

AFFIRMATIVE ACTION AND MISMATCH AT SELECTIVE POSTSECONDARY
INSTITUTIONS

by

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DEDICATION

To Mom and Dad.

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LIST OF ABBREVIATIONS

Standard Aptitude Test	SAT
High School Grade Point Average.....	GPA
American Federation of Labor and Congress of Industrial Organizations	AFL-CIO
Temporary Assistance for Needy Families.....	TANF
Historically Black Colleges and Universities	HBCU
Law School Admission Test.....	LSAT
Undergraduate Grade Point Average	UGPA
Predicted First-Year Average	PFYA
University of Michigan College of Literature, Science, and the Arts	LSA
American College Test	ACT
Socioeconomic Status	SES
Beginning Postsecondary Students Longitudinal Survey.....	BPS
Academic Index	AI
National Postsecondary Student Aid Study	NPSAS
Most Selective Institution	SEL-1
Moderately Selective Institution.....	SEL-2
Minimally Selective Institution.....	SEL-3
College and Beyond Database	C&B
Expected Family Contribution.....	EFC
Texas Agricultural and Mechanical University	Texas A&M
University of California	UC
Federal Supplemental Educational Opportunity Grant.....	FSEOG
Higher Education Act of 1965	HEA
Full-Time Equivalent Enrollment.....	FTE
Science, Technology, Engineering, and Mathematics Education.....	STEM

ABSTRACT

AFFIRMATIVE ACTION AND MISMATCH AT SELECTIVE POSTSECONDARY INSTITUTIONS

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This dissertation assesses the extent to which affirmative action as well as enrolling in a college that matches academic ability – college matching – influence six-year graduation rates for students who started college in the 2003-04 academic year. The Beginning Postsecondary Students Longitudinal Survey (BPS) was used to estimate the number of students admitted by affirmative action and explore how matching student aptitude with institutional selectivity relates to degree completion. This study reports a negative effect on degree completion for affirmative action students and for highly qualified students who attended a less selective college.

INTRODUCTION

Affirmative action at selective colleges and universities has been discussed and debated by academics, legislators, and policy experts for decades. The phrase “affirmative action” was coined to describe policy from the Kennedy and Johnson administrations that was enacted in order to remedy past systematic economic and educational exclusion through measured and visible (that is, *affirmative*) means of incorporating blacks into the labor and education markets in larger numbers. Legislators found affirmative action to be an appropriate tool to overcome imperfect information between available candidates and hiring or admissions committees. By selecting more black participants, employers and educators would find blacks to be as qualified as whites and, over time, eliminate institutional racism (Holzer and Neumark 2000).

Although ample research has investigated the role affirmative action plays in college admissions, enrollment, persistence, and completion, there is no constant definition or application of affirmative action. As the concept of affirmative action is arbitrary, it is often misconstrued, leading to miscommunications about intentions and outcomes (Reyna et al. 2005; Burns and Schapper 2008). These misperceptions are problematic as affirmative action can be defined, constructed, and implemented by ideology.

Proponents of race-based interventions claim that without such programs, economic and social advancement for minorities would be difficult at best, as institutions would be reluctant to admit students with unknown qualifications and characteristics (Bergmann 1994; Kane 1999; Bowen & Bok 1998). Moreover, supporters of affirmative action report that minority students who enroll at prestigious schools enjoy comparable graduation and job placement benefits as their white peers.

Critics of affirmative action view the policy as an inefficiency in the postsecondary education market that denies high achieving students entry into selective institutions in favor of students with less impressive qualifications (Jencks 1993; Sander and Taylor 2012). Affirmative action challengers assert that the prime flaw with race-based policies is that selective colleges admit students with low scholastic aptitude.

Affirmative action policy has many inputs, making implementation and evaluation complex undertakings. Affirmative action originated from legislative actions like Executive Orders and the Civil Rights Act of 1964 yet it has also been adopted by postsecondary education. The courts have been prime in shaping affirmative action, though policy often cannot be applied due to court involvement. Social science research has been tasked with presenting findings on what affirmative action does and what it means. To wit, the courts have relied upon research to inform prominent decisions. All of these different forces are involved in creating, sustaining, and modifying affirmative action policies.

Higher education completion has become central to sociopolitical mobility and informs affirmative action policy. As a result, research seeks to discern the various

factors that predict college graduation. The education and economic disparities that exists in the public and private sectors also occur in the university system, influencing the access, persistence, and completion rates for underrepresented groups.

An emerging body of literature on the processes of affirmative action and college matching examines the ways in which high school graduates of varying aptitudes sort into colleges of different selectivity tiers. Matching theory assesses the extent to which students enroll at a campus with a selectivity level that reflects their own academic qualifications. As potential college entrants can apply to and, if admitted, enroll in a wide variety of universities, student enrollment choices may impact postsecondary outcomes. Affirmative action opponents cite performance gaps between blacks and whites in standardized test scores and in high school grades as evidence that graduates admitted into elite colleges due to race are unable to persist and complete at universities at selectivity levels far above the students' demonstrated ability ("overmatch"), exacerbating economic and scholastic mobility between blacks and whites. Rather than awarding a preferential boost into a more selective university, it is hypothesized that the mismatched students would have better postsecondary performance outcomes if they enrolled at an institution with a selectivity level that matched their skills (Sander 2004; Fischