectivity, they simply use SAT scores, noting, "Past studies have found that students who attended colleges

with higher average SAT scores or higher tuition tend to have higher earnings when they are observed in the labor market" (p. 2). Another very important factor obtusely informs my thesis. The authors argue that while the average SAT score of the school does not seem to have a robust effect on earnings once the selection on the unobservables is taken into account, they do find that some quality about the school a student attends seems to systematically have an effect on their subsequent earnings (p. 24). The authors suggest that there may be a peer effect causing this phenomenon. Dale and Krueger's finding that expenditure per student does not relate significantly to the student's future earning, though net tuition does, indicates there is something about a school other than its quality as defined by SAT scores and its expenditure per student that causes students' subsequent earnings to increase.

Interestingly, Breneman (1994) found that second tier schools actually offer more financial aid than more competitive schools. In essence, these schools are paying a premium in order to try and improve their quality (p. 106). And this idea of quality is closely tied to the quality of each incoming class's configuration of students and their subsequent strengths, which may be explained by the peer effect argument. The final conclusion of Dale and Krueger (2002) is that there is some quality about a school that has a robust effect on earnings and that the school-wide average SAT score is a crude measure of college quality.

Dale and Krueger's (2002) paper makes a number of assumptions in order to create simulations that seem illogical. Specifically, the authors assume that within a particular tier of competitiveness, colleges are of equal quality and that there are simple "idiosyncratic" error terms to explain why a student is rejected at one and accepted at another (p. 5). However, admissions committees, rather than being idiosyncratic, are charged with building the best cohort of incoming students, because each cohort is an important part of the production function of learning at a particular institution. Dale and Krueger also suggest that, for the purposes of their model, students randomly select colleges. More critical even is that they assume no relationship between students' choices and the idiosyncratic term. Dale and Krueger also developed weights in order to correct for their sample (because it was not nationally representative). The authors

then created predictors to fill in when data were missing (e.g., parental income). Finally, they had a relatively small sample size. It would seem that these factors—the use of simulations, the assumptions about behavior, the arbitrary (though not unreasonable) allocation of weights, and then the insertion of data when missing—may complicate the equation and its predictive reliability.

Dan Black and Jeffrey Smith's (2004) paper, "How robust is the evidence on the effects of college quality: Evidence from matching," addresses the issue of returns to college quality by using what they characterize as "matching methods" (p. 99). They point out that the problem with most of the solutions to the selection bias issue is that they rely on the assumption of "selection on observables" (p. 100) to identify the presence of non-random selection. While this paper is the basis for one of my estimation techniques, it is problematic in a few areas. The first is that they use the Armed Services Vocational Aptitude Battery (ASVAB), which is a different psychometric assessment not as directly correlated with college performance as the SAT or ACT, which were designed for that purpose.

Another issue with the model is that Black and Smith (2004), in part to keep their model simple, create one variable for college quality that is a combination of faculty salary, average student SAT, and student retention rate. This is a concerning choice, since by not allowing the variability to flow freely within a cohort the way that nested models do, one forces an arbitrary ranking that may or may not reflect true college quality Are Stanford, MIT, Yale, Princeton, and Penn the "best" colleges in the country? They are neither the most selective as measured in the acceptance rate nor the most popular as measured by total number of applications, so who can say? Because the matching estimates support the overall findings of the regression-based literature with respect to college quality, more straightforward models exist that explore the question at hand (Black & Smith, 2004).

As an example, one challenge is the role of self-selection. Brewer et al. (1998) assume that it is the individual who determines where she will go to school. Clearly, self-selection is involved in the college selection process. If this were not the case, then the "best" school would

receive the most applications and the "worst" schools would receive none. However, what, more specifically, seems to be happening is what some have called the "great sorting." Another challenge is that it is unclear at this time whether ethnic and racial diversity is a variable that influences college choice. Clearly, diversity is a variable for the admissions office (otherwise colleges would not have any lawsuits in this area), but it is unclear whether diversity is a variable for the individual. It may be implausible to generate a choice model for this reason. That said, the model has the benefit of dealing with the common support condition.

James Monks (2000) conducted a more straightforward study looking at the heterogeneity of earnings among college graduates. He also used a large number of individual and institutional characteristics, such as in my proposition. His study used data from the National Longitudinal Survey of Youth and controlled for both individual and institutional characteristics, as it utilized selectivity and college type as the institutional characteristics, arguing that these are the most observable college characteristics (p. 279). Monks argued that since all individuals will attempt to maximize their lifetime wealth, they will enroll in those institutions whose graduates earn a premium. Furthermore, he went on to say that this selection process is compounded by selection on the institutions' side, since most institutions have some sort of selection involved in their admission process. Consequently, Monks argued that individuals are not randomly allocated among institutions and that this raises a huge selection problem. Monks also found flaws with both Brewer et al.'s (1998) multinomial logit and the estimation approach used by Behrman, Rosenzweig, and Taubman (1996). His approach is to simply include individual attributes that he argued affect institutional characteristics (such as income and test scores) in his reduced form equation. He recognized that by doing so, he did not fully capture the endogeneity, but it is sufficient to argue that the coefficients are good reflections of the average earnings of graduates from institutions of certain types, conditional upon their observable characteristics. It is a straightforward solution to what is a fundamental problem in trying to examine the relationship, particularly when one recognizes its complex nature.

Economic Studies that Explore Diversity as an Institutional Characteristic

This next series of articles I will discuss are economic studies that most directly relate to my research. I will first examine two studies that focus on gender, and then I will focus on some studies that look at race and ethnicity as institutional characteristics and how they relate to earnings. I examine the gender studies because conceptually gender can be viewed as a form of "diversity."

Averett and Burton (1996) examine gender differences in the decision of whether or not to attend college. Using the human capital model to examine the decision to attend college, Averett and Burton argue that this decision is a function of family background characteristics and the expected future earning differential between college and high school graduates (the college wage premium). Using data from the NLSY, Averett and Burton found that higher college wage premiums induced men to attend college, but the same did not hold for women. In general, Averett and Burton report that for both men and women who choose not to attend college, they observed behavior consistent with the comparative advantage hypothesis. But men and women who choose to attend college appear not to be similarly motivated. For men, the effect of the college wage premium is positive and statistically significant. For women, the estimated coefficient is much smaller, and its "statistical significance is, at best, questionable." For women, the college wage premium is not nearly as important to the decision to attend college as it is for men. A rise in the college wage premium will probably not lead to further increases in female college enrollments. Averett and Burton's article still does not answer why women do not respond to the college wage premium in the same fashion as men, nor does it adequately mention whether or not women experience the same wage premium as men. Their research also assumes that men and women are studying the same content in college, which may not be a safe assumption to make. Nonetheless, Averett and Burton establish that men and women react to the college wage premium in different ways.

Grogger and Eide (1995) look at the sharp rise in the college wage premium that occurred for new labor market entrants during the 1980s and examine how much of this change arose from changes in the skill level of the typical college graduate. They found that graduation rates fell by three percentage points across cohorts for men, but rose by three percentage points for women. The study shows that for men in 1978, the initial returns to a college degree were essentially zero, and that returns to an advanced degree were significantly positive. Both college and postgraduate degree holders enjoyed rapid secular growth in relative wages over time. On average, the returns to a college degree grew by 1.7 percentage points per year. Holding the effects of experience constant, the college wage premium rose by 13.5 percentage points. For women, the picture looked very different. Female college graduates earned a substantial wage premium from the very beginning of their careers, with female college graduates earning an average of 24% more than female high school graduates, and advanced degree holders earning 34% more. Additionally, the college wage premium appears to have grown over time for women, but at about two-thirds of the rate for men. Overall, the secular wage growth over the 1978-1986 period was less than eight percentage points.

While the primary goal of Grogger and Eide (1995) was to determine how changes in the distribution of college majors and changes in the major-specific wage premiums contributed to the rise in the aggregate college wage premium, their data suggest that there was wide variation in the returns to college by major. Engineering majors earned about 15% more on average than high school graduates, while education and letters majors initially earned 13% less. They argue that substantial changes in the major distribution could lead to substantial changes in the aggregate college wage premium. This indicates that changes in the wage premiums for both genders will coincide more as men and women begin to pick the same majors in equal numbers. Grogger and Eide argue that it is puzzling that the gap between male and female wages narrowed so little across cohorts of college graduates. They attribute this at least partially to changes in the major distribution. They show that in addition to leaving low-paying fields such as education and letters, women also left science, which was the single highest-paying major for women in the

earlier cohort. Another part of the answer may have to do with price changes. Only engineering and "other" majors show larger cross-cohort increases in wage premiums for women than for men, and they account for less than 15% of all female graduates. The authors also point out that if major-specific price changes had been the same for women as for men, the wage gap among college graduates would have narrowed by at least 4.3 percentage points instead of only 1. This is important to understand because, if one is looking at the notion of a cohort, differences among groups in terms of their perceived return may make it difficult to evaluate the impact of the diversity.

There is one very interesting study that posits a similar question—a relationship between a production system and earnings, with diversity playing a key role, but it looks at cities. The study, by Ottaviano and Peri (2006), uses a diversity index to look at the impact on a city's diversity on the earnings of its White inhabitants. This is quite akin to my question in spirit, namely, exploring not only if diversity improves the earnings of the "diverse" but whether it actually is a technology that improves the productivity of everyone and that manifests itself in increased wages of inhabitants of more diverse environments. Ottaviano and Peri note that the positive production value of diversity has been stressed in multiple literatures, especially in the organization and management of teams, which lends credence to my theoretical framework (p. 13). They use a wage regression with controls for other observable characteristics that influence earnings (e.g., education) and, in looking at 130 U.S. metropolitan areas, find indeed that their data support the hypothesis of a positive productivity effect of diversity, with causality running from diversity to productivity of non-diverse and diverse workers (p. 38).

With respect to looking at the effect of diversity on students' earnings, Richard H. Sander (2004) looked at Affirmative Action in law school admissions. His study analyzed 27,000 law school students in order to investigate the costs and benefits to Black students of race-conscious admission decisions in law schools and looked at 21,425 aspiring lawyers who took the bar. The article is useful to the proposed study on a number of fronts. Sander recounts from a legal perspective the evolution of Affirmative Action in law school admissions, and he spends some

time discussing the notion of "racial preferences" and then whether it is only limited to the most elite schools. The crux of his paper is an analysis of the passage rate on the bar exam. Sander used as the dependent variable whether the person passes the bar on one of the first two attempts. The independent variables include Law School GPA, LSAT score, Law School quality, undergraduate GPA, gender, and race/ethnicity. He does not, however, use any variable that characterizes the institution's diversity. He finds Blacks are nearly six times as unlikely as Whites to pass the bar exam. He then projects that eliminating Affirmative Action would increase the percentage of Blacks passing the bar 8.8% (p. 468).

While Sander's (2004) study is incredibly interesting and engaging, it does present a large number of theoretical and statistical challenges. For an excellent review of the issues surrounding the study, one can read Chambers, Clydesdale, Kidder, and Lempert's (2005) empirical critique. They make a case that Sander's (2004) logic is based on a series of assumptions that are each flawed and that a critical reexamination suggests that rather than increase the number of Black lawyers, one would see a 25-30% decline (Chambers et al., 2005, p. 3).

The use of logistic regression requires making several assumptions that may or may not hold true, since the methods tend to have less stringent requirements than even OLS. It does require that observations are independent and that the logit of the independent variables is linearly related to the dependent variable. Since there is no explanation of the methodology at all in Sander's (2004) paper and the actual summary reports are not presented, it is hard to make any sort of causal inference. Sander (2005) claimed that law schools admit solely on LSAT scores and GPAs, but admitted in his response to critics that this view is flawed and that he did not deal at all with selection bias issues.

There are other issues in Sander's (2004) study that do not make it a good foundation for my research. The use of test scores (bar exam) may be problematic. According to Card and Krueger (1996), test scores are not strong predictors of students' success in the labor market and may also be a poor indicator of what is learned in school and subsequently rewarded in the labor market. As an example, while Sander (2004) argues vehemently against Affirmative Action in

law school admissions, he does find that Black lawyers earn 6% to 9% more than their non-Black peers in the marketplace. It could be that this is simply because there is some market phenomenon such as a greater demand for African American lawyers, but if one accepts the findings of Card and Krueger (1996), it is also plausible that there may be a disconnect between the bar exam as a measure of "value." If Card and Krueger are correct, then it weakens Sander's (2004) argument that Affirmative Action hurts Blacks because fewer pass the bar after being admitted into "elite" schools and performing poorly. There is also a strong statistical relationship between law school GPA and performance. Nowhere does Sander acknowledge that the market may be capturing something that the bar examination does not.

For my purposes, it would have been much more interesting—since Sander (2004) argues in favor of changing law school admission policies to make them race blind—to look at institutional diversity and salaries. The study as conducted makes too many iterative assumptions to be useful in this regard. Sander also does not consider the possibility of benefits to peers derived from diversity in a law school. Even if one accepts the findings that admitting Blacks based on Affirmative Action hurts them, from a law school's perspective, if it improves the overall quality of its cohort's learning (as realized in earnings), it may be a logical strategy for a law school to employ. Finally, Sander's study's focus on law schools and its use of Blacks as the sole criterion for diversity severely limit its use for my purposes.

Kermit, Black, and Smith (2001) present a study that used data from the U.S. National Longitudinal Survey of Youth (NLSY) to examine racial differences in the effects of college quality on wages. The study investigated whether the economic benefit of college quality might be higher for groups helped by diversity programs. However, it also explored whether a racially diverse student body would directly benefit all students. The authors approached the questions using a structural model. First, they looked at differences in college quality on wages for both Blacks and non-Blacks. Second, they estimated the effect on wages of attending a college with a more diverse student body. Their data came from three sources and contained 17 different college characteristics. The NLSY provided them with the individual characteristics of students

as well as identified each graduate's college. The authors augmented this with the IPDES data and the *U.S. News & World Report's Directory of Colleges and Universities* to provide the institutional characteristics. Based on the work of Daniel, Black, and Smith (1995, 1997), the authors knew that the chosen characteristics correlate with one another and that each one separately has a positive effect on wages. Therefore, because Kermit et al. (2001) viewed each of these as one facet of an underlying notion of quality, they created a quality index (p. 224). This index is based on average SAT score, rejection rate, and spending per student for men, as well as faculty/student ratio, average SAT score, and fraction of entering class in the top 10% of their high school class for women.

While Kermit et al.'s (2001) study explains the data and spends some time discussing the college quality index, there is no discussion of the methodology, nor does it provide any discussion of a hypothesis that warrants an exploration of the relationship. Given that this is the one study in the literature that deals explicitly and primarily with what has been a politically charged issue, the joint shortcoming of neither positing a theory nor discussing the empirical process for investigating the relationship is troubling and suggests the need for my work. The study's findings were fascinating, however. The first finding was that school "quality" matters much more to Blacks than to non-Blacks, in terms of economic returns. Indeed, the effect of college quality on later wages of Black men is roughly triple that for non-Black men (p. 223), and they reported a similar finding when comparing Black and non-Black women.

Even more intriguing is that Kermit et al.'s (2001) study found that attending a college with moderate student diversity, as measured by the fraction of Black students, raised earnings for both Black and non-Black men. Those who attended colleges with a population of between 5% and 7% Black students earn more than those who attended colleges with fewer than 5% Black students. In addition, men who attended colleges with a population of between 8% and 17% Black students earn more than do men who attended schools with fewer than 8% or more than 17% Black students (p. 228). A troubling finding, though, is that this advantage did not

translate to women; there was no relationship for non-Black women and only a weak effect for Black women. This may be the result of a specification error.

Kermit et al.'s (2001) study is the only one that looks at earnings and an indicator of diversity as an institutional characteristic, and therefore it provides an excellent guide to how to approach the question. That said, there are a number of issues with the study that I addressed in my study. The first is that by using the NLSY data, the authors end up having to use the Armed Services Vocational Aptitude Battery (ASVAB). While the SAT and ASVAB have been shown to correlate, at least one study found that the SAT is both a better predictor of innate cognitive ability and of college success (Frey & Detterman, 2004). Therefore, a study should be done using the SAT as an individual characteristic rather than the ASVAB.

The second problem with the Kermit et al. (2001) study is that while there is logic to using a college quality index to deal with the statistical noise of all the multicollinearity, one does sacrifice some information because the data are being restricted. The second challenge is that the authors are obliged to give up data points by creating the index. If they did not have information on each of the three characteristics that describe quality in their index, they would have had to throw out all individuals who attended that college. In my study, I am able to better address the issue because the College Board has the more robust data set on institutions of higher education.

The use of different quality indices based on gender, when one could argue that gender may be one component of diversity, may create some biases in Kermit et al.'s (2001) data. While their logic using different indices was based on the data themselves, rather than using the data, they simply developed two different ways of computing quality—one for women and one for men. The final issue with the index is that they elected to ordinally rank all the colleges. As I noted in the discussion of the Black and Smith (2004) study, it is unclear whether any ordinal ranking allows one to differentiate among schools. Or stated more simply: Is MIT really better than Williams? Much more useful would be a grouping of similar institutions. For the purposes of my study, I am more interested in whether two institutions—that otherwise look similar—produce "different" graduates based on their institutional diversity. This allows looking at less

selective institutions and comparing them in terms of racial and ethnic diversity while concurrently looking at more selective institutions and comparing them—in essence, comparing the proverbial apples to apples and oranges to oranges in terms of institutional selectivity.

Finally, the Kermit et al. (2001) study only looked at the percentage of Black students as an indicator of diversity. In their model, Native Americans and Latinos do not "count" as contributing to diversity. Clearly, a more robust definition of diversity is required, and perhaps also a layered notion of diversity that recognizes that a plurality may or may not be more beneficial than a diversity index based on one group.

The final paper I will discuss is Rumberger and Thomas's study (1993), which was the only one of its kind when I began exploring the issue in 1996. Interestingly, their finding on the relationship of diversity to economic returns was only a footnote in their paper. The focus of the paper was on other economic returns—college major, the quality of the institution, and the performance of the student. Nonetheless, a discussion of both their data and their methodology will be important in understanding their results. By looking at these methodological choices, along with their findings, I can better support the choices I will make in my study.

Rumberger and Thomas (1993) used two types of data: data on individual college graduates and data on their corresponding colleges. The individual data came from the 1987 Recent College Graduates (RCG). The graduates were selected from 404 institutions from the 1983-84 Higher Education General Information Survey (HEGIS) XIX. The graduates were then sampled from lists supplied by the schools. African American and Hispanic students were over-sampled. The research then elected to exclude data for various reasons. They excluded graduated seniors who went on to graduate school, students who were not working or enrolled in school, and students who had no corresponding school data. The end result was a sample size of 8,021 individuals or about 50% of the original data set (p. 2).

Rumberger and Thomas (1993) had what seem to be intellectually valid reasons for excluding certain groups. For example, they excluded workers who were also enrolled in school, because they were concerned that as students they could be working in non-career occupations

while attending school (p. 2). However, the end result is an exclusion of over 50% of the graduates.

The school-level data for the study were drawn from the College Board's Annual Survey of Colleges for 1985-1986. Rumberger and Thomas (1993) supplemented these data with Astin's institutional selectivity ratings. From the initial sample, they dropped schools with missing school level data and removed the corresponding students. The end result was 262 schools remaining in the data set from an original 404 (p. 2). A troubling factor in this data set is that, as anecdotally reported by the College Board, it is the less selective colleges that often elect not to complete the surveys.

A variety of both individual level and school level variables was used in the study conducted by Rumberger and Thomas (1993). The individual level variables consisted of four types: demographic, family background, education, and labor market. The school level variables covered a range of characteristics of schools that, according to the researchers, reflect the "quality" of the college. A couple of their variables will be of importance to me in this paper and warrant mentioning. The first are the percentage of minority undergraduates and the mean educational level of students' fathers. The other variables (other than their selectivity measure, which basically reflects the mean SAT scores of matriculating freshman) deal with information such as the percentage of full-time faculty and the student/faculty ratio (p. 3). These variables may be important when I do my research, as part of my premise is that the labor market pays a premium for better-educated students, including those that have the cosmopolitan skill set. It may be important to look at these variables to determine if they correlate with not only the earnings but with some of the diversity indices that I will use.

According to his "seminal" work, *Applied Multilevel Analysis*, by J. J. Hox (1995) at the faculty of Educational Sciences of the University of Amsterdam, hierarchical linear modeling has become a widely used analytical tool for nested data structures, though as far as my research shows, it is mainly used in other disciplines such as sociology and educational psychology. The basic premise is that nested data present several problems for analysis. First, people that exist

within hierarchies tend to be more similar to each other than to people randomly sampled. Second, it is difficult in nested data sets to disentangle individual and group effects. Multilevel models are designed to analyze variables from different levels simultaneously (p. 6).

The basic idea behind Hierarchical Linear Models (HLM) is similar to OLS regression. At the individual level, an outcome variable is predicted as a function of a linear combination of one or more individual level variables, plus an intercept, so that:

$$Y_{ij} = \beta_{oj} + \beta_{1j}X_1 + \ldots\beta_{kj}X_k + r_{ij}$$

where β_{oj} is the intercept, $+ \beta_{1j}$ is the slope of X_1, of group j and r_{ij} is the residual. Then at the institutional level, the individual level slopes and intercept become dependent variables being predicted from level two variables such that:

$$\beta_{oj} = \gamma_{oo} + \gamma_{o1}W_1 + \ldots \gamma_{ok}W_k + u_{oj}$$

$$\beta_{1j} = \gamma_{1o} + \gamma_{11}W_1 + \ldots \gamma_{1k}W_k + u_{1j}$$

where γ_{oo} and γ_{1o} are intercepts, and γ_{o1} and γ_{11} are the slopes that predict β_{oj} and β_{1j} from the W. The idea behind this is that cross-level interactions can be predicted.

For the purposes of my research, I am only going to discuss the steps requisite with arriving at what Rumberger and Thomas (1993) call their "conditional model 2," which has the results of interest in my research. In their study, they first estimate an individual level within each school, and then estimate between school models using the betas as dependent variables. They elect to subdivide the sample of graduates into the same college major. The first step Rumberger and Thomas take is to partition the variance in each sub-sample into its within school and between school components. They use the following two equations, the first the within school and the second the between school equation:

$$\ln Y_{ij} = \beta_{jo} + E_{ij}$$

where Y_{ij} is the annual earnings for individual i at school j and β_{jo} is the mean earnings for school j, and E_{ij} is the deviation from the school mean for individual i.

$$\beta_{jo} = u + U_j$$

where β*jo* is the school mean, u is the grand mean, and U*j* is the deviation from the grand mean for school j. The results they received show that most of the variance occurs within schools (p. 9).

The next step Rumberger and Thomas (1993) take is to estimate an unconditional model based on some independent variables, which they assume to vary randomly among schools. They center each independent variable on the school mean, so that the mean value of the dependent variable represents the log mean earnings for all graduates of that school. They use the following two equations:

$$Y_{ij} = \beta_{oj} + \beta_{lj}(\text{Female}) + \beta_{2j}(\text{GPA}) + \beta_{3j}(\text{other job}) + E_{ij}$$

where β*oj* is the mean earnings of the graduates from school j, β*lj* is the differential received by female graduates compared to males for school j, β*2j* is the increment associated with a unit change in GPA, and β*3j* is the differential for students employed in a job not related to their major.

$$\beta_{jk} = u_k + U_{jk} \qquad \text{for } k = 0,1,2,3,4$$

where β*jk* represents the within unit regression parameters from the first equation above and u*k* is the mean value for each of the within unit parameters. The results show large earnings differences among the majors. In general, the female differential was also statistically significant, and in some instances, GPA was significant. With respect to between school variables, it did not make a difference where one went to school if one was an engineering major, but for other majors, it did (Rumberger & Thomas, 1993, p. 12).

The final step that I will discuss is that of Rumberger and Thomas's (1993) last conditional model, which includes a wide array of institutional characteristics. They use the following equation:

$$\beta_{jo} = I_{oo} + I_{10}Z_{lj} + \ldots + I_{no}Z_{nj} + U_{jo}$$

where β*jo* is the within-school intercept from the unconditional equation above, Z*nj* are a series of school level variables, and I*no* are the estimated parameters of the school-level variables. Basically, the minority composition of the student body had a positive and significant effect on

the starting salaries of business, health, and education graduates. According to Rumberger and Thomas, it was from 3% to 7% for each 10% increase in minority concentration (p. 12).

One limitation that Rumberger and Thomas (1993) noted was that in HLM models, the number of variables used in the individual models is constrained by the number of observations within the institutional units. Another possible problem is implied by Cameron and Heckman (1992) in their work on the bias in estimating differences between majority and minority groups. They argue that by measuring the difference between majority and minority outcomes by imposing equality of slope coefficients but allowing for different intercepts creates bias in the outcomes (p. 152).

Econometric Challenges Related to Studies Exploring Institutional Characteristics

There are two fundamental concerns that arise when one posits a causal relationship between the diversity of an institution (or any indicator of quality) and wages. Namely, endogeneity and selection bias. All of the work that explores college quality and wages suffers from this limitation, and short of randomizing the college admission process, there is not too much that one can do; students do not randomly select colleges, and colleges do not randomly select students, and the sorts of students who opt to go to a particular school may not be similar to students who select a different sort of school and schools do not look for the same sorts of students.

Imagine a scenario even if one were comparing two highly selective schools. It is reasonable to assume that Reed College looks for "different" sorts of students than MIT and that the admission counselors at both schools are also looking for students with somewhat different characteristics. This is all confounded by the fact that these differences are not observable to the researcher.

This first bias is what Heckman (1979) terms selection bias. The concept here is that if one's sample is not random, then one has a specification error. In the case of the studies

discussed in this paper, because college students are by definition different in some way from non-college students as well as differences among students based on the institution they choose to attend, a specification error exists. In other words, we can only observe college graduates' income for college graduates, and one can only observe income for Reed College graduates for Reed graduates. It is important to note that the variance is significant (Willis & Rosen, 1979, note that more than 67% of variance is due to unobservables). There are several ways that one might attempt to control for these errors. One popular argument is that the best one can do is to control for observable characteristics and assume that is not highly correlated with unobserved things that contribute to the variance in income. The literature seems to simply deal with this issue by either admitting it or making assumptions. It is interesting to note that in the closest comparison literature—that of immigrants and wages—scholars also do not deal with selection bias whereby the country must admit the immigrant and the immigrant must elect to be admitted into the country. Borjas (1987) writes about self-selection of the immigrant but is silent on the role of the country in admitting the immigrant.

A related but distinct bias is the notion of endogeneity. This phenomenon occurs when the dependent variable is somehow related to unobserved variables. In this case, if one conducted a study on earnings and institutional characteristics and did not factor in selectivity, even though institutional selectivity was related to earnings, the result would be a specification error. To deal with this, one must find instruments, namely, a variable whose exogenous variation affects the diversity of an institution but not its learning. In addition, one can assume that the endogeneity effects differ depending on the student and the institution and that there are interaction effects between the two. Feldman and Newcomb (1994) basically devote a whole book exploring such effects, dubbing them "accentuations." So particular sorts of students not only self-select to particular schools and those schools concurrently self-select students, but those interactions affect subsequent experiences and then in theory earnings. The question to deal with the endogeneity issue is to identify a variable that would be related to college quality and diversity but not be related to earnings. Scholars seem to have had difficulty finding valid instruments. In

a number of papers, beginning with Card (1995), college proximity has been used as an instrument for years of education completed. The reasoning is that having a nearby college lowers the cost of attendance and thereby prompts students to obtain additional years of education. This use of proximity as an instrument for years of education has been challenged because of its weak correlation with years of education (e.g., Long, 2006). For the purposes of this study, I would need to identify an instrumental variable that would allow me to differentiate not only whether or not one goes to school but also the quality of the school and the diversity of the school. In effect, if proximity to college is to work in this context, the proximity of the college must influence the decision to attend the right school, and it is reasonable to assume that neighborhood characteristics interact with college quality to affect outcomes. For example, the student likely benefits from some degree of academic fit with the institution, or college towns might have more diversity and it would consequently underestimate the impact.

Another econometric challenge deals with the "common support" condition. In such a case, where so-called comparable groups are not comparable, it becomes confounding (Heckman 1980). As one might expect, there are some issues regarding common support in the college admission process. Highly talented students tend to go to selective colleges, and less talented individuals go to less selective schools. However, some precocious students go to less selective colleges (perhaps for financial aid or some other unobservable reason, such as a learning disorder). While we hope it is not as often the case, it could also be that less talented students go to more selective colleges for some unobservable reason, like a "legacy admit." In either scenario, one would end up with asymmetrical relationships between the groups (e.g., fewer low ability students end up in selective colleges than vice versa).

The best way to attempt to deal with this issue is through a "quasi-experimental" approach, such as that Black and Smith (2004) used to explore the impact of college quality on earnings. Consequently, I also adopt this approach as one of my estimation techniques. The principal disadvantage to this approach is that it may fail to yield straightforward results that are easy to interpret. Furthermore, the matching the authors used also forced such small pairs that the results

may not be statistically reliable. Conceptually, it is important to remember that in randomized trials, the propensity scores are known, but in these quasi-experiments, they are estimated and may not be accurate. Finally, it ultimately does not deal with either unmeasured heterogeneity or selection bias.

In situations like the one we are exploring here, because there are unobservable factors that contribute to earnings, we would expect the error term to be correlated with the explanatory variable. Some researchers (e.g., Monks, 2000) simply use as many observable variables as feasible, rely on OLS, and acknowledge the biases. I discuss my approaches to mitigating these specification issues in my methods section, but it is important to note that one cannot over-infer results from these sorts of studies.

Chapter III

METHODOLOGY AND DATA

Data and Samples

In the most general terms, in order to explore the thesis, one needs two sets of data—data that describe individuals and data that describe institutions of higher education. I follow in the footsteps of Rumberger and Thomas (1993), using the College Board's Annual Survey of Colleges for the school level data and the Baccalaureate and Beyond Longitudinal Study (BB: 93) for the individual students' data. Rumberger and Thomas used 1985 and 1986 data for their study.

The Baccalaureate and Beyond Longitudinal Study (BB: 93) provides information concerning education and work experiences of students after completion of the bachelor's degree. It is a nationally representative sample of students and is structured to provide an optimum sample of graduating seniors in all majors. In the 1992-1993 academic year, some 1.1 million students received bachelor's degrees from 1,809 institutions of higher education. Participants in the 1993 National Postsecondary Student Aid Study (NPSAS: 93) who received their bachelor's degree between July 1992 and June 1993 make up the base sample. Approximately 12,480 respondents were deemed initially eligible, though 1,500 were subsequently determined to be ineligible and another 900 declined to be interviewed, which resulted in a nationally representative sample of that population made up of 10,080 students who attended 648 institutions. I limited the present study to graduates of bachelor programs, and I excluded individuals who were missing school level data, were not working at the time of the survey, or were still enrolled in school. The final sample size was 8,054.

It is important to note that by limiting my sample only to college graduates, I am influencing the model. If one frames my hypothesis in human capital terms, then the better measure would simply be a continuous variable of time in college, hypothesizing that the longer one is exposed to people who are different, the better one's fluency in working within diversity increases. In addition, one can hypothesize that diversity might be an unobservable when it comes to success in college; in other words those students who have a propensity for succeeding in diverse environments succeed in diverse colleges, and those who do not end up not persevering. However, since my hypothesis is that employers value this "cosmopolitan" skill set, the simplest way to compare is to use college graduates looking for variance with respect to institutional diversity. But we should assume that the findings may be biased, with some factors positively influencing the coefficient and others negatively influencing the coefficient.

The college level data I use is for the year prior to the data on individual students because the individual data are based on graduates and we need a profile of the college while the students were still in school. Perhaps one could make the case that taking an average for each school level variable of the whole time of a student's tenure or, perhaps, using data of students' first college year would be more accurate. However, because students' tenures vary considerably, taking school level data from the year before the BB: 93 survey was conducted is the most reliable and consistent way to arrive at data of an institution, as it was when the student was enrolled.

In addition to the student interview data, BB: 93 collected postsecondary transcripts covering the undergraduate period. The second BB: 93 follow-up took place in 1997 (BB: 93/97). For the purposes of this study, the primary focus is on the initial salary (1993) following graduation because the hypothesis is that the employer would recognize some inherent quality difference in graduates' potential productivity, given that they come from a particular institution, based on the firm's prior hiring experiences. In addition, while we all agree that initial salary is not the best measure of long-term productivity, it has the added benefits of not creating the increased noise of on-the-job training needing to be factored into the equation, and it also allows one to capture the signaling effects that come from employers' perception of the undergraduate

institution. The institution's diversity is argued to contribute to increased productivity, even if the employer may not recognize a causative relationship; the employer simply knows that graduates of certain schools among a pool "are better" and would consequently pay a premium for those employees. Over time, on-the-job training and other factors may mitigate the variability caused by the institutional diversity.

With respect to the school level data, I use the College Board's Annual Survey of Colleges from 1992. This survey of 3,171 colleges, including community colleges, consists of information on characteristics, programs, and college entrance requirements. I take the set of colleges that make up the universe of schools attended by the graduates in the sample data and see if they vary significantly from the overall universe of colleges, excluding the community colleges since they are by definition not awarding a bachelor's degree. The Baccalaureate and Beyond sample of 648 colleges is taken from the 1,978 institutions in the 1988-1989 Integrated Postsecondary Education Data System (IPEDS) file. BB stratified the data by whether they represented public or private education and by degrees awarded in the field of education (over or under a specified number). Within each of these strata, institutions were selected according to size. The representative schools also satisfied the following criteria: (1) the institution was accredited at the college level by an agency recognized by the U.S. Secretary of Education; (2) the institution was in one of the 50 states or the District of Columbia; and (3) the institution was one that awarded bachelor's degrees. It is important to note that while the sample is representative of the overall population of institutions of higher education, it significantly excludes community colleges because I focus on the bachelor's degree. When I matched the 648 BB schools to the College Board data, I was forced to discard some because the College Board did not have a complete data set on that institution (the corresponding students were also dropped). The final college sample size is thus 466 colleges. I compared the data using a two-sample t-test with equal variances for salaries, males, percent minority, and also percentages of each of the minorities to see if there were significant differences between the sample and the universe, and there were no significant differences. The table is in the appendices.

Individual Variables

From these two datasets, I use a variety of both individual and school-level variables. The individual data (the "I" variables) consist of demographic, family background, education, and labor market variables. Each of these variables has been argued in the literature to affect salary (e.g., Behrman, Constantine, Kletzer, McPerson, & Schapiro., 1996; Brewer et al., 1998; Dale & Krueger, 2002; James et al.,1989; etc.).

The list of variables is as follows:

Demographic Variables

- Gender (dummy)
- Ethnicity (dummy)

Family Background Variables

- Parents' Education Attainment
- Total Undergraduate Debt

Education Variables

- Major (dummy variables)
- G.P.A.
- Entrance Examination Score quartile

Labor Market

- Years of experience
- Employed part time (dummy)
- Enrolled in school (dummy)
- Work in public sector (dummy)
- Self-employed (dummy)
- Degree not required for job (dummy)
- Job not related to field of study (dummy)
- Age at Graduation
- Unemployed (dummy)
- Out of labor force (dummy)

School Level Variables

The school level variables that are part of the study reflect a range of characteristics describing the institution and have, in the literature, been linked to salaries. I want to control for institutional factors other than diversity that the literature suggests may likely contribute to

starting salaries. Examples include selectivity (Brewer et al., 1999; Dale & Krueger, 1999), student/faculty ratios (Behrman, Rosenzweig, & Taubman, 1996), and average tuition charged (Dale & Krueger, 1999). In addition to the variables that the literature has suggested are indicators of quality, I use two rankings—College Board groupings based on selectivity and the *US News and World Report* rankings. I also use Carnegie codes to allow proper comparison among institutional types. It is interesting to note that the two college quality variables are not highly correlated with each other or with any of the diversity variables and may help control for some measures of quality not captured by diversity or average test scores.

The following is a list of variables that relate to "quality" and may affect graduates' income (C):

- Private university (dummy)
- Carnegie Code (categorical)
- Student/faculty ratio
- Percentage of those admitted who actually enrolled
- Percentage of applications accepted
- Average SAT Scores
- Average ACT Scores
- Percent of Grads who go to graduate school
- Tuition charged
- Aid awarded
- Two categorical "college quality variable" that groups the colleges into 5 categories based on College Board and US News and World Report groupings.

Variables that Relate to Diversity (D)

Since the crux of this thesis involves defining and measuring diversity, a discussion of what diversity is and how it is measured is warranted. The *Oxford English Dictionary* (2006) defines *diversity* as the "condition or quality of being different or varied." It is important to note that in this definition any sort of variability can be inferred as adding value in the classroom. Indeed, as Bowen and Bok (1998) note in *The Shape of the River*, the concept of diversity in the classroom is not new to American higher education and has been stressed for over 150 years. However, historically, diversity was thought of mainly in terms of differences of ideas or points of view. Bowen and Bok go on to note that the dimensions of diversity were subsequently

expanded to include "geography, religion, nation of birth, upbringing, wealth, gender, and race" (p. 219). The federal government never overtly defines diversity but suggests that it can be thought of (at least in terms of litigation issues) to involve differences in "race, color, national origin, religion, gender, age, or disability" (GSA, 2006). Without detracting from the value of such an all-encompassing notion of diversity, it becomes untenable to measure it. More importantly, it is not where the public policy debate is occurring. While many have written eloquently about the subject, as Bowen and Bok (1998) note, "we have yet to explain precisely how, in what circumstances and to what degree diversity on campuses has enriched education" (p. 156).

There are three economic studies that deal most directly with diversity and college: Sanders (2004), Kermit et al. (2001), and Rumberger and Thomas (1993). All three studies discuss diversity broadly but actually explore a much more narrowly focused notion of diversity. Rumberger and Thomas (1993) simply use a percentage of minority graduates. Kermit et al. (2001) measure "moderate student diversity" by looking at the fraction of Black students. While Sanders's (2004) study (limited to law schools) uses language to suggest that he explores "racial Affirmative Action" and does initial work looking at "underrepresented minorities," the body of the study focuses solely on African Americans. My work broadens the focus somewhat to include more diversity of groups than just a single racial category. In addition, I explore more facets of such diversity than simply using the percentage of the undergraduate population that can be categorized as a minority.

The College Board has eight variables that relate directly to racial and ethnic background. For each, it is important to note that the data are for first-time freshmen and do not fully capture the ethnic make-up of a campus. One might infer that the undergraduate student body is stable; however, transfer students are less likely to be minority (Jenkins, 2006). This picture assumes that the trend during a four-year cohort is fairly stable. The eight racial/ethnic variables I use are from the College Board:

- American Indian/Alaskan Native
- Black/Afro-American
- Oriental/Asian-American/Pacific Islander
- White/Caucasian
- Mexican-American/Chicano
- Puerto Rican
- Hispanic (not included above)
- Other and/or unknown

The first transformed variable is an aggregate continuous variable for total percentage of minority, which is simply the sum of the following percentages for the institution:

- American Indian/Alaskan Native
- Black/Afro-American
- Oriental/Asian-American/Pacific Islander
- Mexican-American/Chicano
- Puerto Rican
- Hispanic (not included above)

While the transformed variable made up of the aggregates more aptly captures the crux of the current public policy debate, it does lend itself to two problems, and both suggest exploring whether to also include variables that aggregate the overall diversity of the institution. There is a difference—at least intuitively—between a school that has enormous diversity in its non-white population (e.g., many different ethnic and racial groups) and one that simply has a large percentage of one group. It is unclear whether it would add more value due to what some consider peer "distance" (Winston & Zimmerman, 2003). Another way to approach the same issue is not whether there is a plurality of diversity but if one is thinking of diversity as a euphemism for percentage minority, if that is the case, then conceptually—*too much diversity is the same as too little*. In this instance, you would expect a parabolic effect, where a low percentage of Black or minority students contributes in the same way as a very large percentage of Black or minority students.

A related issue is whether there is a "benchmark" for a particular minority. For example, we know that in 1992, the percentage of minorities at college was 25% (O'Hare, 1992). We must ask ourselves a similar question then as before: Is Navajo Community College or Spelman College more diverse than Michigan State simply because there are more minorities there? I

posit that such minority-serving institutions—while noble in their mission—are actually less diverse than the average among colleges, and while there may be educational benefits that form the foundation of the advocacy for such institutions, they may not provide the set of skills that I posit the market values. There has been some work on the quality of decisions and how it relates to the diversity of the group making the decision. This work builds on the notion of *groupthink*, where critical analysis is thwarted by a desire to maintain group cohesion. As Cox and Blake (1991) note, "decision quality is best when neither excessive diversity nor excessive homogeneity are present" (p. 51). Some of the measures of diversity I use are based on the index of fractionalization work routinely used in political economics (Ottaviano & Peri, 2006); this allows me to get at what we might call the "richness" of a college. Such a low percentage may seem odd for describing a college as "Historically Black" or "minority serving," but such approaches have been demonstrated empirically in studies that look at, among other things, "White flight" in housing. Kermit et al. (2001) dealt with this issue for Blacks in their study by grouping colleges based on the fraction of Blacks. They use categories of 0–4% Black, 5-7% Black, 8-17% Black, and more than 17 percent Black (p. 226).

To explore this phenomenon in my own way, I include some dummy variables to get at the question of diversity. Each one represents a category of diversity based on averages within higher education of different minority groups and broken out based on groupings to characterize the number of minorities. They are below, with explanation:

(1) *African-American fraction* (Mean is 9%).

- Dummy 1: Few African-Americans—less than 6% of enrollments
- Dummy 2: About average—more or equal to 6% and less than 10% of enrollments
- Dummy 3: Above average—more than or equal to 10% and less than 17% of enrollments
- Dummy 4: Historically African-Americans—more than 17% of enrollments

Table 1. Illustrating the African American Fraction Variable

Dummy	N	%	Examples
1	6022	75.9	Adelphi U, Albright Coll, Lafayette Coll
2	315	4.0	Temple U, Union Coll, Iona Coll
3	306	3.8	Delaware State U, Bowie State U, Florida Agriculture & Mechanical U
4	1272	19.8	Alabama State U, , U Mississippi

(2) *Minority fraction* (Mean is 19.6%)

- Dummy 1: Few minorities—less than 14% of enrollments
- Dummy 2: About average—more than or equal to 14% and less than 21% of enrollments
- Dummy 3: Above average—more than or equal to 21% and less than 26% of enrollments
- Dummy 4: Minority serving—more than 26% of enrollments

Table 2. Illustrating the Minority Fraction Variable

Dummy	N	%	Examples
1	1086	13.7	Coll of St. Rose, Concordia Coll, Ithaca Coll
2	3390	42.7	Albright Coll, Colgate U, Oklahoma State U
3	1845	23.2	Boston Coll, Duke U, Florida State U
4	1617	20.4	Alcorn State U, Andrews U, Rutgers Newark

It is important and interesting to note that when one compares the "minority" institution in terms of fraction versus the "Black" institutions, there is only a 54% overlap, and in terms of other measures of quality, the profiles of the schools are quite different (with fewer in the "Black" equivalent dummy being as highly ranked as "minority"). I also posit that while I have age and work experience as two variables that may describe non-traditional students, when one looks at the list of the minority versus the Black fraction variables, one could also suggest other non-observable characteristics, such as the percentage of non-residential students. Unfortunately, other than the variables mentioned above, there are no other variables in the data set that would allow one to control for this. It is an important caveat because, based on my conceptual argument, whether one is living on campus or commuting would impact the extent to which one

is “learning” the “cosmopolitan skill set.” This issue may partially explain the variance in results between selective and non-selective institution in the findings.

Models

The overall goal of my research is to estimate the differentials in earnings across institutional characteristics related to diversity conditional on other institutional characteristics the literature informs us are relevant to earnings, as well as individuals’ traits and labor market experiences. We know from the literature that controlling for such attributes may enhance our understanding of the variation of earnings across characteristics related to an institution’s perceived quality, described in the literature by variables such as selectivity, average test scores, and student faculty ratios. Since my hypothesis is that diversity may be an input into quality, ipso facto this approach allows us to explore the variation of earnings across characteristics related to an institution’s diversity. As discussed in Chapter II of this thesis, there are many reasons why institutional characteristics may impact earnings, and I posit a human capital theory, but empirically, for the purposes of this study, it does not matter whether it is because of human capital affects or “signaling.” Indeed, perceived institutional quality may be a more readily visible characteristic than an individual’s ability. And perhaps diversity might be a signal; it is interesting to note that seven years ago, the College Board started explicitly including an institution’s diversity in its profile.

To accomplish my analysis, I use three estimation procedures: an OLS with controls, an HLM model, and propensity score matching. Prior to explaining each of these approaches, I discuss further, building on the end of the last chapter, some of the overarching technical issues with these sorts of models and vein of empirical work, highlighting the limitations and making transparent the necessary caveats when it comes to interpreting the results. As part of the explanation of each of the approaches, I will first highlight particular benefits and limitations to each approach. In this manner, the reader can understand the limitations of this vein of empirical

research, the particular limitations to the approaches used in this study, and yet understand that these approaches are the most logical given the questions I posit.

Once a theory has been posited, the next task is to estimate features of the causal relationship—in this instance institutional diversity and salaries of graduates. This study, like all empirical studies in economics, has a host of problems implicit in drawing inferences from empirical work. Brewer (1995) uses the world of psychology to help us understand what they would refer to as threats to validity, namely, the problem of drawing economic conclusions from empirical studies because of some challenges with the research design (p. 152). While there are a host of potential issues that might impact my study, the large empirical issues are omitted variables, selection and endogeneity, and common support condition. I will again review each of the issues, review strategies for mitigating some of these challenges, and then explore whether the strategies work for my study.

In their writings on empirical strategies in labor economics, Angrist and Krueger (1999) succinctly summarize the challenges this way: “The causal relationships at the heart of these questions involve comparisons of counterfactual states of the world” (p. 1297). In my research, I can only observe one outcome of one scenario (e.g., where the student went to school and how much she earned). And since one cannot create randomized trials for such questions, one ends up with what Heckman (1979) terms "sample selection bias." The concept here is that if one’s sample is not random, then one has a specification error. In the case of the studies discussed in this paper, because college students are by definition different in some way from non-college students, a specification error exists. In other words, we can only observe college graduates’ wages for college graduates. A related but distinct bias is the notion of endogeneity, where the dependent variable is somehow related to unobserved variables. In this case, if one conducted a study on earnings and institutional characteristics and did not factor in selectivity, even though institutional selectivity was related to earnings, the result would also be a specification error. Heckman discusses this sort of specification error as well, but the two types of bias are different conceptually. Sample selection can be thought of as the intercept effect and endogeneity the

slope effect. So one can think of this as a series of confounding issues: students who opt to go to college or not and the recognition that those two groups are different; students who graduate from the college they attend or not and that those two groups are different; which college a student selects to based on some sort of reasoned approach that in theory maximizes their future potential income; and which employees employers hire based on some sort of cost benefit analysis of cost of employment and increased organizational value.

Another econometric challenge deals with the "common support" condition. In such a case, where so-called comparable groups are not comparable, it becomes confounding (Heckman 1980). As one might expect, there are some issues regarding common support in the college admission process. High-talented students tend to go to selective colleges, and less talented individuals go to less selective schools. However, some precocious students go to less selective colleges (perhaps for financial aid or some unobservable reason). While we hope it is not as often the case, it could also be that less talented students go to more selective colleges for some unobservable reason (e.g., a "legacy admit"). In either scenario, one would end up with asymmetrical relationships between the groups (e.g., fewer low-ability students end up in selective colleges than vice versa).

In general, social scientists have widely differing approaches to exploring empirical issues related to labor, salaries, performance, and learning, and there is constant debate on the validity of these different approaches. Some (Boruch & Mosteller, 2002) have argued that randomized trials are the only way to deal with many of the specification issues that arise. Heckman (1995) does a nice job of refuting some of these arguments. More importantly for our purposes, the issue is moot. No college would forego the admission process and admit a randomized cohort simply to participate in a study; no employer would hire ignoring altogether the institution that a student attends, and certainly, no student would want to take on such a risk either with an employer or a college. For indeed fundamental to the hypothesis is that there are differences among colleges and that employers value these differences, as do students. In this instance, what is important theoretically is that which creates significant empirical issues.

Labor economists have faced these empirical issues for decades, and while researchers continue to search for better natural experiments, there is a recognition that other, less perfect but still informative approaches might be useful. The classic approach to mitigating in situations like the one I am exploring is to control for confounding variables, such as ordinary least squares with controls. The argument is to introduce other variables that might contribute to earnings, with controls for ability being the first adopted by economists studying the relationship between schooling and earnings (e.g., Ashenfelter & Mooney, 1968; Hansen, Weisbrod, & Scanlon, 1970). This approach, controlling for ability and other measures that have been found to impact earnings, is still widely used. The premise is that these other variables help address the selection and endogeneity "specification" errors. There are a number of issues in using regression analysis. Since it is reasonable to assume that schooling is not randomly assigned, we ultimately cannot infer exactly how the process occurs dynamically between the school and the individual. Consequently, the variables elected to control are crucial. There is simply no way to find perfect variables that could control for the differences in earnings. At the same time, the introduction of added variables, particularly if the variable of choice is sensitive, can take away the inference on the variable of interest, so one wants to be as parsimonious as possible. The end result is that it is reasonable to assume that there will be an upward bias estimate on the returns to schooling. Some researchers (e.g., Monks 2000) simply use as many observable variables as feasible, rely on OLS, and acknowledge the biases.

Another popular approach is the fixed effects approach, which uses repeated observations of individuals to address the unobservable characteristics. It "fixes" characteristics that are unchanging but related to both the inferred causal variables and the outcomes. HLM is quite similar to fixed effects but relaxes some of the assumptions. HLM has a number of benefits. First, it can help to control for clustering of observations and heteroskedasticity. Second, it can improve the efficiency of estimated impacts, given that the assumptions of the HLM are correct. Third, even if the assumptions are violated, HLM will still produce a best "HLM" fit, similar to the Best Linear Unbiased Estimate property of an OLS model (Goldberger, 1991).

HLM has some significant challenges. First, one must limit the number of control variables for the multilevel modeling to work. Second, it does not allow for negative within group correlations in the error terms. This may be a problem if we assume that college students use their peers when it comes to either college selection or employment. In HLM the random component of the intercept causes a positive correlation between observations within the same school.

A popular alternative to regression is using propensity scores to create a quasi-experiment. Conceptually one creates the counterfactual by finding two individuals that seem similar based on a set of characteristics but who can be compared on the variable of choice (in this instance school diversity). One creates a "propensity score" that becomes a proxy for the variables in question. The appeal of this approach is that it focuses the attention on the variable of interest. It also addresses the common support condition in a way that OLS and fixed effect/HLM do not. The problem is that the researcher has to make a number of decisions about what goes into the score and how to weight the scores. At least according to Angrist and Kreuger (1998), there is little formal statistical theory to guide this process. And as Black and Smith (2004) found, while it deals with the common support condition, it works best when it is bifurcated (in their case either highly selective college or not).

Perhaps the most elegant of the approaches in that it is conceptually rigorous and not statistically complicated is the use of instrumental variables. In this model, one conceptualizes a scheme that uses exogenous field variation to approximate randomized trials. The trick is to identify a variable that one could posit is related to the variable of interest but is otherwise unrelated to potential outcomes such as earnings. The classic example is using draft eligibility status (which was randomly assigned) to see if individuals with lower earnings potential were less adept at getting deferments (Hearst, Newman, & Hulley, 1986). The pitfall to this approach is the validity of an instrument. There are a number of studies that have used instrumental variables to deal with selection issues in higher education when looking at earnings. These include things such as quarter of birth to look at years of schooling (Angrist & Krueger, 1998),

twins (Behrman, Rosenzweig, & Taubman, 1996) and zip codes (Card, 1995). Unfortunately, nothing in the literature presented itself as a viable instrumental variable related to college selectivity and its diversity that would not be correlated with earnings.

As a result of the limitations available to me, the empirical part of this work follows Monks (2000), Rumberger (1993), and Black and Smith (2004) and uses OLS with controls, HLM, and Propensity Score Matching, which give me three of the four major approaches to trying to deal with the empirical challenges. None of these approaches fundamentally deals with either endogeneity or selection bias, though proponents of each approach argue that each does address some of the selection issues. It is important to note, though, that even if one must approach the results cautiously, it will offer some insight into the relationships among the variables studied, and if one sees patterns across the approaches, it may suggest that the relationship has some tenacity. I found Monks's philosophical approach, which errs on the side of simplicity, and transparency compelling, though against the grain in current economic work generally. Monks (2000) discusses that the flaws of various approaches (e.g., Behrman, Rosenzweig, & Taubman, 1996; Brewer et al., 1998) and then simply uses an OLS with controls that includes individual attributes that he argues affect institutional characteristics (such as income and test scores) in his reduced form equation. He recognizes that by doing so, he does not fully capture the endogeneity, but it is sufficient to argue that the coefficients are good reflections of the average.

While I cannot solve the endogeneity issues, there is a mitigating circumstance. The major potential specification error derives from the idea that particular students elect to go to diverse schools and that one therefore cannot deduce that the difference in the earnings are a result of the institution but are more the result of the type of student selecting the more diverse institution. However, the College Board did not publish ethnic and racial diversity until 1999, so the college applicants would not have had an easy way of knowing the level of diversity. They would have had to rely on reputation or word of mouth. Consequently, this would weaken any effect resulting from students choosing to go to a diverse college.

Estimation Approach #1

I have discussed OLS above as an approach, and it is generally accepted within the literature (e.g., Brewer et al., 1998; Monks, 2000) that adding controls helps mitigate the selection issues. In addition, the OLS approach can hide the failure of the common support condition. The key to mitigating is to identify variables that would be correlated with both schooling and earnings (e.g., test scores). If one gets the variables correct, one can negate things like the negative impact of ability variables on college quality, but then one may create an endogeneity issue because the test scores are affected by schooling, and it is reasonable to assume that people who do well on tests might earn more regardless of their schooling. We should assume, therefore, that in this model we will have negative ability biases. If one adds variables to try and isolate diversity in order to protect against biases, the worse we make the error of measurement. To address this, one could simply add every available variable, but then we need to be mindful of the sensitivity of variables when adding other variables.

I use a reduced-form equation that explores the relationship between the logarithm of an individual's yearly earnings (ln Y*i*) relating it to individual (i) who attended college (j) as a function of the individual's characteristics (I_i). In addition, relationships of this nature are measured with a set of institutional characteristics other than diversity for the college they attended (C_{ij}) and the characteristics that demonstrate diversity of the college they attended (D_{ij}). These variables have already been discussed. I include an error term (μ_i), which consists of two components—individual specific error and random error.

$$\ln Y_{ij} = \beta_o + \beta_1 I_i + \beta_2 C_{ij} + \beta_3 D_{ij} + \mu_i$$

To attempt to control for the matriculation process, I include among the regressors individual characteristics that might affect matriculation. However, the institutional characteristics may still be influenced by unobservables, and we should not interpret the coefficients as more than a reflection on the average earnings of graduates of the different institutional diversity types, conditional on other observable individual and institutional characteristics.

In my analysis, I first regress the log of income against experience, a male dummy variable and a White dummy variable as a benchmark for the incorporation of individual other characteristics that affect income and college characteristics. Then I expand this regression to include the diversity characteristics as well as the test score quartile and total debt. All specifications are estimated using ordinary least squares. Finally, because this study focuses on issues of diversity—and research has shown that there may be differences in returns to different groups —I estimate regressions for Whites and Blacks, Native Americans, and Hispanics. Chow tests are performed to test for any variation in the coefficients across groups.

Estimation Approach #2

While OLS is the most common approach for estimating earnings equations because of individual students, nested data within specific institutions may not be independent. Thus, I may have misestimated standard errors (Rumberger, 1993). To accomplish this, in the second model I use an HLM approach where I first estimate an individual level model within each school and then estimate a between-school model using the estimated within-school parameter as a dependent variable.

Hierarchical linear modeling was specifically developed to model within-school and between-school phenomena and lends itself nicely to exploring the notion of institutional diversity as an indicator of quality. In theory it helps to better distinguish between individual and institutional effects when contrasted with OLS. This is important conceptually because the area of interest is diversity as an institutional effect. However, it does not provide a goodness of fit measure, and it does not deal with the selection or common support issues.

Since the HLM approach I take is quite similar to fixed effect models, it falls prey to many of the similar issues inherent in fixed effect models. Since both going to college and learning to interact with folks who are different involve past experience, I am bound to generate a spurious positive effect of both schooling and possibly also of diversity simply because of the nested nature of the model and the regression to the mean.

There are many steps to HLM, with the ultimate goal of having a conditional model that has diversity in it with a number of explanatory variables in the between-school equations. To arrive at this model, I start by dividing the variance in earnings within and between schools. I then fit within a school model where I specify only a random mean earnings coefficient. Next, I create an unconditional between school model to divide the total variance in earnings between its within-school and between-school components. Then, I create an unconditional within-school model to explain earnings differences based on individual variables within each school. This allows me to estimate the total variance and regression slopes of the different variables and to see if they are homogeneous across schools. Since they are, I can specify a common parameter in the third step.

The final step is to use the school-level variables to explain differences that vary significantly across schools. To do this, I create a conditional model. It emulates Rumberger and Thomas (1993) and is based on selectivity, but replaces selectivity with diversity, and then expands the number of explanatory variables in the between-school equations.

Estimation Approach #3

The "quasi-experimental" approach that Black and Smith (2004) used has already been mentioned. The principal econometric disadvantage to this approach is that it is statistically complex and, at least in the study they attempted, ultimately failed to yield straightforward results that are easy to interpret. Furthermore, the matching the authors used also forced such small pairs that the results may not be statistically reliable. Black and Smith, while arguing that propensity score matches deal with the selection issues and the common support condition, end up having to severely limit the stratification in order not to compromise the common support condition. Indeed, as Angrist and Krueger (1999) note, propensity score matching works best when it is a bifurcated choice (e.g., intervention versus comparison group). Because there are both a host of institutional characteristics that make up "quality" and then an added criterion of

"diversity," the counterfactual, becomes much harder to find, these limitations impact my work as well.

Using Black and Smith (2004) as a model, I first create propensity scores and then match based on sets of characteristics. The goal of propensity score analysis is to balance two nonequivalent groups on observed variables to get better estimates of the effect of a treatment (in this case, institutional diversity). To do this analysis, I will first use the background variables described earlier to build propensity scores and then match on those data on the variables I have related to institutional selectivity AND diversity. Shadish (2010) writes extensively on the use of propensity scores and suggests using all variables that can be reasonably included in the score and the matching. The intuitive leap is that one can imply a similar probability of treatment by combining what are a large number of variables.

Conceptually, one must create two groups. Let Y_1 be the outcome in the group treated with diversity and let Y_0 be the outcome in the undiverse/untreated state. Obviously, both groups go to college. Consequently, Y_1 corresponds to the potential outcome associated with attending a more diverse college, and Y_0 corresponds to the potential outcome associated with attending a more homogeneous college. It is important to note that I can only observe one o=(either Y_1 or Y_0) for each graduate. I assign D=1 to indicate that a person attended a more diverse college and D=0 to indicate that a person attended a homogeneous college. Finally, let X be a propensity score of observed covariates affecting both the choice of a more diverse college and economic outcomes. The question of interest—the impact of diversity on those who go to a more diverse college—is the mean effect of attending a more diverse college rather than a less diverse college on the graduate who chose to attend a diverse school. It can be described as:

$$\Delta^{\uparrow}\pi = E\,(Y_{\downarrow}1 - Y_{\downarrow}0 \mid D = 1)fix$$

The generic form for the matching estimator is

$$E(Y_{\downarrow}0 \mid P(X_{\downarrow}i)) = \sum_{\downarrow}(j = 1)^{\uparrow}J \equiv [\![w(P(X_{\downarrow}(i)), (P(X_{\downarrow}j))Y_{\downarrow}0j]\!]$$

for the individual counterfactual for treated observation i. In this equation, j=1,…,J indexes the untreated comparison group observations. Per Black and Smith (2004), "all matching estimators

construct an estimate of the expected unobserved counterfactual for each treated observation by taking a weighted average of the outcomes of the untreated observations" (p. 115).

Rationale for Approach

Fundamentally, the focus of this study is to explore empirically my hypothesis as to whether there is a difference in quality of graduates of institutions that have similar profiles in terms of perceived institutional quality but have different racial and ethnic percentages, and whether that perceived difference is manifested in graduates' starting salaries. This approach is different from most work in several ways and presents several potential issues to consider. First, it explores whether the market recognizes an initial premium of having gone to an institution that has student body diversity, when all other things are equal. Most importantly, fundamentally trying to tease out diversity as an institutional "quality" variable in terms of contribution to its alumni salaries based on a reasoned use of the literature is what makes my study different from other studies that have looked at the relationship between institutional diversity and outcomes, particularly since I am exploring different measures of diversity beyond percent African American, which is what other studies have done (e.g., Rumberger & Thomas, 1993).

Short of a randomized experiment in which diversity across colleges was randomly assigned, I cannot infer any causal relationship between a college's diversity and the salaries of its graduates. However, this holds true for any study that would look at an institutional characteristic and wages. And like other studies that explore quality, my goal is simply to inform conversation and to explore whether the reasoning I propose may have some support empirically, even while recognizing that there are a host of challenges. A review of the literature involving the methodology of looking at the returns to college quality provides support for my approach. I rely somewhat on other studies (e.g., Brewer et al., 1998; Krueger, 1999) to argue for the inclusion or exclusion of particular variables.

While I explore the impact of institutional characteristics on individual students, my main goal is to inform policy discussion. The logic is that if colleges realize that students who attend a more diverse college earn more, then they are more apt to embrace Affirmative Action policies in their recruiting. It is well known that the sort of reduced-form equation relating the log of income to individual and institutional characteristics results in biased estimates of the returns to institutional characteristics, since it does not account for the selection process either by the student or the institution (Mayer-Foulkes, 2002). Using Rumberger and Thomas's (1993) initial posing of the question as inspiration, I consequently opt also to explore using an HLM model. I then explore propensity score matching to try and deal with the common support condition. None of these models adequately addresses the issue of students selecting colleges and colleges selecting students. However, I also have three different models to compare—one that relies solely on the introduction of control variables to control for biases, another that uses the HLM approach but has fewer control variables, and a third that has less statistical significance but does deal with the common support condition.

Since this paper's models add yet further institutional characteristics to the set of observables potentially related to income, I may well run into issues of multicollinearity. Multicollinearity occurs when the independent variables are correlated and the more variables one adds into the equation, then the higher the likelihood of such an occurrence. It is not a theoretical program but rather a practical one. It is doubtful that exact multicollinearity would occur, but even approximate linear relationships among the independent variables will lead to estimation errors. The main consequence is increased variance in the coefficient. This is because OLS only uses unique variance in calculating the coefficient (though it uses common variance for the R squared); consequently, it will have high variance and will be less reliable. HLM, while having many benefits, does not account for this. In addition, I emulate Monks (2000) and attempt to control for college selection by including among the regressors those individual attributes that influence the enrollment process for the student. In my data set, they are *Total Undergraduate Debt* and *Entrance Examination Score Quartile*. As Monks notes, the approach does not fully

capture the endogeneity of the institutional characteristics. The results are biased; consequently, one cannot view the coefficients on the institutional characteristics and diversity as a true return, but what should be reflected are the average earnings of graduates from institutions of different levels of diversity conditional to their observable individual characteristics (p. 284). In other words, at best I can only make some inferences on institutional performance; I cannot fundamentally address the counterfactuals, such as people who did not go to college or for some reason elected to go to a more or less diverse college. I can only make inferences about the average earnings of graduates from institutions that differ observably only on diversity.

Because he includes a number of institutional variables, Monks (2000) argues that he can use neither a multinomial logit correction, such as Brewer et al. (1998) used, nor an instrumental variable approach, as in Behrman, Constantine, et al.'s (1996) approach, which is why he attempts to control for college selection by including among the regressors those individual attributes that influence the enrollment process for the student. In his research, he uses the Armed Forces Qualification Test (AFQT) score and net family income, arguing that those are key determinants in the college selection process (Monks, 2000, p. 284). I use the same approach, but with entrance score and debt as the two individual characteristics. To ensure that this is a reasonable approach, I regressed standard earnings functions with my data, and the results are quite consistent with Rumberger's and Thomas's OLS results, which used similar data sources; consequently I am reasonably confident that my approach is fairly consistent with others' analyses.

As mentioned earlier in this paper, there is a dearth of empirical work exploring the relationship between school diversity and income of graduates. The two studies done both focused solely on African Americans, and one used fraction of Blacks and the other used percentage Black. My work used four different variables—two continuous (percentage Black and percentage minority) and two that were sets of dummy variables (focusing on percentage of Black and percentage minority) —that group the college based on how close its diversity was to the diversity of the nation.

I used three models with each of the four variables for diversity, getting a total of eight results that explore the relationship. For the first model, I regressed the log of income against individual characteristics that affect income and college characteristics and the diversity characteristic. All specifications are estimated using ordinary least squares. For the second model, I used an HLM approach where I first estimate an individual level model within each school and then estimate a between-school model using the estimated within-school parameter as a dependent variable. For the third, I used propensity scores matching. The fundamental idea was to see if there was consistency among the results that might support or refute the thesis.

Chapter IV

ANALYSIS AND FINDINGS

Results

There were three models run—an OLS with controls, a Hierarchical Linear model, and Propensity Score Matching. Each of the first two models was run several times using different estimations for diversity—two sets of dummy variables that grouped a college's diversity based on difference from the mean, and two continuous variables—minority and black. For the OLS with controls, significance was estimated not only for all graduates but also for Whites, Blacks, and Hispanics. The dependent variable is the natural log of the salary of the graduate. For the Propensity Score Matching, the model was evolved to bifurcate college quality and diversity and was run for Whites only.

Testing the Premise with OLS without Controls

Recognizing that Ordinary Least Squares without control is the roughest estimation of a possible relationship between a dependent and independent variable, given the number of empirical challenges behind the question posited, OLS allows one to explore whether there might be a relationship, in particular the notion that the relationship might be parabolic rather than linear. In this scenario, I did not run separate regressions for Whites, Blacks, or Hispanics but did run regressions for each of the estimations for campus diversity. I conducted the OLS solely for the two continuous variables.

First, we notice that in all four scenarios the p values are small enough to indicate that the model is statistically significant. What I found is that for both estimations of diversity—percent Black and percent minority—in the linear model, the percentage of minority students negatively

impacts the log of the salaries. However, in both cases the variable becomes positive with a significant quadratic, which is consistent with the hypothesis that the impact of diversity on income is first positive as it rises and then decreases in relation to log salary.

Table 3. Comparison among the OLS Results

Model	Diversity Variable	Adjusted R Squared	Dependent Variable	Beta	95% CI	p value
Linear	Percent Minority	0.003	% Min.	-0.002	-0.002 to -0.001	0
Quadratic	Percent Minority	0.018	% Min.	0.01	0.008 to 0.013	0
			% Min. Sqr.	0.0001	-0.0002 to -0.0001	0
Linear	Percent Black	0.012	% Bl	-0.69	-0.86 to -0.53	0
Quadratic	Percent Black	0.014	% Bl	1.18	-0.12 to 2.48	0.075
			% Bl Sqr.	-4.34	-7.33 to -1.36	0.004

It also suggests that there is a negative effect for students in minority-serving institutions. The amount of variance explained in all the models is modest, but in both cases the likelihood test shows that the quadratic model accounts for more variance than the linear model.

Results of the Two Models: OLS with Controls and HLM

By design this presents the results as variations on themes. In other words, I ask basically the same question of the data using three approaches—OLS with controls and HLM—and in each of these there are four runs, two with continuous variables (percent Black and percent minority) and two with dummy variables that group the institutions into four categories based on the percentage Black and percentage minority). What we are most interested are trends or variance among all the models that would either support or not support the hypothesis of this paper.

Consequently, I will first present the results from all of the models with respect to the variables other than my measures of diversity. The logic behind this is that it builds on others' work. In other words, if my findings in my models are consistent with others with respect to

other indicators of college quality and demographic variables that relate to graduates earnings, it may suggest that any evidence we surface of a relationship between indicators of diversity and graduates' earnings also might warrant further study.

I then will present the results of all the models with respect to the variables for diversity, noting the signs and the patterns among the models rather than going into depth about any particular model. Finally, I will present the runs of all the models, differentiating among the different racial and ethnic categories, because if there is variance among these, it may further bolster the reasoning behind the hypothesis, namely, if say there is a difference in impact of college diversity between Whites and Hispanics, say, it would be different than if the benefit were the same among groups, with the latter perhaps suggesting alternate hypotheses.

I present all the results in their entirety as an appendix to the paper.

Non-Diversity Variables

Many of the non-diversity variables were found to be consistent with the literature. Being male consistently related to increased salary with at least a 99% confidence level. Being Black or Hispanic related to decreased salary, and being Asian related to increased salary but was not statistically significant. Other examples again are supported by the literature. College major mattered consistently; as an example, majoring in engineering consistently increased salary, while majoring in education consistently decreased salary. GPA, age at graduation, and job experience all consistently had positive impacts on salary. Table 4 presents the coefficients of some of the variables with income as the dependent variable comparing the variables among the different models of diversity (e.g., percent minority versus percent Black). One can see that there is a fair amount of consistency among the different approaches with respect to the coefficient and statistical significance of the non-diversity variables, which again are supported by the literature.

In terms of variables that describe institutional “quality,” the student faculty ratio was consistently related to positive salary, and the US News ranking generally had an impact on salary, though interestingly neither the College Board selectivity nor the private institution

Table 4. Comparison of Example Variable (Non-diversity) across the OLS Results with Controls

Variable	% Minority	% Black	Black Dummy	Minority Dummy
Male	0.1232246**	0.1237967**	0.1204931**	0.117207**
Total Debt	0.000000125	0.000000347	0.000000348	0.117207
Black	-0.016234	0.0301164	0.0170731	-0.0142506
Hispanic	-0.00040992	0.0109001	-0.0005349	-0.0192054
Asian	0.049313	0.0402072	0.0536862	0.0255961
Cumulative GPA	0.0004392*	0.0005474**	0.0005489**	0.0004834*
Job Experience	0.0895161**	0.0899818**	0.0871339**	0.0865782**
Part-time Worker	-0.618303**	-0.6207115**	-0.621586**	-0.6227396**
Age at B.A.	0.0112255**	0.0123307**	0.0124048**	0.0124078**
Education Major	-0.2629436**	-0.2687916**	-0.2633613**	-0.2591345**
Engineering Major	0.1384565**	0.1437432**	0.1446991**	0.1424413**
Private Institution	0.0299221	0.0165285*	0.0186794	0.0084634
Carnegie Class (1993)	-0.000552	-0.0007377**	-0.0007649	-0.0007766*
Student/faculty Ratio	0.1689399*	0.2086712**	0.218053**	0.17034**
US News Ranking	0.0207732*	0.0201801*	0.0217381*	0.009341
College Board Selectivity	0.0084505	-0.0088714	-0.0028388	0.0005811

*significant at 95%, **significant at 99%

dummy did. Perhaps this can be explained as a function of using a much broader base on institutions with a large number of open access admission policies in the dataset. There are some other interesting findings worth noting. In terms of college indicators, while as noted majoring in education seems to have a negative impact on earnings generally, it has a positive impact for Blacks. Another interesting finding is whether a college is private matters to White graduates' salaries but not to Blacks' or Hispanics'. In addition, the US News Rank matters to Whites and Hispanics, while for Blacks the College Board's Selectivity Index matters.

In terms of labor market indicators, being in school while working negatively impacts Whites' salaries but does not seem to matter one way or the other to Blacks or Hispanics. While

working in the public sector does not seem to matter for Whites, for Blacks and Hispanics it negatively impacts salaries. These findings all reinforce findings in other studies.

The only variables that did not seem to reinforce others' findings were whether the institution was private, which was positive but wasn't statistically significant, and total debt, which for all intents and purposes did not seem to have any relationship. Perhaps both of these findings could be explained in that unlike the vast majority of studies on college quality that have focused on highly selective institutions, my data included non-selective colleges.

Variables for Diversity

The various regressions using different indicators of diversity produced some interesting results. Each of the regressions roughly explained 31% of the variance, so no one combination explained more of the variance than another. In terms of general trends, the models seemed to support each other; the HLM models did not differ in any compelling way with the OLS with control models, so no one approach seemed more powerful than another.

The first finding is that the relationship between the percentage of Blacks on a college's campus and the starting salaries of its graduates, after controlling for other factors known to impact salary, on the surface seems to be linear and negative because the quadratic multivariate does not do a better job of explaining the variance and the linear model is small but statistically significant, which would tend to support the arguments against Affirmative Action. However, when one looks at the dummy model, what is interesting is that it seems to support the notion of a non-linear effect rather than a linear one, and one might infer than it is the distribution of Blacks on college campuses that may be pulling the linear model into significance in the continuous variable model. To explore this further, I conducted another regression that used a diversity squared variable, and the findings support the parabolic hypothesis. In the dummy model version, at institutions with few Blacks, it seems that there is no impact on percentage Blacks impacting salary (which makes sense since there are no Blacks to speak of at these institutions). However, at institutions that are about average in terms of percent Blacks or slightly

above average, the relationship suggests a slightly positive impact on salary, whereas at institutions with a significant number of Black students, the relationship between percentage Blacks and starting salaries is negative.

Taking the broader definition of minority to include Hispanics and Asian Americans as well as Blacks, the results seem to better support the hypothesis. Specifically, while controlling for factors known or suspected to impact salary, institutional diversity as measured by the percent minority on campus accounts for a small yet significant amount of variance, and the multivariate model using a quadratic variable for diversity to explore the hypothesis of a parabolic relationship accounts for more variance than does the linear model.

The dummy variable model supports the continuous variable model for minorities. It also supports, with statistical significance, the findings from the dummy variable model using Blacks only that was not statistically significant. Namely, there is no relationship at institutions with no minorities, a positive relationship at institutions that have about the mean or above the mean in terms of diversity, and a significant falling off when the institution approaches majority minority.

Table 5. Findings for the Diversity Variable across OLS with Control Models

Model	Type of Variable for Diversity	N	Adjusted R Squared	Dependent Variable	Coefficient
Quadratic	Percent Minority	5512	0.3069	% Minority	0.006812**
				% Min Squared	-0.0000787**
Quadratic	Percent Black	4825	0.3057	% Black	-0.7
				% Black Squared	-0.11
Linear	Minority Dummy	5512	0.3081	NA	NA
				M1 (few)	0.0004404
				M2 (avg)	0.0220819**
				M3 (above avg)	0.0707118**
				M4 (min.- serving)	0.0041305
Linear	Black Dummy	4825	0.3083	NA.	NA
				B1 (few)	0.0097363
				B2 (avg)	0.0247544*
				B3 (above avg)	0.0609683
				B4 (HBCU)	-0.0585005**

As mentioned before, the HLM analysis did not differ significantly. To conduct the HLM analysis, the total sample was divided into subsamples of graduates who had the same major (since this was the most powerful predictor of earnings). The analysis then considers what other factors, both individual and institutional, impact earnings with the same major. Because students who have the same major can be graduates of different schools, the numbers and the schools variables change with each group of majors.

The first step in the analysis is to partition the total variance in each sub-sample into its within-school and between-school components. The next step is to estimate an equation whereby individual variables are assumed to be randomly distributed among schools (e.g., Female or Job Experience). Each individual variable is also centered at its school means (as explained in the models section, this allow the HLM model to be akin to a fixed effect model). The final step is to then input the wide array of institutional characteristics.

The results of both minority variables are small but statistically significant, while both Black variables are not statistically significant.

Table 6. HLM Findings

Model	Variable	Beta	p value
Minority dummy	AVG Min	0.017	0.025
N-5634	R.E. Intercept	0.01	<0.0001
ICC = .04	R.E. Residual	0.25	<0.0001
Black Dummy	HBCU	-0.012	0.065
N=4825	R.E. Intercept	0.01	<0.0001
ICC = .04	R.E. Residual	0.25	<0.0001
Black Quad	% Black	-0.57	0.46
N=4825	% Bl Squared	-0.73	0.71
ICC = .04	R.E. Intercept	0.01	<0.0001
	R.E. Residual	0.25	<0.0001
Minority Quad	% Minority	0.007	<0.001
N-5634	% Min. Squared	-0.00009	<0.001
ICC = .04	R.E. Intercept	0.009	<0.0001
	R.E. Residual	0.25	<0.0001

As one can see comparing the two tables, the conditional HLM results are consistent with the OLS with controls.

Differences by Race/Ethnicity

Because minority-serving institutions can be perceived as just as un-diverse as institutions that significantly lower percentages of minorities attending them compared to the broader national population, exploring differences on how institutional diversity impacts graduates' salaries based on the graduates' own race/ethnicity may be interesting. Breaking the data down this way by race of graduates—to explore the benefits of institutional diversity based on racial/ethnic groups—produces some results that best support the hypothesis. Specifically, what one finds is that there is little relationship that is statistically significant ever for Blacks or other minorities in attending a school that has a larger percentage of minorities but that, with certain variables used for diversity such as the dummy minority and the continuous variable for minority in the quadratic, one finds that some diversity has a positive impact on the salaries of White students, and it is the benefit to White students that ends up pulling the overall result of the benefit to all students when it is not broken down by race/ethnicity.

In other words, in these models, the graduates who seem to benefit the most from attending more diverse institutions are White students; one might reason that non-White students have had more opportunities than Whites to interact with students who are different and have learned some of the skills detailed in earlier chapters of this paper. It also suggests that other studies may have made improper inferences based on averages and not differentiating by race and ethnicity as well as by institutional diversity. In working through the propensity scores empirically, I had to make certain choices to ensure that the common support condition will fail. Since the crux of my hypothesis is the impact diversity has on Whites, I elected only to investigate the diversity treatment on White students. I also created a dummy variable for major that puts all the majors that have negative coefficients into one (education and social sciences) and those that have positive coefficients in the other (e.g., health and engineering). I then have a

propensity score with gender, major, GPA, job experience, age, and total debt. I then estimate the propensity scores for men and women using a logit model.

Table 7. Differences among Race/Ethnicity for Diversity Variable: OLS with Controls

Variable	All	Whites	Black	Hispanics
% Minority	-0.0008077	0.0035408**	-0.0014409	0.0017095
% Minority	0.006812**	0.0034825*	0.0025134	0.0032878
% Min Squared	-0.0000787**	1.19E-06*	-0.0000369	-0.0000167
% Black	-0.75**	-.8012*	-.06713	-.2453*
% Black	-0.7	-.7431	-.06532	-.2241
% Black Squared	-0.11	-.131	.0054	-.00462
M1 (few)	0.0004404	0.0125209	-0.120998	-0.2605975
M2 (avg)	0.0220819**	0.0414385**	-0.2129427	-0.2160535
M3 (above avg)	0.0707118**	0.089153**	0.0551102	-0.4677416
M4 (min.- serving)	0.0041305	0.0994517	-0.1269945	-0.1277531
B1 (few)	0.0097363	0.0227325	0.0746755	-0.1329021
B2 (avg)	0.0247544*	0.0315921*	0.0196601	(dropped)
B3 (above avg)	0.0609683	0.2909298	0.2171659	(dropped)
B4 (HBCU)	-0.0585005**	-0.0183267	-0.0529779	-0.0508954

This was exactly the issue that Black and Smith (2004) confronted, and so I modeled what they did in their study, focusing on the region that has lots of observations rather than the tails. To help increase the number of observations, I create two categories for type of school—selective and non-selective—based on whether they are ranked in US News and whether they are selective or not in the College Board data. In other words, I assume that if one is ranked (no matter how poorly) and if one is selective (even if moderately), then that is a "selective" college, and if not, then it is a non-selective college.

I then take a similar approach with diversity, taking the four categories of "minority" and breaking it down into two—"diverse." Since the mean is 19.6%, I simply use it as the dividing line, taking those close to the mean as diverse similarly to how I divided the dummy variables in the HLM and OLS models but using 2 rather than 4 dummies in order to explore the

hypothesized parabolic effect. I consequently end up with only 4 categories of college as opposed to 20.

To remind the reader, the following variables go into building the propensity score. For individuals, it is whether they are a part-time student, their race/ethnicity and gender, their major, GPA, age, work experience, and total debt. Institutionally, I use the student-faculty ratio, a dummy variable for private, and Carnegie classification in addition to the rankings of US News and College Board. Table 8 provides the results.

Table 8. Propensity Score Matching, White Only Selective vs. Non-selective Colleges

	Non-Selective	Selective
Matching	.07589	.104998
S.E.	.1247	.1397
OLS	.0456	.062789
S.E.	.0232	.0329
Observations	N=3271	N=1402

Table 9. Comparison of Matching & OLS Analyses for Whites

Method	Non-selective	Selective
OLS	4.6%	6.3%
Matching	7.6%	10.5%

The way to interpret Table 9, which highlights the findings from Table 8 ,is that for Non-selective Schools, the OLS estimates indicate a 4.6% increase in income as the effect of moving from an homogeneous college to a diverse one. The OLS estimate is statistically significant at 5% level. In contrast, the matching estimate suggests a 7.6% increase in income, suggesting a larger impact. The matching estimate is not statistically significant at conventional levels. The estimates tell a similar and more dramatic story for selective colleges. Here the OLS estimate indicates an income effect of 6.3% associated with attending a more diverse college and is significant at the 5% level. The matching estimate is almost 10.5%, but is not statistically

significant. As one would expect because observations are dropped, in each case, the standard error is larger in the matching estimate than in the OLS.

Research on employer perceptions by Moss and Tilly (2001) suggest one explanation for the weaker findings for "Black" versus the broader "minority" variable. Moss and Tllly argue that employer perceptions on race and ethnicity negatively impact hiring (p. 14). One could extend their argument of this negative bias against historically underrepresented minorities and posit that employers may be negatively biased against institutions that have larger percentages of Blacks versus institutions that have larger percentages of minorities (to also includes Hispanics and Asian-Americans). Their research falls in line with typical discriminatory arguments that explain lower wages paid to Blacks and simply extends the argument to institutions that have more Blacks and are less selective. This may explain why the findings indicate that attending a college with a high percentage of Black students does not have the same positive pattern of effects as attending a college with a high percentage of minority students and would suggest that there is some specification error that negatively impacts the variable of choice.

Revisiting the Question

In the last generation, the debate surrounding Affirmative Action in college admissions has been quite divisive and is far from over. However, the current debate around using Affirmative Action in college admissions has been framed almost in a Rawlsian context that creates a moral dilemma for admissions professionals and policymakers. Specifically, the debate consistently is framed as to whether it is good for society to give preference to one group of students at the expense of other groups. In this frame, policymakers and researchers determine whether the additional benefits to the admitted group would offset the costs borne by the non-admitted group. As a consequence, the few academics who have looked at the question of Affirmative Action have focused on whether or not it benefits African Americans (e.g., Bowen & Bok, 1998; Sander, 2004).

While not trying to argue against the import of the current frame in the academic literature, this paper has explored a fundamentally different question and a different frame—and one that to date has not been either posited or researched—specifically, how a school's diversity, as measured by the amount of historically underrepresented minorities on its campus, impacts all of its graduates, not just minority graduates. In order to explore the idea, it was important to first provide a historical context to how as a country we got to the current state of admissions policies by discussing the role of Affirmative Action in admissions and how it has been contested in the courts. The point of that discussion was to demonstrate that the issue is not trivial. At the same time, there have been some studies that suggest there are problems with alternatives to Affirmative Action programs (e.g., Tienda, 2003). It is important to understand that the issue is still debated and that there don't seem to be alternatives to Affirmative Action that meet colleges' needs; it suggests that the current thinking leaves us in a conundrum.

This is where exploratory work such as in this paper, which suggests a possible different frame in which to situate Affirmative Action in admissions, might be useful in providing an alternative to the public policy question of the efficacy of "robbing Peter to pay Paul." The alternative frame I suggest in this paper is to think of diversity as an input into the production function of the college experience. This frame alters the question significantly because Affirmative Action ceases to be framed as a tool of social engineering and rather as a factor in college quality, and it offers an additional lens in which to contextualize Affirmative Action in college admissions.

If further research supports this new framework, then barring institutionally based policies such as Affirmative Action could be construed as regulation that impedes college quality, that impacts colleges' ability to compete in the marketplace as suppliers of learning, and that serves as a barrier to trade, given the size of U.S. higher education as an export. For firms, it would mean they would have to come up with different ways of finding the cosmopolitan skill sets they currently rely on colleges to produce in their graduates as colleges could no longer use Affirmative Action in admissions to produce the cosmopolitan skill sets.

One possible explanation surrounding the dearth of research on the topic of the economic benefits to individuals who attend a more diverse college may be inherent in the framing of the argument in terms of social justice. That said, simply positing an alternative to a prevailing frame and then conducting a flawed empirical analysis might cloud the picture rather than reframe it. Consequently, for exploratory work that presents a different way of looking at a problem, it is useful to use existing literature to make a reasoned case for why it might be plausible to explore this new frame empirically.

The challenge is that one must make an iterative case using the literature and pull from diverse literatures in order to build the case. There is actually ample research—if pulled together eclectically—that does build a reasoned case for this new frame and that I reviewed in detail earlier. The reasoning is as follows.

I began conceptualizing a theory around linking salaries to a college's institutional diversity by making a case for a business need for diversity. There is literature to suggest that for a host of reasons business values a diverse workforce because it improves their bottom line (e.g., Dunphy, 2004; Esser, 1998; Larkey, 1996; Milikin & Martins, 1996). I then argued that diverse workplaces tend to underperform unless there are these "cosmopolitan" employees that bridge the structural holes (Anderson, 2004; Burt, 2001; Kochan et al., 2003). I then used neoclassical economics to argue that it is reasonable for firms to pay for the cosmopolitan skill set and that human capital theory says that one can see the manifestation of the premium because of having developed the skill set (e.g., Roy, 1951; Schultz, 1952). I then made the argument that it is reasonable for employers to look to colleges as a source of these cosmopolitan employees because development in general is not a core competency of business and diversity-training programs in general tend to fail because of their design (e.g., Allen, 2001; Dunphy, 2004; Kochan et al., 2003; Ng & Tung, 1998). I then suggested that colleges may be ideally suited to develop people with these skill sets. I first argued that if we think about learning as a production function, then we can think about peers as an input and a diverse peer group as a technology, examining the literature to bolster the argument.

I finally argued that the college experience is a "trial by ordeal" that results in a prolonged shared experience that in some ways forces students to overcome the initial tendency to stay within homogeneous groups. There has been some work done in this area: Transactional Stress and Coping (Lazarus & Folkman, 1984), Uncertainty Anxiety Management Theory (UAM) (Gudykunst, 1995;,2005), and Critical Race Theory (e.g., Stevenson, 2008).

The argument is made that organizations value diversity for business reasons but that, in the absence of these cosmopolitan employees, diversity initiatives largely fail. I have suggested that organizations will pay a premium for these employees, and while they can develop the skill sets, it is more effective for them to look upstream to colleges who produce them. I then argued that certain colleges have a technological advantage in their "production" of learning in that they have more diverse student cohorts. The result is a cohort of cosmopolitan potential employees. The development of cosmopolitan employees is something that the racially and ethnically diverse college does by affirming in its recruitment of a diverse student body and thrusting this diverse group of students—who are at an age where they are ready to experience this cognitive dissonance and who learn not only how to cope with this heterogeneous environment but to value it and leverage it. And it is this ability to leverage, to fill these structural holes created by disparate groups, that leads to innovation and that the employer places a premium on.

The result is a reasoned chain supported by the literature that takes us from income to colleges. What is important to note is that the logic does not require the diversity input to impact academic performance. The crux of the argument is that regardless of how it impacts academic performance while in college, learning to be cosmopolitan impacts income once one graduates from college. This is a fundamentally different argument than even the few academics who have argued the benefits of diversity within college (e.g., Terenzini et al., 2001) and is important given the mixed results we have seen from the peer effect (e.g., Hoxby, 2000).

To explore the thesis empirically, I needed two sets of data: data that describe individuals and data that describe institutions of higher education. I used the College Board's Annual Survey of Colleges for the school level data and the Baccalaureate and Beyond Longitudinal Study

(BB: 93) for the individual students' data. I supplemented these sets with the US News and World Report Rankings and with the College Board selectivity index. The final sample size was 8,054, and the final college sample size was 466 colleges. The general equation that demonstrates my thesis is:

$$\ln Y_{ij} = \beta_o + \beta_1 I_i + \beta_2 C_{ij} + \beta_3 D_{ij} + \mu_i$$

which posits a relationship between the natural log of yearly income for individual i in time j as a function of individual characteristics (I) such as demographic variables, family background variables, education variables and labor market variables, school level variables (C) for individual i in time j that focus on school type and quality, and variables for diversity. The individual and school level variables were all based on the literature.

As mentioned earlier in this paper, there is a dearth of empirical work exploring the relationship between school diversity and income of graduates. The two studies done both focused solely on African Americans, with one using fraction of Blacks and the other using percentage Black. My work used 4 different variables—two continuous (percentage Black and percentage minority) and two that were sets of dummy variables (focusing on percentage of Black and percentage minority) —that group the college based on how close its diversity was to the diversity of the nation.

I used three models, and within each model I used 4 variables for diversity, getting a total of 8 results that explored the relationship. For the first model, I regressed the log of income against individual characteristics that affect income and college characteristics and the diversity characteristic. All specifications were estimated using ordinary least squares. For the second model, I used an HLM approach where I first estimated an individual level model within each school and then estimated a between-school model using the estimated within-school parameter as a dependent variable. For the third, I used propensity scores matching. The fundamental idea was to see if there was consistency among the results that might support or refute the thesis.

Discussion of the Findings

One might characterize the findings as modest but consistent with the theoretical framework that I suggested to inform this exploration. In general terms, many of the non-diversity variables were found to be consistent with the literature. Being male consistently related to increased salary with at least a 99% confidence level. Being Black or Hispanic related to decreased salary, and being Asian related to increased salary but was not statistically significant. Other examples again are supported by the literature. College Major mattered consistently; as an example, majoring in engineering consistently increased salary, while majoring in education consistently decreased salary. GPA, age at graduation, and job experience all consistently had positive impacts on salary. Table 4 on page 84 presents the coefficients of some of the variables comparing across the models. One striking difference is a graduate's total debt and the fact that consistently in my analysis it was not statistically significant. One can conceive of a graduate's debt as a potential indicator of social economic status (the logic being that if one has debt, one could not afford college). Fairly consistently in the literature, debt has been found to be statistically significant (e.g., Kermit, Rumberger). While it is quite possible that this difference from the majority of the literature is a function of the data and models used, another potential explanation is that, unlike all the other studies done on college quality, I included non-selective and community colleges in my sample. Consequently, the average cost of college tuition among the colleges in my data set is probably significantly lower, and it could follow either that because the cost is lower there is less debt per student on average or that because socio-economic status is generally associated with college quality (e.g., Krueger, Monks, Rumberger), having a broader set of institutions may not create as much variance around the mean of the debt. A similar argument may explain why neither the College Board selectivity nor the private institution dummy variable was statistically significant.

In these other institutional variables, future researchers may want to explore further the relationship between race , salary, and majoring in education. Another curious finding is that

attending a private institution mattered for Whites but not for Blacks. It would be interesting to explore further whether minority-serving private institutions are at a competitive disadvantage in the marketplace as compared to private non-minority-serving institutions.

As noted earlier, the various models and combination of variables yielded consistent results. Each explained roughly 31% of the variance, so it is important to realize that none of the models are compelling as capturing most of the variance that exists among graduates' salaries.

My dummy variable approach and the quadratic suggests that perhaps it is a non-linear effect, and one might infer than it is the distribution of Blacks on college campuses that may be pulling the linear model into significance in the continuous variable model. In the dummy model version, at institutions with few Blacks, it seems that there is no marginal impact on percentage on salary as the percentage of Blacks grows (which makes sense since there are no Blacks to speak of at these institutions). However, at institutions that are about average in terms of percent Blacks or slightly above average, the relationship suggests a slightly positive impact on salary, whereas at institutions with a significant number of Black students, the relationship between percentage Black and starting salaries is negative. This finding is different from the finding of Rumberger that the percentage of Blacks at an institution had a positive impact on salaries. These findings suggest that further research is needed.

However, the theoretical construct I am exploring takes a broader definition of minority to include Hispanics and Asian Americans as well as Blacks, and the results seem to better support the hypothesis. Specifically, while controlling for factors known or suspected to impact salary, institutional diversity as measured by the percent minority on campus accounts for a small yet significant amount of variance and the multivariate model using quadratic accounts for more variance than does the linear model. This finding, while modest, was consistent across my analyses. What is perhaps most intriguing is that it suggests a parabolic effect—namely, that there is no relationship at institutions with no minorities, a positive relationship at institutions that have about the mean or above the mean in terms of diversity, and a significant falling off when the institution approaches majority minority.

These results in these models suggest that the graduates who seem to benefit the most from attending more diverse institutions are White students, although one might reason that non-White students have had more opportunities than Whites to interact with students who are different and have learned some of the skills detailed in earlier chapters of this paper. It also suggests that other studies may have made improper inferences based on averages and not differentiating by race and ethnicity as well as by institutional diversity. Hossler (1989) found in surveying students that Black students who attend Black high schools would want to attend predominantly White high schools to round out their experience, while Black students who attended predominantly White high schools attend HBCUs to explore their "roots." To reconcile the empirical discrepancy that not as many Black students attend predominantly White institutions, he suggests that they do not have the academic performance to be admitted, and that might explain the discrepancy.

Implications

For an individual student, one might expect to see institutional racial and ethnic diversity become more important in the college selection process. There is anecdotal evidence that this information is more readily available now than it was when the cohort analyzed for this paper was applying to college (the College Board did not publish percent minority in its College Handbook until 1990). However, one could not comfortably posit that this change is a result of potential college students recognizing the value of institutional diversity to their future income. It could simply be the zeitgeist or the simple increased availability of all sorts of information. Perhaps equally important, if such findings ended up to be supported by future research, it would suggest different sorts of activities by students when they attend school. One need only think of examples where a school seems integrated only to walk into the lunchroom and see only segregation (Greene 1998). One would expect students to seek out such opportunities to learn

from others in the same way now that students select particular majors or classes based partially on perceived potential future income.

The most intriguing implications for individual students are for Black, Asian American, and Latino students. Since the analyses suggest that institutional diversity matters less to them, it is reasonable that they might look at less "diverse" institutions, such as minority-serving institutions, that might meet other needs, as argued in the literature (Henderson 2001). Equally important, if one accepts Fryer and Greenstone's (2007) argument that HBCUs' value to graduates has declined, then minority students, who are a rare commodity, might command a premium in the marketplace and could use that to increase the cost to institutions for them to matriculate.

For colleges, if one were to posit that institutional diversity contributed to graduates' earnings, then one might expect colleges to attempt to attract, enroll, and retain a more diverse student body. They might expect wealthier alumni to donate more money, and they would recognize that in the marketplace for students, the ability to attract a more diverse cohort would mean a competitive advantage among their peers.

One could imagine more explicit marketing around institutional diversity as well as more explicit admission policies. In addition, one could imagine "diversity aid," to try and increase the institutional yield of students attractive to the institution. One might imagine the system working similar to "merit aid" used to attract students with better grades or test scores under the premise that it will improve the learning of the students' peers as well as a school's rankings based on things such as test scores.

Given the scarcity of minority students, and the "value added" of these students as an educational input, one might expect to see significant aid allocated not to need but rather to diversity. In essence, a student's value in contributing to the learning of her peers might require a premium paid based on her value in the same way that one pays a premium for higher quality steel in the production of buildings or a scholarship to a football player based on potential wins and revenues from bowl games. That premium might manifest itself as "diversity aid."

It is interesting to consider the implication for colleges. Given that individual colleges compete in a marketplace and that in this world a diverse cohort is a part of the production of competitive graduates, any sort of limitation on admission policies amounts to a "barrier to trade." This may sound far-fetched, but one need only remember that when California passed Proposition 209, the University of California at Berkeley saw an immediate decrease in the number of minority applicants and matriculants (Engelgau, 1998). In this scenario, the state of California negatively impacted Berkeley's ability to compete in the marketplace and forced them to produce an inferior product. The issue may be important to colleges because proxies that are being put forth in lieu of Affirmative Action do not seem to be generating the sort of cohorts that institutions want in terms of ethnic or racial diversity (e.g., Massey & Fischer, 2005). It is important to note as well that, while institutions such as the College Board argue that performance differences among ethnic and racial groups are largely a result of educational experiences, there may be some evidence that suggests that test scores may under-predict the potential for academic success of minority students.

The potential implications for public policy and public perceptions surrounding Affirmative Action are also worth pondering. A recent *Wall Street Journal* poll (Evans, 2010) of recruiters asking them to identify the best colleges from which to hire employees only had one Ivy League institution among the top 25. One can envision employers getting increasingly sophisticated in recognizing talented employees and sourcing their college rather than relying either on the simple acquisition of a college degree or traditional selectivity rankings based largely on college inputs rather than outcome or learning. One certainly would expect evidence that suggests that institutional diversity enhances the salaries of White students to significantly change the public policy debate, because the reasonable moral argument that it is problematic to hurt one potential student simply to "right a historical wrong" becomes irrelevant.

Future Research

We need to develop better measures of diversity. My work explored doing analyses similar to work that others had done (Rumberger) using more than one measure, and the findings did vary significantly when one looked at African Americans or a broader measure of diversity. Other measures of diversity could be used, such as the number of international students or variance in socio-economic status or geographic background, as potential other indicators. My work looked at both Blacks and other minorities as a way of indicating diversity and looked at them both as continuous and dummy variables and whether there was more than one group. It was a plausible place to start given the attack on Affirmative Action. However, from an institution's perspective, if geographic diversity, SES diversity, or number of international students positively impacts salaries of graduates, that has important ramifications for the institution's financial aid and admissions policies and strategies in the marketplace. Basically, the research community needs to come up with better ways of capturing diversity in all of its richness, particularly given the public rhetoric about the value of diversity.

To further explore some of the specification issues that arise empirically, it might be insightful to explore further more homogeneous types of institutions (e.g., highly selective or community colleges). It would also be useful to find some within-institutional variable that describes better whether a student is a commuter. And one could even explore whether students who attend but do not finish college receive some benefit from institutional diversity. Finally, it is worth noting that there is no way of ascertaining whether students have these skills before they enter college. Despite knowing from the College Board that when the students in this dataset went to college minority enrollment was not presented in their data on colleges, we cannot really know whether the college is somehow sending a signal that sorts students out in such a way that only those who either are or are somehow predisposed to be cosmopolitan are going to apply rather than it simply being a function of their learning to be cosmopolitan at the institution. In essence, not only is it to know in this scenario whether the metaphorical chicken or egg comes

first—the student or the institution, it is also, given the selection issues, to know whether the student has an interest in poultry metaphorically speaking or it is some curious red herring that is indicating some other unobservable value about the individual and the institutional match.

Hopefully, this exploratory paper on whether a college's diversity was related to its graduates' salaries posed enough questions and through the analysis raised enough other questions to encourage other researchers to explore the four areas mentioned above so that the various stakeholders in the higher education process can make better informed decisions.

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APPENDIX

Table 10. Descriptive Statistics of Model Candidate Variables in the Merged B&B and College Board Files

Variable	Scale	Valid (n)	$\bar{X}$	X_{mdn}	X_{mode}	Min	max	s_x	25_p	75_p	IQR	Kur-tosis	Skewness
Annual Salary for April Job	Interval Ratio	5750	21517.3	19200	18000	0	2184000	44724.1	13000	25662	12662	1765.5	40.1
Gender	Categorical (1,2)	7931	1.6	2	2	1	2	0.5	1	2	1	1.1	-0.3
Ethnicity (Revised 92-93)	Categorical (1 – 7)	7729	1.3	1	1	1	7	0.8	1	1	0	18.3	3.6
Father's Education	Categorical (1-14)	7823	7.3	8	3	1	14	3.9	3	10	7	1.6	-0.2
Mother's Education	Categorical (1-14)	7867	6.4	6	3	1	14	3.5	3	10	7	1.5	0.04
Total Undergrad. Debt	Interval Ratio	7871	5508.1	1869	0	0	120000	8301.1	0	9500	9500	22.27	3.1
ACT Test Quartile	Quartile (1 – 4)	7938	2.6	3	0	1	4	1.1	2	4	2	1.6	-0.05
SAT Test Score	Quartile (1 – 4)	7938	2.4	2	0	1	4	1.1	1	3	2	1.8	0.04
Bachelor's Degree Field	Categorical (1 – 12)	7563	6	6	2	1	12	3.9	2	10	8	1.6	0.2
Undergraduate G.P.A.	Interval Ratio	7314	3.0	3.0	2.9	0	4	0.5	2.6	3.4	0.8	5.1	-0.6
Years of Experience	Interval Ratio	-											
Employment Status as of Interview Date	Categorical (1 – 5)	7924	1.2	1	1	1	5	0.6	1	1	0	26.6	4.6
Enrolled in school	Categorical (0, 1)	7938	0.2	0	0	0	1	0.4	0	0	0	2.7	1.3
Work in public sector	Categorical (0 – 15)	6523	10.4	13	13	0	15	3.4	8	13	5	2.6	-0.8
Self Employed: Degree not required for job	Categorical (0, 1)	7902	0.6	1	1	0	1	0.5	0	1	1	1.3	-0.6
Job Related to Major	Categorical (0 – 3)	7542	1.8	2	3	0	3	1.2	1	3	2	1.5	-0.22
Age at Graduation	Interval Ratio	7842	24.8	22	22	18	68	5.9	22	24	2	10.8	2.7
Unemployed	(dummy)												
Out of labor force	(dummy)												
Student/Faculty Ratio	Interval Ratio	7698	0.1	0.08	0.1	0.03	4.0	0.1	.06	0.1	0.04	452.7	18.2

Table 10 - Descriptive Statistics for Regression Model Candidate Variables in the Merged B&B and College Board Files (continued)

Variable	Scale	Valid (n)	$\bar{X}$	X_{mdn}	X_{mode}	min	max	s_x	25_p	75_p	IQR	Kur-tosis	Skew-ness
Carnegie Code	(Categorical 0 - 190)	7928	45.4	50	50	0	190	25.3	30	50	20	7.8	1.3
Percentage of Ph.D. holding faculty	Interval Ratio	7033	0.6	0.6	0.7	0.01	0.9	0.2	0.5	0.7	0.2	3.1	-0.5
Percentage of admitted who enrolled	Interval Ratio	6909	0.5	0.4	0.5	0.1	1	0.1	0.4	0.5	0.1	4.1	1.0
Percentage of applications accepted	Interval Ratio	7938	3407.8	2793	5398	0	13333	3077.4	777	5398	4621	3.6	1.0
Average SAT Scores – Verbal	Interval Ratio: 25th – 50th percentile	5809	419.4	430	430	250	600	57.6	390	450	60	3.6	-0.2
	Interval Ratio: 50th – 75th percentile	5809	523.2	520	520	360	700	54.4	500	560	60	3.8	-0.1
Average SAT Scores – Math	Interval Ratio: 25th – 50th percentile	5809	469.8	480	480	280	660	74.0	430	510	80	3.4	-0.5
	Interval Ratio: 50th – 75th percentile	5809	586.0	600	520	400	750	71.1	560	620	60	4.0	-0.8
Average ACT Composite Scores:	Interval Ratio: 25th – 50th percentile	3853	19.8	20	20	11	28	2.8	18	21	3	3.9	-0.1
	Interval Ratio: 50th – 75th percentile	3853	25.0	25	24	17	32	2.3	24	26	2	3.6	0.2
Percent of 4 yr. Grads who go to grad. school	Interval Ratio	2090	22.3	22	22	3	75	10.6	15	25	10	5.6	1.2
Percentage of full time faculty	Interval Ratio	7698	.75	0.8	0.9	0.04	1.0	0.2	0.6	0.9	0.3	3.5	-0.9
Tuition charged	Interval Ratio	5062	5092.7	2764	2754	608	18880	4972.2	1950	7780	5830	3.7	1.4
College Board Region (e.g., New England versus West)	Categorical (1 – 6)	7938	3.4	3	3	1	6	1.3	3	4	1	3.0	0.5
Location (urban, suburban, rural)	Categorical (1 – 6)	7938	3.4	3	3	1	6	1.2	3	4	1	2.8	-0.3
Aid Awarded	Interval Ratio	2390	0.8	0.8	0.31	0	1	0.3	0.6	1.0	0.4	3.1	-1.1

Table 10. Descriptive Statistics for Regression Model Candidate Variables in the Merged B&B and College Board Files (continued)

Variable	Scale	Valid (n)	$\bar{X}$	X_{mdn}	X_{mode}	min	max	s_x	25_p	75_p	IQR	Kur-tosis	Skewness
% of minority undergraduates	Interval Ratio	7776	19.9	11	9	1	99	22.4	8	21	13	8.8	2.5
% of internatl. Undergraduates	Interval Ratio	7118	2.6	2	1	1	30	2.7	1	3	2	24.5	3.8
%of minority: Afr. American	Interval Ratio	6784	0.04	0.01	0.02	0.0004	0.4	0.1	0.005	0.02	0.02	14.8	3.7
% of minority: Asian American	Interval Ratio	6385	0.007	0.003	0.002	0.0001	0.09	0.01	0.002	0.008	0.006	12.1	2.8
% of minority: Hispanic	Interval Ratio	5437	0.006	0.003	0.003	0.0002	0.09	0.008	0.001	0.007	0.006	20.7	3.4
% of minority: Unknown	Interval Ratio	4358	0.006	0.003	0.001	0.00005	0.1	0.01	0.001	0.005	0.004	41.4	5.5
% of out of state	Interval Ratio	7883	751.8	790	710	0	990	221.4	700	910	210	5.1	-1.5
Minority status considered in application (important/not)	Categorical (1- 4)	7541	3.0	3	3	1	4	0.8	2	4	2	2.3	-0.3
Father's highest education	Categorical (1-6)	7277	3.7	4	1	1	6	1.8	1	5	4	1.5	0.005
Mother's highest education	Categorical (1-6)	6591	3.4	3	1	1	6	1.6	2	5	3	1.6	0.3
Total undergrad debt	Interval Ratio	7321	6415.4	1800	0	0	300000	20909.4	0	9000	9000	170.3	12.2
Cumulative GPA	Interval Ratio	7338	312.5	310	3.0	20	400	46.6	280	348	68	3.6	-0.3
Work exp related to degree?	Categorical (0,1)	7478	0.5	0	0	0	1	0.5	0	1	1	1.0	0.1
Employ status at interview	Categorical (1-5)	7421	1.6	1	1	1	5	1.2	1	2	1	5.6	2.0
In school while at job?	Categorical (0,1)	7558	0.2	0	0	0	1	0.4	0	0	0	4.3	1.8
Job req degree?	Categorical (0,1)	6443	0.6	1	1	0	1	0.5	0	1	1	1.2	-0.4
Age when rec BA	Interval Ratio	7498	24.7	22	22	18	68	5.9	22	24	2	11.0	2.7
Full or part time	Categorical (1,2)	7183	1.3	1	1	1	2	0.5	1	2	1	1.9	1.0

Table 11. Analysis of Impact of Missing Demographic Data

Percent Minority Test						
Group	Observations	Mean	Std. Error	Std. Dev.	(95% Conf Interval)	
0	5729	19.38942	0.2914106	22.05691	18.81815	19.9607
1	5512	19.08454	0.2953595	21.92833	18.50552	19.66356
combined	11241	19.23993	0.2074397	21.9935	18.83331	19.64654
difference		0.3048794	0.4149653		-0.5085252	1.118284
diff -= Mean (0) - mean (1)						t = 0.7347
Ho: diff = 0					degrees of freedom = 11239	
Ha: diff < 0			Ha: diff != 0			Ha: diff > 0
Pr (T < t) = 0.7687			Pr(|T| > |t|) = 0.4625		Pr(T > t) = 0.2313	
Salary Test						
Group	Observations	Mean	Std. Error	Std. Dev.	(95% Conf Interval)	
0	5865	9.782294	0.0079621	0.6097671	9.766685	9.797903
1	5512	9.775145	0.008236	0.6114644	9.758999	9.791291
combined	11377	9.77883	0.0057243	0.6105736	9.76761	9.790051
difference		0.0071491	0.0114545		-0.0153036	0.0296018
diff -= Mean (0) - mean (1)						t = 0.6241
Ho: diff = 0					degrees of freedom = 11375	
Ha: diff < 0			Ha: diff != 0			Ha: diff > 0
Pr (T < t) = 0.7337			Pr(|T| > |t|) =0.5326		Pr(T > t) = 0.2663	

Table 12. Analysis of Impact of Missing Demographic Data

Variable	Pre missing	Post missing	Pearson chi^2	Percent
Total count	5865	5512	NA	NA
Male	3362	3165	0.0151	0.902
Black	601	571	0.03866	0.844
Hispanic	204	184	0.1693	0.681
Asian	134	106	1.7998	0.18
American Indian	31	28	0.0233	0.879

Table 13. Black OLS Model (Dummy) with Controls

Source	SS	df	MS		Number of obs =	5634
Model	648.27946	35	18.5222703		F(35, 5598) =	71.3
Residual	1454.33701	5598	0.259795821		Prob > F =	0
Total	2102.61647	5633	0.373267614		R-squared =	0.3083
					Adj R-squared =	0.304
					Root MSE =	0.5097

Variable	**Coef.**	**Std. Err.**	**t**	**P>|t|**	**[95% Conf.**	**Interval]**
black_1	0.0097363	0.0363598	0.75	0.452	-0.0439165	0.0986423
black_2	0.0247544	0.1485483	0.17	0.045	-0.0026645	0.0315966
black_3	0.0609683	0.1387736	0.44	0.66	-0.2110817	0.3330183
black_4	-0.0585005	0.0202733	-2.89	0.004	-0.098244	-0.018757
Male	0.1204931	0.0154286	7.81	0	0.090247	0.1507392
Black	0.0170731	0.0259269	0.66	0.51	-0.0337538	0.0679
Hispanic	-0.0005349	0.0382963	-0.01	0.989	-0.0756104	0.0745407
Asian	0.0536862	0.0476479	1.13	0.26	-0.0397221	0.1470944
amer_indian	0.0735455	0.095252	0.77	0.44	-0.1131854	0.2602764
TOTDEBT	3.48E-07	9.18E-07	0.38	0.705	-1.45E-06	2.15E-06
Education	-0.2633613	0.0262324	-10.04	0	-0.314787	-0.2119356
Engineering	0.1446991	0.0338453	4.28	0	0.0783491	0.211049
health_prof	0.198002	0.0337859	5.86	0	0.1317685	0.2642356
public_aff~s	-0.1088347	0.0434548	-2.5	0.012	-0.1940229	-0.0236465
bio_science	-0.089229	0.0436358	-2.04	0.041	-0.1747721	-0.0036859
math_science	-0.1193894	0.0338025	-3.53	0	-0.1856554	-0.0531234
social_sci~e	-0.1814479	0.0281097	-6.45	0	-0.2365539	-0.1263419
History	-0.6386448	0.0485178	-13.16	0	-0.7337585	-0.5435311
Psychology	-0.1909258	0.0454501	-4.2	0	-0.2800257	-0.101826
Humanities	-0.2691472	0.0314592	-8.56	0	-0.3308195	-0.2074749
Other	-0.1307021	0.0271501	-4.81	0	-0.1839269	-0.0774772
GPACUM	0.0005489	0.0001625	3.38	0.001	0.0002304	0.0008675
JOBEXPR	0.0871339	0.014128	6.17	0	0.0594375	0.1148302
Parttime	-0.621586	0.0215702	-28.82	0	-0.663872	-0.5792999
Inschool	-0.1950824	0.0184635	-10.57	0	-0.2312779	-0.1588868
public_sec	-0.0378962	0.0154032	-2.46	0.014	-0.0680925	-0.0076999
self_emp	-0.1651888	0.0869557	-1.9	0.058	-0.3356558	0.0052781
AGEATBA	0.0124048	0.0012962	9.57	0	0.0098637	0.014946
Unemployed	-0.0740328	0.0333267	-2.22	0.026	-0.1393661	-0.0086995
out_force	-0.372424	0.049403	-7.54	0	-0.4692731	-0.2755749
Private	0.0186794	0.0184122	1.01	0.31	-0.0174157	0.0547745
CB93_CARNE~E	-0.0007649	0.0003606	-2.12	0.034	-0.0014718	-0.000058
Ratio	0.218053	0.051232	4.26	0	0.1176185	0.3184876
Usnews	0.0217381	0.0108304	2.01	0.045	0.0005064	0.0429699
board_sele~y	-0.0028388	0.0106197	-0.27	0.789	-0.0236576	0.01798
_cons	9.449204	0.0634588	148.9	0	9.324801	9.573608

Table 14. Minority OLS Model (Dummy) with Controls

Source	SS	df	MS		Number of obs =	5634
Model	647.745545	35	18.5070156		F(35, 5598) =	71.21
Residual	1454.87092	5598	0.259891197		Prob > F =	0
Total	2102.61647	5633	0.373267614		R-squared =	0.3081
					Adj R-squared =	0.3037
					Root MSE =	0.5098

Variable	**Coef.**	**Std. Err.**	**t**	**P>|t|**	**[95% Conf.**	**Interval]**
min_1	0.0004404	0.0217469	0.02	0.984	-0.0421919	0.0430727
min_2	0.0220819	0.0256446	0.86	0.003	0.0028191	0.0723553
min_3	0.0707118	0.0320998	2.2	0.013	0.067839	0.1336398
min_4	0.0041305	0.0263519	1.57	0.117	-0.0103554	0.0929645
Male	0.117207	0.01542	7.6	0	0.0869778	0.1474362
Black	-0.0142506	0.0265145	-0.54	0.591	-0.0662293	0.0377282
Hispanic	-0.0192054	0.0390827	-0.49	0.623	-0.0958227	0.0574119
Asian	0.0255961	0.0484078	0.53	0.597	-0.069302	0.1204942
amer_indian	0.0510764	0.0952472	0.54	0.592	-0.1356452	0.2377979
TOTDEBT	3.97E-07	9.22E-07	0.43	0.667	-1.41E-06	2.21E-06
Education	-0.2591345	0.0262923	-9.86	0	-0.3106776	-0.2075914
Engineering	0.1424413	0.0338806	4.2	0	0.0760223	0.2088604
health_prof	0.198945	0.0337776	5.89	0	0.1327278	0.2651621
public_aff~s	-0.1063702	0.043484	-2.45	0.014	-0.1916157	-0.0211247
bio_science	-0.0904867	0.0436527	-2.07	0.038	-0.1760628	-0.0049105
math_science	-0.1201698	0.033807	-3.55	0	-0.1864446	-0.0538951
social_sci~e	-0.1833267	0.0281409	-6.51	0	-0.2384938	-0.1281596
History	-0.6301575	0.0485743	-12.97	0	-0.7253818	-0.5349331
Psychology	-0.1989663	0.0454591	-4.38	0	-0.2880837	-0.1098489
Humanities	-0.2755885	0.0314327	-8.77	0	-0.3372087	-0.2139683
Other	-0.1317691	0.027183	-4.85	0	-0.1850583	-0.0784799
GPACUM	0.0004834	0.0001631	2.96	0.003	0.0001635	0.0008032
JOBEXPR	0.0865782	0.0141286	6.13	0	0.0588807	0.1142758
Parttime	-0.6227396	0.0215915	-28.84	0	-0.6650672	-0.580412
Inschool	-0.1965172	0.0184891	-10.63	0	-0.232763	-0.1602714
public_sec	-0.0384839	0.0153931	-2.5	0.012	-0.0686605	-0.0083074
self_emp	-0.1718659	0.0869691	-1.98	0.048	-0.3423591	-0.0013728
AGEATBA	0.0124078	0.0012975	9.56	0	0.0098641	0.0149515
Unemployed	-0.0715809	0.0333126	-2.15	0.032	-0.1368865	-0.0062753
out_force	-0.3750454	0.0494537	-7.58	0	-0.4719938	-0.2780971
Private	0.0084634	0.0185891	0.46	0.649	-0.0279784	0.0449052
CB93_CARNE~E	-0.0007766	0.0003575	-2.17	0.03	-0.0014774	-0.0000758
Ratio	0.17034	0.0516085	3.3	0.001	0.0691674	0.2715126
Usnews	0.009341	0.0110408	0.85	0.398	-0.0123032	0.0309852
board_sele~y	0.0005811	0.0108393	0.05	0.957	-0.0206682	0.0218304
_cons	9.483483	0.0676501	140.18	0	9.350862	9.616103

Table 15. Minority Continuous Model OLS with Controls

Source	SS	df	MS		Number of obs =	5512
Model	630.895691	32	19.7154903		F(32, 5479) =	75.56
Residual	1429.6061	5479	0.260924639		Prob > F =	0
Total	2060.50179	5511	0.373888911		R-squared =	0.3062
					Adj R-squared =	0.3021
					Root MSE =	0.51081

Variable	**Coef.**	**Std. Err.**	**t**	**P>|t|**	**[95% Conf.**	**Interval]**
Minority	-0.0008077	0.0004492	-1.8	0.072	-0.0016883	0.0000728
Male	0.1237967	0.0156489	7.91	0	0.0931187	0.1544747
Black	0.0301164	0.0303896	0.99	0.322	-0.0294593	0.0896921
Hispanic	0.0109001	0.0403495	0.27	0.787	-0.0682009	0.090001
Asian	0.0402072	0.0510803	0.79	0.431	-0.0599305	0.140345
amer_indian	0.0637602	0.0970606	0.66	0.511	-0.126517	0.2540375
TOTDEBT	3.47E-07	9.35E-07	0.37	0.711	-1.49E-06	2.18E-06
Education	-0.2687916	0.0264879	-10.15	0	-0.3207184	-0.2168649
Engineering	0.1437432	0.0344698	4.17	0	0.0761686	0.2113177
health_prof	0.1954766	0.03435	5.69	0	0.1281369	0.2628164
public_aff~s	-0.1043407	0.044007	-2.37	0.018	-0.1906119	-0.0180695
bio_science	-0.1002026	0.0441454	-2.27	0.023	-0.1867451	-0.0136602
math_science	-0.1169562	0.0341861	-3.42	0.001	-0.1839746	-0.0499378
social_sci~e	-0.1807966	0.0284437	-6.36	0	-0.2365575	-0.1250357
History	-0.6436481	0.0490086	-13.13	0	-0.7397244	-0.5475717
Psychology	-0.1887296	0.0464036	-4.07	0	-0.2796992	-0.09776
Humanities	-0.2804114	0.031737	-8.84	0	-0.3426286	-0.2181943
Other	-0.1316584	0.0273405	-4.82	0	-0.1852566	-0.0780602
GPACUM	0.0005474	0.0001653	3.31	0.001	0.0002234	0.0008714
JOBEXPR	0.0899818	0.0143206	6.28	0	0.0619079	0.1180558
Parttime	-0.6207115	0.0219393	-28.29	0	-0.6637213	-0.5777017
Inschool	-0.1945618	0.0186869	-10.41	0	-0.2311956	-0.157928
public_sec	-0.0400392	0.0156409	-2.56	0.01	-0.0707016	-0.0093768
self_emp	-0.1746918	0.0871446	-2	0.045	-0.3455299	-0.0038538
AGEATBA	0.0123307	0.0013202	9.34	0	0.0097426	0.0149187
Unemployed	-0.0667519	0.0335714	-1.99	0.047	-0.1325652	-0.0009387
out_force	-0.3751017	0.049989	-7.5	0	-0.4731	-0.2771034
Private	0.0165285	0.0189736	0.87	0.384	-0.0206674	0.0537243
CB93_CARNE~E	-0.0007377	0.0003657	-2.02	0.044	-0.0014546	-0.0000209
Ratio	0.2086712	0.0544172	3.83	0	0.1019918	0.3153505
Usnews	0.0201801	0.0111597	1.81	0.071	-0.0016974	0.0420576
board_sele~y	-0.0088714	0.0108331	-0.82	0.413	-0.0301085	0.0123657
_cons	9.472865	0.063617	148.9	0	9.34815	9.597579

Table 16. Minority Quadratic Model OLS with Controls

Source	SS	df	MS		Number of obs =	5512
Model	639.914894	29	22.0660308		F(29, 5482) =	85.15
Residual	1420.58689	5482	0.25913661		Prob > F =	0
Total	2060.50179	5511	0.373888911		R-squared =	0.3106
					Adj R-squared =	0.3069
					Root MSE =	0.50905

Variable	**Coef.**	**Std. Err.**	**t**	**P>|t|**	**[95% Conf.**	**Interval]**
Minority	0.006812	0.0012679	5.37	0	0.0043265	0.0092976
min2	-0.0000787	0.000013	-6.05	0	-0.0001041	-0.0000532
Male	0.1232246	0.0155201	7.94	0	0.0927991	0.1536501
TOTDEBT	1.25E-07	9.31E-07	0.13	0.893	-1.70E-06	1.95E-06
Education	-0.2629436	0.026396	-9.96	0	-0.3146904	-0.2111969
Engineering	0.1384565	0.0342939	4.04	0	0.0712269	0.2056861
health_prof	0.1951413	0.0342228	5.7	0	0.1280511	0.2622316
public_aff~s	-0.1127433	0.043858	-2.57	0.01	-0.1987224	-0.0267642
bio_science	-0.0994134	0.0439772	-2.26	0.024	-0.1856261	-0.0132007
math_science	-0.1114251	0.0340742	-3.27	0.001	-0.178224	-0.0446262
social_sci~e	-0.1754846	0.0283288	-6.19	0	-0.2310203	-0.119949
History	-0.6374802	0.0488185	-13.06	0	-0.7331839	-0.5417765
Psychology	-0.2023559	0.0462314	-4.38	0	-0.2929879	-0.111724
Humanities	-0.2788534	0.0314481	-8.87	0	-0.3405041	-0.2172027
Other	-0.1313	0.0272216	-4.82	0	-0.1846651	-0.0779349
GPACUM	0.0004392	0.0001591	2.76	0.006	0.0001274	0.000751
JOBEXPR	0.0895161	0.0142624	6.28	0	0.0615561	0.1174762
Parttime	-0.618303	0.0218351	-28.32	0	-0.6611084	-0.5754976
Inschool	-0.1971531	0.0186001	-10.6	0	-0.2336166	-0.1606896
public_sec	-0.0306192	0.0155275	-1.97	0.049	-0.0610593	-0.0001791
self_emp	-0.1692498	0.086811	-1.95	0.051	-0.3394339	0.0009342
AGEATBA	0.0112255	0.0013281	8.45	0	0.0086219	0.0138292
Unemployed	-0.0547491	0.033284	-1.64	0.1	-0.119999	0.0105008
out_force	-0.3883196	0.0498316	-7.79	0	-0.4860093	-0.2906298
Private	0.0299221	0.0189959	1.58	0.115	-0.0073175	0.0671617
CB93_CARNE~E	-0.000552	0.0003649	-1.51	0.13	-0.0012674	0.0001634
Ratio	0.1689399	0.0545752	3.1	0.002	0.0619509	0.275929
Usnews	0.0207732	0.0110848	1.87	0.061	-0.0009574	0.0425038
board_sele~y	0.0084505	0.0111243	0.76	0.448	-0.0133576	0.0302586
_cons	9.404356	0.0637083	147.62	0	9.279462	9.52925

Table 17a. Black Model (Dummy) by Race, Impact on Whites

Source	SS	df	MS		Number of obs =	4674
Model	556.314763	31	17.9456375		F(31, 4642) =	66.72
Residual	1248.54354	4642	0.268966725		Prob > F =	0
Total	1804.8583	4673	0.38623118		R-squared =	0.3082
					Adj R-squared =	0.3036
					Root MSE =	0.51862

Variable	**Coef.**	**Std. Err.**	**t**	**P>|t|**	**[95% Conf.**	**Interval]**
black_1	0.0227325	0.0402377	0.56	0.572	-0.0561524	0.1016175
black_2	0.0315921	0.1855812	-0.31	0.075	-0.4211438	0.3065106
black_3	0.2909298	0.2611282	1.11	0.265	-0.2210056	0.8028653
black_4	-0.0183267	0.023115	-0.79	0.428	-0.0636432	0.0269897
Male	0.1323494	0.0172754	7.66	0	0.0984814	0.1662174
TOTDEBT	-1.34E-06	1.04E-06	-1.29	0.196	-3.38E-06	6.93E-07
Education	-0.3373133	0.0292465	-11.53	0	-0.3946504	-0.2799762
Engineering	0.1393871	0.0379447	3.67	0	0.0649976	0.2137767
health_prof	0.1577896	0.0373023	4.23	0	0.0846593	0.2309198
public_aff~s	-0.1388555	0.0483657	-2.87	0.004	-0.2336753	-0.0440357
bio_science	-0.1316683	0.0477138	-2.76	0.006	-0.22521	-0.0381266
math_science	-0.1864491	0.0387157	-4.82	0	-0.2623501	-0.110548
social_sci~e	-0.1992076	0.0321985	-6.19	0	-0.2623319	-0.1360833
History	-0.6644041	0.0519948	-12.78	0	-0.7663386	-0.5624696
Psychology	-0.2303712	0.0495768	-4.65	0	-0.3275653	-0.1331772
Humanities	-0.3183777	0.0348183	-9.14	0	-0.3866381	-0.2501172
Other	-0.165786	0.0304153	-5.45	0	-0.2254145	-0.1061575
GPACUM	0.0006937	0.0001817	3.82	0	0.0003375	0.0010499
JOBEXPR	0.0735949	0.0158954	4.63	0	0.0424323	0.1047575
Parttime	-0.5877204	0.0242019	-24.28	0	-0.6351677	-0.5402731
Inschool	-0.2448557	0.0208983	-11.72	0	-0.2858262	-0.2038851
public_sec	-0.0166803	0.0171909	-0.97	0.332	-0.0503827	0.017022
self_emp	-0.2349099	0.0925324	-2.54	0.011	-0.4163174	-0.0535024
AGEATBA	0.0109507	0.001433	7.64	0	0.0081414	0.0137601
Unemployed	-0.045885	0.0406379	-1.13	0.259	-0.1255547	0.0337847
out_force	-0.3514115	0.0557972	-6.3	0	-0.4608006	-0.2420224
Private	0.0508965	0.0210297	2.42	0.016	0.0096682	0.0921248
CB93_CARNE~E	-0.0008637	0.0004092	-2.11	0.035	-0.0016659	-0.0000616
Ratio	0.1949598	0.0544483	3.58	0	0.0882153	0.3017044
Usnews	0.0366156	0.0120435	3.04	0.002	0.0130047	0.0602266
board_sele~y	-0.0074743	0.0118401	-0.63	0.528	-0.0306865	0.0157378
_cons	9.445817	0.0707247	133.56	0	9.307163	9.584471

Table 17b. Black Model (Dummy) by Race, Impact on Blacks

Source	SS	df	MS		Number of obs =	576
Model	70.9292632	31	2.28804075		F(31, 544) =	20.73
Residual	60.0528103	544	0.110391195		Prob > F =	0
Total	130.982073	575	0.22779491		R-squared =	0.5415
					Adj R-squared =	0.5154
					Root MSE =	0.33225

Variable	**Coef.**	**Std. Err.**	**t**	**P>|t|**	**[95% Conf.**	**Interval]**
black_1	0.0746755	0.0989566	0.75	0.451	-0.1197085	0.2690594
black_2	0.0196601	0.1763816	0.11	0.911	-0.3268122	0.3661325
black_3	0.2171659	0.1246734	1.74	0.082	-0.0277343	0.4620661
black_4	-0.0529779	0.0617754	-0.86	0.391	-0.1743255	0.0683697
Male	0.1001838	0.0422782	2.37	0.018	0.0171353	0.1832323
TOTDEBT	3.28E-06	2.37E-06	1.38	0.168	-1.38E-06	7.94E-06
Education	0.1933831	0.0590073	3.28	0.001	0.0774731	0.3092932
Engineering	0.1436466	0.0840711	1.71	0.088	-0.0214971	0.3087902
health_prof	0.3643533	0.096523	3.77	0	0.1747498	0.5539567
public_aff~s	0.0555714	0.0989914	0.56	0.575	-0.1388809	0.2500236
bio_science	0.0429676	0.1229653	0.35	0.727	-0.1985774	0.2845126
math_science	0.3441348	0.0643358	5.35	0	0.2177579	0.4705118
social_sci~e	-0.0543006	0.0601258	-0.9	0.367	-0.1724079	0.0638066
History	-0.582747	0.207462	-2.81	0.005	-0.9902718	-0.1752222
Psychology	0.0517232	0.1258872	0.41	0.681	-0.1955614	0.2990078
Humanities	0.0981529	0.1074772	0.91	0.362	-0.1129682	0.309274
Other	0.1156156	0.0625058	1.85	0.065	-0.0071668	0.2383979
GPACUM	-0.0002813	0.0004578	-0.61	0.539	-0.0011806	0.0006181
JOBEXPR	0.1590097	0.0353706	4.5	0	0.08953	0.2284893
Parttime	-0.7667228	0.0557133	-13.76	0	-0.8761624	-0.6572832
Inschool	0.0295701	0.0377218	0.78	0.433	-0.0445281	0.1036683
public_sec	-0.192802	0.0434644	-4.44	0	-0.2781805	-0.1074235
self_emp	0.6442511	0.3456994	1.86	0.063	-0.0348182	1.32332
AGEATBA	0.0258029	0.0035203	7.33	0	0.0188879	0.0327179
Unemployed	-0.3335919	0.0628126	-5.31	0	-0.456977	-0.2102069
out_force	-0.506187	0.1270254	-3.98	0	-0.7557073	-0.2566667
Private	0.0763016	0.0461804	1.65	0.099	-0.014412	0.1670153
CB93_CARNE~E	-0.0003624	0.0008364	-0.43	0.665	-0.0020054	0.0012805
Ratio	0.1895836	0.1706369	1.11	0.267	-0.1456043	0.5247715
Usnews	-0.0837384	0.0322481	-2.6	0.01	-0.1470844	-0.0203924
board_sele~y	0.0651703	0.0263156	2.48	0.014	0.0134778	0.1168629
_cons	9.303371	0.1639264	56.75	0	8.981365	9.625377

Table 17c. Black Model (Dummy) by Race, Impact on Hispanics

Source	SS	df	MS		Number of obs =	193
Model	45.7043279	29	1.57601131		F(29, 163) =	4.83
Residual	53.1800055	163	0.326257702		Prob > F =	0
Total	98.8843334	192	0.51502257		R-squared =	0.4622
					Adj R-squared =	0.3665
					Root MSE =	0.57119

Variable	**Coef.**	**Std. Err.**	**t**	**P>|t|**	**[95% Conf.**	**Interval]**
black_1	-0.1329021	0.1943901	-0.68	0.495	-0.5167495	0.2509453
black_2	(dropped)					
black_3	(dropped)					
black_4	-0.0508954	0.1535003	-0.33	0.741	-0.3540009	0.25221
Male	0.0940608	0.1109445	0.85	0.398	-0.1250129	0.3131345
TOTDEBT	2.94E-06	6.99E-06	0.42	0.675	-0.0000109	0.0000167
Education	-0.0114412	0.2178883	-0.05	0.958	-0.4416889	0.4188065
Engineering	0.3382564	0.2363581	1.43	0.154	-0.1284621	0.804975
health_prof	0.3507156	0.2306792	1.52	0.13	-0.1047893	0.8062204
public_aff~s	-0.3135018	0.3182944	-0.98	0.326	-0.9420138	0.3150101
bio_science	0.2046234	0.3002678	0.68	0.497	-0.3882927	0.7975396
math_science	-0.1605947	0.2284822	-0.7	0.483	-0.6117614	0.2905719
social_sci~e	-0.1357985	0.1885948	-0.72	0.473	-0.5082023	0.2366053
History	-0.071928	0.6146633	-0.12	0.907	-1.285657	1.141801
Psychology	-0.149734	0.2902411	-0.52	0.607	-0.7228511	0.4233832
Humanities	-0.5694956	0.2066909	-2.76	0.007	-0.9776325	-0.1613586
Other	-0.284569	0.1682354	-1.69	0.093	-0.6167708	0.0476328
GPACUM	0.001586	0.0011738	1.35	0.178	-0.0007317	0.0039038
JOBEXPR	0.2745046	0.0970937	2.83	0.005	0.0827811	0.4662282
Parttime	-0.6272003	0.133395	-4.7	0	-0.8906054	-0.3637953
Inschool	-0.1554984	0.1166071	-1.33	0.184	-0.3857536	0.0747569
public_sec	-0.1237206	0.1225599	-1.01	0.314	-0.3657305	0.1182893
self_emp	0.8244176	0.6126212	1.35	0.18	-0.3852792	2.034114
AGEATBA	0.002384	0.0080955	0.29	0.769	-0.0136015	0.0183695
Unemployed	-0.7572256	0.4346292	-1.74	0.083	-1.615455	0.1010039
out_force	-0.5935201	0.2660656	-2.23	0.027	-1.1189	-0.0681404
Private	-0.0472544	0.1142087	-0.41	0.68	-0.2727737	0.178265
CB93_CARNE~E	-0.0027498	0.0021452	-1.28	0.202	-0.0069858	0.0014861
Ratio	0.2685734	0.636524	0.42	0.674	-0.9883225	1.525469
Usnews	0.2249522	0.0788765	2.85	0.005	0.0692008	0.3807036
board_sele~y	-0.1151185	0.0652497	-1.76	0.08	-0.2439622	0.0137251
_cons	9.100595	0.4624986	19.68	0	8.187333	10.01386

Table 18a. Minority Model (Dummy) by Race, White

Source	SS	Df	MS		Number of obs =	4674
Model	560.246547	31	18.0724693		F(31, 4642) =	67.4
Residual	1244.61175	4642	0.268119723		Prob > F =	0
Total	1804.8583	4673	0.38623118		R-squared =	0.3104
					Adj R-squared =	0.3058
					Root MSE =	0.5178

Variable	**Coef.**	**Std. Err.**	**t**	**P>|t|**	**[95% Conf.**	**Interval]**
min_1	0.0125209	0.0228158	0.55	0.583	-0.0322089	0.0572507
min_2	0.0414385	0.0272702	1.52	0.002	-0.0120241	0.0949012
min_3	0.089153	0.0350117	2.55	0.011	0.0205134	0.1577927
min_4	0.0994517	0.0303212	3.28	0.001	0.0400078	0.1588956
Male	0.1308846	0.0172404	7.59	0	0.0970853	0.1646839
TOTDEBT	-1.40E-06	1.04E-06	-1.34	0.179	-3.44E-06	6.41E-07
Education	-0.3331673	0.029262	-11.39	0	-0.3905347	-0.2757998
Engineering	0.1277333	0.0380209	3.36	0.001	0.0531942	0.2022724
health_prof	0.1565013	0.037256	4.2	0	0.0834619	0.2295406
public_aff~s	-0.139171	0.0483232	-2.88	0.004	-0.2339075	-0.0444345
bio_science	-0.1349631	0.0476349	-2.83	0.005	-0.2283501	-0.0415761
math_science	-0.1855512	0.0386588	-4.8	0	-0.2613409	-0.1097615
social_sci~e	-0.2004505	0.0321433	-6.24	0	-0.2634667	-0.1374343
History	-0.6534941	0.0519395	-12.58	0	-0.7553201	-0.551668
Psychology	-0.2423676	0.0495166	-4.89	0	-0.3394436	-0.1452916
Humanities	-0.3227839	0.0347549	-9.29	0	-0.3909199	-0.2546478
Other	-0.168139	0.0304152	-5.53	0	-0.2277673	-0.1085108
GPACUM	0.0006506	0.0001817	3.58	0	0.0002944	0.0010069
JOBEXPR	0.0706387	0.0158871	4.45	0	0.0394924	0.1017851
Parttime	-0.5896702	0.024193	-24.37	0	-0.6370999	-0.5422405
Inschool	-0.2479178	0.0208972	-11.86	0	-0.2888863	-0.2069494
public_sec	-0.0142292	0.0171401	-0.83	0.406	-0.0478319	0.0193735
self_emp	-0.2313974	0.0923535	-2.51	0.012	-0.4124541	-0.0503407
AGEATBA	0.0105018	0.0014342	7.32	0	0.00769	0.0133136
Unemployed	-0.0471696	0.040553	-1.16	0.245	-0.1266727	0.0323334
out_force	-0.3592299	0.05575	-6.44	0	-0.4685263	-0.2499334
Private	0.0457608	0.0211416	2.16	0.03	0.0043133	0.0872084
CB93_CARNE~E	-0.0006955	0.0004054	-1.72	0.086	-0.0014902	0.0000992
Ratio	0.1438535	0.0548599	2.62	0.009	0.036302	0.2514049
Usnews	0.0286759	0.0122597	2.34	0.019	0.0046411	0.0527106
board_sele~y	0.0020919	0.0120937	0.17	0.863	-0.0216176	0.0258013
_cons	9.438801	0.0752589	125.42	0	9.291257	9.586344

Table 18b. Minority Model (Dummy) by Race, Black

Source	SS	df	MS		Number of obs =	576
Model	71.3658633	31	2.30212462		F(31, 544) =	21.01
Residual	59.6162102	544	0.109588622		Prob > F =	0
Total	130.982073	575	0.22779491		R-squared =	0.5449
					Adj R-squared =	0.5189
					Root MSE =	0.33104

Variable	**Coef.**	**Std. Err.**	**t**	**P>|t|**	**[95% Conf.**	**Interval]**
min_1	-0.120998	0.1042471	-1.16	0.246	-0.3257742	0.0837782
min_2	-0.2129427	0.1107507	-1.92	0.055	-0.4304941	0.0046087
min_3	0.0551102	0.1168387	0.47	0.637	-0.1744	0.2846204
min_4	-0.1269945	0.1021027	-1.24	0.214	-0.3275584	0.0735694
Male	0.0746709	0.0421315	1.77	0.077	-0.0080895	0.1574314
TOTDEBT	3.67E-06	2.38E-06	1.54	0.124	-1.01E-06	8.35E-06
Education	0.186545	0.0584877	3.19	0.002	0.0716555	0.3014345
Engineering	0.1521132	0.0841194	1.81	0.071	-0.0131253	0.3173518
health_prof	0.3105968	0.0955732	3.25	0.001	0.1228591	0.4983345
public_aff~s	0.0375491	0.0985951	0.38	0.703	-0.1561246	0.2312227
bio_science	0.0359492	0.1223117	0.29	0.769	-0.2043118	0.2762102
math_science	0.3196114	0.063713	5.02	0	0.1944576	0.4447651
social_sci~e	-0.0492622	0.0601708	-0.82	0.413	-0.1674578	0.0689334
History	-0.5860293	0.2083501	-2.81	0.005	-0.9952985	-0.1767601
Psychology	0.0169339	0.1259657	0.13	0.893	-0.2305048	0.2643726
Humanities	0.097017	0.1078724	0.9	0.369	-0.1148805	0.3089145
Other	0.1010027	0.0617654	1.64	0.103	-0.0203252	0.2223306
GPACUM	-0.0003862	0.0004723	-0.82	0.414	-0.0013139	0.0005416
JOBEXPR	0.151356	0.0359065	4.22	0	0.0808237	0.2218884
Parttime	-0.7409474	0.0547857	-13.52	0	-0.8485649	-0.63333
Inschool	0.0269444	0.0376427	0.72	0.474	-0.0469984	0.1008872
public_sec	-0.2087241	0.04297	-4.86	0	-0.2931316	-0.1243166
self_emp	0.4419368	0.3506131	1.26	0.208	-0.2467845	1.130658
AGEATBA	0.0278612	0.0034692	8.03	0	0.0210465	0.034676
Unemployed	-0.3377789	0.0623756	-5.42	0	-0.4603055	-0.2152524
out_force	-0.4956669	0.1270882	-3.9	0	-0.7453106	-0.2460232
Private	0.0228125	0.0435275	0.52	0.6	-0.06269	0.108315
CB93_CARNE~E	-0.0002763	0.0008216	-0.34	0.737	-0.0018902	0.0013375
Ratio	0.135855	0.1727657	0.79	0.432	-0.2035146	0.4752247
Usnews	-0.0705529	0.0326624	-2.16	0.031	-0.1347128	-0.006393
board_sele~y	0.0553993	0.0259182	2.14	0.033	0.0044873	0.1063113
_cons	9.419505	0.2001144	47.07	0	9.026413	9.812596

Table 18c. Minority Model (Dummy) by Race, Hispanic

Source	SS	df	MS		Number of obs =	193
Model	47.2116143	31	1.5229553		F(31, 161) =	4.75
Residual	51.672719	161	0.320948565		Prob > F =	0
Total	98.8843334	192	0.51502257		R-squared =	0.4774
					Adj R-squared =	0.3768
					Root MSE =	0.56652

Variable	**Coef.**	**Std. Err.**	**t**	**P>|t|**	**[95% Conf.**	**Interval]**
min_1	-0.2605975	0.2628505	-0.99	0.323	-0.7796768	0.2584818
min_2	-0.2160535	0.2535144	-0.85	0.395	-0.7166958	0.2845889
min_3	-0.4677416	0.2727314	-1.72	0.088	-1.006334	0.0708506
min_4	-0.1277531	0.2397238	-0.53	0.595	-0.6011617	0.3456554
Male	0.1327899	0.1127839	1.18	0.241	-0.0899366	0.3555163
TOTDEBT	2.75E-06	6.96E-06	0.39	0.694	-0.000011	0.0000165
Education	-0.0351899	0.2184557	-0.16	0.872	-0.466598	0.3962182
Engineering	0.2720597	0.2367058	1.15	0.252	-0.1953888	0.7395083
health_prof	0.3253066	0.2332708	1.39	0.165	-0.1353585	0.7859716
public_aff~s	-0.2706527	0.3106003	-0.87	0.385	-0.8840287	0.3427233
bio_science	0.2608236	0.2976403	0.88	0.382	-0.3269588	0.848606
math_science	-0.1855752	0.2296383	-0.81	0.42	-0.6390668	0.2679163
social_sci~e	-0.1278853	0.1861622	-0.69	0.493	-0.49552	0.2397493
History	-0.0496653	0.6178232	-0.08	0.936	-1.269748	1.170417
Psychology	-0.1391575	0.2865137	-0.49	0.628	-0.7049671	0.4266521
Humanities	-0.597727	0.1949432	-3.07	0.003	-0.9827023	-0.2127516
Other	-0.3220741	0.164769	-1.95	0.052	-0.6474613	0.0033131
GPACUM	0.0017572	0.0011633	1.51	0.133	-0.0005401	0.0040545
JOBEXPR	0.2649219	0.0966574	2.74	0.007	0.074042	0.4558018
Parttime	-0.6502625	0.1341677	-4.85	0	-0.9152181	-0.385307
Inschool	-0.1448695	0.1155045	-1.25	0.212	-0.3729687	0.0832297
public_sec	-0.1192908	0.1228963	-0.97	0.333	-0.3619874	0.1234059
self_emp	0.8048857	0.6001014	1.34	0.182	-0.3801993	1.989971
AGEATBA	0.0031027	0.0080757	0.38	0.701	-0.0128452	0.0190507
Unemployed	-0.6099078	0.4359823	-1.4	0.164	-1.470889	0.2510737
out_force	-0.6506008	0.2668641	-2.44	0.016	-1.177606	-0.1235953
Private	-0.0637876	0.1121556	-0.57	0.57	-0.2852734	0.1576983
CB93_CARNE~E	-0.0025962	0.0021375	-1.21	0.226	-0.0068174	0.0016249
Ratio	0.042046	0.6487554	0.06	0.948	-1.239121	1.323213
Usnews	0.1529281	0.0822227	1.86	0.065	-0.0094459	0.3153021
board_sele~y	-0.1003814	0.0671099	-1.5	0.137	-0.2329105	0.0321477
_cons	9.418979	0.4917145	19.16	0	8.447937	10.39002

Table 19a. Minority Continuous by Race, Impact on Whites

Source	SS	df	MS		Number of obs =	4582
Model	548.05802	28	19.5735007		F(28, 4553) =	72.85
Residual	1223.26198	4553	0.268671642		Prob > F =	0
Total	1771.32	4581	0.386666668		R-squared =	0.3094
					Adj R-squared =	0.3052
					Root MSE =	0.51834

Variable	**Coef.**	**Std. Err.**	**t**	**P>|t|**	**[95% Conf.**	**Interval]**
Minority	0.0035408	0.000828	4.28	0	0.0019176	0.0051641
Male	0.1360336	0.0174259	7.81	0	0.1018703	0.1701969
TOTDEBT	-1.21E-06	1.05E-06	-1.15	0.251	-3.27E-06	8.53E-07
Education	-0.3349847	0.0294375	-11.38	0	-0.3926964	-0.277273
Engineering	0.125373	0.0385599	3.25	0.001	0.049777	0.2009691
health_prof	0.1564208	0.0377692	4.14	0	0.0823748	0.2304668
public_aff~s	-0.1372742	0.0487753	-2.81	0.005	-0.2328974	-0.041651
bio_science	-0.1370502	0.0480534	-2.85	0.004	-0.2312582	-0.0428421
math_science	-0.1852406	0.0390241	-4.75	0	-0.2617468	-0.1087345
social_sci~e	-0.2021464	0.0323693	-6.25	0	-0.265606	-0.1386869
History	-0.6610433	0.0521825	-12.67	0	-0.7633463	-0.5587404
Psychology	-0.2411577	0.0504739	-4.78	0	-0.340111	-0.1422044
Humanities	-0.3304214	0.035063	-9.42	0	-0.3991618	-0.2616809
Other	-0.1674813	0.0305207	-5.49	0	-0.2273167	-0.1076459
GPACUM	0.0006401	0.0001832	3.49	0	0.000281	0.0009993
JOBEXPR	0.0751405	0.0160732	4.67	0	0.0436291	0.1066518
Parttime	-0.5897494	0.0244956	-24.08	0	-0.6377727	-0.5417262
Inschool	-0.2459406	0.0210782	-11.67	0	-0.2872641	-0.2046172
public_sec	-0.0159363	0.0173604	-0.92	0.359	-0.0499711	0.0180985
self_emp	-0.2305068	0.092459	-2.49	0.013	-0.4117712	-0.0492423
AGEATBA	0.0103107	0.0014562	7.08	0	0.0074557	0.0131656
Unemployed	-0.038323	0.0408419	-0.94	0.348	-0.1183929	0.0417469
out_force	-0.3600962	0.0563996	-6.38	0	-0.4706668	-0.2495256
Private	0.0471368	0.0213238	2.21	0.027	0.0053319	0.0889417
CB93_CARNE~E	-0.0007358	0.0004126	-1.78	0.075	-0.0015447	0.0000731
Ratio	0.1653951	0.0573827	2.88	0.004	0.0528972	0.277893
Usnews	0.0270181	0.0120664	2.24	0.025	0.003362	0.0506742
board_sele~y	0.0044458	0.0123137	0.36	0.718	-0.019695	0.0285867
_cons	9.42349	0.0713209	132.13	0	9.283666	9.563313

Table 19b. Minority Continuous by Race, Impact on Blacks

Source	SS	df	MS		Number of obs =	571
Model	70.5816978	28	2.52077492		F(28, 542) =	22.9
Residual	59.6517283	542	0.110058539		Prob > F =	0
Total	130.233426	570	0.228479695		R-squared =	0.542
					Adj R-squared =	0.5183
					Root MSE =	0.33175

Variable	**Coef.**	**Std. Err.**	**t**	**P>|t|**	**[95% Conf.**	**Interval]**
Minority	-0.0014409	0.0008158	-1.77	0.078	-0.0030433	0.0001615
Male	0.0993821	0.041988	2.37	0.018	0.0169028	0.1818613
TOTDEBT	2.80E-06	2.46E-06	1.14	0.255	-2.03E-06	7.63E-06
Education	0.1791419	0.0584015	3.07	0.002	0.0644209	0.2938629
Engineering	0.1296382	0.0835446	1.55	0.121	-0.0344726	0.293749
health_prof	0.272254	0.0983628	2.77	0.006	0.0790349	0.4654731
public_aff~s	0.036764	0.0987354	0.37	0.71	-0.1571869	0.2307149
bio_science	0.0531307	0.122528	0.43	0.665	-0.1875571	0.2938186
math_science	0.3344349	0.06391	5.23	0	0.2088933	0.4599766
social_sci~e	-0.0485592	0.0601883	-0.81	0.42	-0.16679	0.0696716
History	-0.6038728	0.2071924	-2.91	0.004	-1.010871	-0.1968743
Psychology	0.0210313	0.1255657	0.17	0.867	-0.2256238	0.2676865
Humanities	0.0866998	0.1066605	0.81	0.417	-0.1228189	0.2962184
Other	0.0893449	0.0626197	1.43	0.154	-0.0336621	0.2123519
GPACUM	-0.0000973	0.0004583	-0.21	0.832	-0.0009976	0.000803
JOBEXPR	0.1603351	0.0357198	4.49	0	0.0901689	0.2305014
Parttime	-0.7657319	0.0552135	-13.87	0	-0.8741906	-0.6572732
Inschool	0.0373566	0.0378203	0.99	0.324	-0.0369356	0.1116488
public_sec	-0.1955513	0.0435085	-4.49	0	-0.2810173	-0.1100853
self_emp	0.6523018	0.3453281	1.89	0.059	-0.0260437	1.330647
AGEATBA	0.0257553	0.0035477	7.26	0	0.0187865	0.0327242
Unemployed	-0.3150527	0.0644382	-4.89	0	-0.4416318	-0.1884735
out_force	-0.503582	0.1270719	-3.96	0	-0.7531956	-0.2539683
Private	0.0527612	0.0455017	1.16	0.247	-0.0366201	0.1421425
CB93_CARNE~E	-0.0001123	0.0008337	-0.13	0.893	-0.0017499	0.0015254
Ratio	0.3071751	0.2099132	1.46	0.144	-0.105168	0.7195181
Usnews	-0.0456027	0.0338518	-1.35	0.179	-0.1120995	0.0208941
board_sele~y	0.0525496	0.0260899	2.01	0.044	0.0012998	0.1037994
_cons	9.221128	0.1616564	57.04	0	8.903578	9.538677

Table 19c. Minority Continuous by Race, Impact on Hispanics

Source	SS	df	MS		Number of obs =	184
Model	43.7736032	28	1.56334297		F(28, 155) =	4.67
Residual	51.8553056	155	0.334550359		Prob > F =	0
Total	95.6289089	183	0.522562344		R-squared =	0.4577
					Adj R-squared =	0.3598
					Root MSE =	0.5784

Variable	**Coef.**	**Std. Err.**	**t**	**P>|t|**	**[95% Conf.**	**Interval]**
Minority	0.0017095	0.0024378	0.7	0.484	-0.0031061	0.0065251
Male	0.056405	0.1146177	0.49	0.623	-0.1700093	0.2828193
TOTDEBT	5.49E-06	7.50E-06	0.73	0.465	-9.32E-06	0.0000203
Education	-0.0362716	0.2293308	-0.16	0.875	-0.4892888	0.4167456
Engineering	0.343486	0.2569739	1.34	0.183	-0.164137	0.851109
health_prof	0.3746443	0.2339424	1.6	0.111	-0.0874824	0.836771
public_aff~s	-0.3230412	0.3181053	-1.02	0.311	-0.9514223	0.3053399
bio_science	0.2365855	0.3087314	0.77	0.445	-0.3732785	0.8464495
math_science	-0.1233736	0.245499	-0.5	0.616	-0.6083292	0.3615821
social_sci~e	-0.1365142	0.1909739	-0.71	0.476	-0.5137615	0.2407332
History	0.0151043	0.6232957	0.02	0.981	-1.216146	1.246355
Psychology	-0.1705505	0.2959718	-0.58	0.565	-0.7552095	0.4141084
Humanities	-0.6504083	0.2045614	-3.18	0.002	-1.054496	-0.2463204
Other	-0.3328472	0.1740722	-1.91	0.058	-0.6767072	0.0110129
GPACUM	0.0016153	0.0012102	1.33	0.184	-0.0007752	0.0040059
JOBEXPR	0.2979996	0.1009591	2.95	0.004	0.0985663	0.4974329
Parttime	-0.6131029	0.141754	-4.33	0	-0.893122	-0.3330838
Inschool	-0.1333808	0.1231505	-1.08	0.28	-0.3766507	0.1098892
public_sec	-0.1433907	0.1281938	-1.12	0.265	-0.3966231	0.1098418
self_emp	0.9625295	0.6177294	1.56	0.121	-0.2577251	2.182784
AGEATBA	0.0046796	0.0085846	0.55	0.586	-0.0122783	0.0216375
Unemployed	-0.7499376	0.4445865	-1.69	0.094	-1.628168	0.1282928
out_force	-0.5806712	0.2705377	-2.15	0.033	-1.115088	-0.0462545
Private	-0.1154564	0.1338401	-0.86	0.39	-0.3798423	0.1489295
CB93_CARNE~E	-0.0025218	0.0024116	-1.05	0.297	-0.0072856	0.0022421
Ratio	0.1936741	1.520508	0.13	0.899	-2.809918	3.197266
Usnews	0.1787648	0.0849176	2.11	0.037	0.0110196	0.3465099
board_sele~y	-0.1139799	0.0714968	-1.59	0.113	-0.2552138	0.027254
_cons	9.121595	0.4741634	19.24	0	8.184938	10.05825

Table 20a. Quadratic Minority Model, Impact by Race, Whites

Source	SS	df	MS		Number of obs =	4582
Model	548.058274	29	18.8985612		F(29, 4552) =	70.33
Residual	1223.26173	4552	0.268730609		Prob > F =	0
Total	1771.32	4581	0.386666668		R-squared =	0.3094
					Adj R-squared =	0.305
					Root MSE =	0.51839

Variable	**Coef.**	**Std. Err.**	**t**	**P>|t|**	**[95% Conf.**	**Interval]**
Minority	0.0034825	0.00207	1.68	0.093	-0.0005757	0.0075406
min2	1.19E-06	0.0000386	0.03	0.975	-0.0000746	0.0000769
Male	0.1360152	0.0174381	7.8	0	0.1018282	0.1702023
TOTDEBT	-1.21E-06	1.05E-06	-1.15	0.251	-3.27E-06	8.53E-07
education	-0.3350153	0.0294575	-11.37	0	-0.3927664	-0.2772643
engineering	0.1253838	0.0385657	3.25	0.001	0.0497763	0.2009912
health_prof	0.156395	0.0377827	4.14	0	0.0823227	0.2304674
public_aff~s	-0.1373337	0.0488189	-2.81	0.005	-0.2330423	-0.041625
bio_science	-0.1370613	0.0480601	-2.85	0.004	-0.2312823	-0.0428403
math_science	-0.1852408	0.0390284	-4.75	0	-0.2617553	-0.1087262
social_sci~e	-0.2021496	0.032373	-6.24	0	-0.2656165	-0.1386828
History	-0.661108	0.0522304	-12.66	0	-0.763505	-0.558711
psychology	-0.2411904	0.0504906	-4.78	0	-0.3401765	-0.1422044
humanities	-0.3304231	0.0350669	-9.42	0	-0.3991712	-0.261675
Other	-0.167506	0.0305346	-5.49	0	-0.2273686	-0.1076434
GPACUM	0.00064	0.0001833	3.49	0	0.0002806	0.0009994
JOBEXPR	0.0751536	0.0160807	4.67	0	0.0436277	0.1066796
Parttime	-0.5897447	0.0244988	-24.07	0	-0.6377742	-0.5417152
Inschool	-0.2459118	0.0211013	-11.65	0	-0.2872806	-0.2045431
public_sec	-0.0159433	0.0173638	-0.92	0.359	-0.0499848	0.0180981
self_emp	-0.2305375	0.0924745	-2.49	0.013	-0.4118325	-0.0492426
AGEATBA	0.0103109	0.0014564	7.08	0	0.0074556	0.0131662
unemployed	-0.0383111	0.0408482	-0.94	0.348	-0.1183934	0.0417712
out_force	-0.3600591	0.0564187	-6.38	0	-0.4706671	-0.249451
Private	0.0471722	0.0213572	2.21	0.027	0.0053017	0.0890428
CB93_CARNE~E	-0.0007377	0.0004172	-1.77	0.077	-0.0015556	0.0000801
Ratio	0.1655603	0.0576394	2.87	0.004	0.0525591	0.2785615
Usnews	0.0270123	0.0120692	2.24	0.025	0.0033507	0.0506739
board_sele~y	0.0044076	0.0123775	0.36	0.722	-0.0198583	0.0286735
_cons	9.424181	0.0747793	126.03	0	9.277577	9.570784

Table 20b. Quadratic Models, Impact by Race, Blacks

Source	SS	df	MS		Number of obs =	571
Model	70.7212082	29	2.43866235		F(29, 541) =	22.17
Residual	59.5122179	541	0.1100041		Prob > F =	0
Total	130.233426	570	0.228479695		R-squared =	0.543
					Adj R-squared =	0.5185
					Root MSE =	0.33167

Variable	**Coef.**	**Std. Err.**	**t**	**P>|t|**	**[95% Conf.**	**Interval]**
Minority	0.0025134	0.0036048	0.7	0.486	-0.0045677	0.0095945
min2	-0.0000369	0.0000327	-1.13	0.261	-0.0001011	0.0000274
Male	0.1011499	0.042007	2.41	0.016	0.0186331	0.1836667
TOTDEBT	2.21E-06	2.51E-06	0.88	0.38	-2.73E-06	7.14E-06
education	0.1839806	0.0585449	3.14	0.002	0.0689773	0.2989839
engineering	0.1382083	0.0838699	1.65	0.1	-0.0265422	0.3029589
health_prof	0.2712323	0.0983427	2.76	0.006	0.0780519	0.4644126
public_aff~s	0.0300036	0.0988933	0.3	0.762	-0.1642584	0.2242656
bio_science	0.0559946	0.122524	0.46	0.648	-0.1846866	0.2966758
math_science	0.3382608	0.0639844	5.29	0	0.2125724	0.4639492
social_sci~e	-0.0480557	0.060175	-0.8	0.425	-0.1662611	0.0701496
History	-0.6045972	0.2071421	-2.92	0.004	-1.011499	-0.1976957
psychology	0.0215531	0.1255355	0.17	0.864	-0.2250437	0.26815
humanities	0.0809784	0.1067551	0.76	0.448	-0.1287269	0.2906837
Other	0.09196	0.0626472	1.47	0.143	-0.0311017	0.2150216
GPACUM	-0.0002113	0.0004693	-0.45	0.653	-0.0011331	0.0007105
JOBEXPR	0.1654657	0.0360004	4.6	0	0.094748	0.2361834
Parttime	-0.7666528	0.0552059	-13.89	0	-0.875097	-0.6582086
Inschool	0.0405834	0.0379193	1.07	0.285	-0.0339037	0.1150706
public_sec	-0.1889145	0.0438952	-4.3	0	-0.2751404	-0.1026887
self_emp	0.6319903	0.3457135	1.83	0.068	-0.047115	1.311096
AGEATBA	0.0249808	0.0036129	6.91	0	0.0178839	0.0320778
unemployed	-0.3084665	0.0646871	-4.77	0	-0.4355352	-0.1813977
out_force	-0.5152416	0.1274616	-4.04	0	-0.7656219	-0.2648613
Private	0.0679475	0.0474471	1.43	0.153	-0.0252556	0.1611506
CB93_CARNE~E	-0.0003033	0.0008505	-0.36	0.722	-0.001974	0.0013675
Ratio	0.2784049	0.2114105	1.32	0.188	-0.1368811	0.693691
Usnews	-0.0468041	0.0338602	-1.38	0.167	-0.1133178	0.0197095
board_sele~y	0.0573841	0.0264344	2.17	0.03	0.0054575	0.1093107
_cons	9.217829	0.1616429	57.03	0	8.900305	9.535354

Table 20c. Minority Quadratic Model, Impact by Race, Hispanic

Source	SS	df	MS		Number of obs =	184
Model	43.7834089	29	1.50977272		F(29, 154) =	4.48
Residual	51.8455	154	0.336659091		Prob > F =	0
Total	95.6289089	183	0.522562344		R-squared =	0.4578
					Adj R-squared =	0.3558
					Root MSE =	0.58022

Variable	**Coef.**	**Std. Err.**	**t**	**P>|t|**	**[95% Conf.**	**Interval]**
Minority	0.0032878	0.009566	0.34	0.732	-0.0156096	0.0221853
min2	-0.0000167	0.0000977	-0.17	0.865	-0.0002096	0.0001763
Male	0.0575857	0.1151863	0.5	0.618	-0.1699635	0.2851348
TOTDEBT	5.44E-06	7.52E-06	0.72	0.471	-9.43E-06	0.0000203
education	-0.0319553	0.2314385	-0.14	0.89	-0.4891593	0.4252487
engineering	0.3522499	0.2628476	1.34	0.182	-0.1670024	0.8715022
health_prof	0.3773341	0.2352071	1.6	0.111	-0.0873148	0.8419829
public_aff~s	-0.3166159	0.3213196	-0.99	0.326	-0.9513788	0.3181471
bio_science	0.2381795	0.3098436	0.77	0.443	-0.3739129	0.8502719
math_science	-0.1147647	0.2513846	-0.46	0.649	-0.6113719	0.3818425
social_sci~e	-0.1300706	0.1952598	-0.67	0.506	-0.5158041	0.2556628
History	0.0221468	0.6266172	0.04	0.972	-1.215728	1.260022
psychology	-0.1674612	0.2974545	-0.56	0.574	-0.7550789	0.4201565
humanities	-0.6404107	0.2134029	-3	0.003	-1.061986	-0.2188358
Other	-0.3298693	0.1754896	-1.88	0.062	-0.6765468	0.0168083
GPACUM	0.0016427	0.0012245	1.34	0.182	-0.0007764	0.0040618
JOBEXPR	0.3002901	0.1021622	2.94	0.004	0.09847	0.5021103
Parttime	-0.6048032	0.1502862	-4.02	0	-0.9016917	-0.3079147
Inschool	-0.1364413	0.1248329	-1.09	0.276	-0.3830472	0.1101645
public_sec	-0.1439195	0.1286345	-1.12	0.265	-0.3980355	0.1101965
self_emp	0.9498684	0.6240982	1.52	0.13	-0.2830301	2.182767
AGEATBA	0.00425	0.0089719	0.47	0.636	-0.0134739	0.021974
unemployed	-0.7468756	0.4463461	-1.67	0.096	-1.628627	0.1348758
out_force	-0.5810444	0.2713978	-2.14	0.034	-1.117188	-0.0449013
Private	-0.108881	0.1396799	-0.78	0.437	-0.384817	0.167055
CB93_CARNE~E	-0.0025003	0.0024225	-1.03	0.304	-0.0072859	0.0022852
Ratio	0.1572089	1.540185	0.1	0.919	-2.885409	3.199827
Usnews	0.177732	0.0853995	2.08	0.039	0.0090263	0.3464377
board_sele~y	-0.1084818	0.0786251	-1.38	0.17	-0.2638047	0.0468412
_cons	9.084477	0.5230199	17.37	0	8.051257	10.1177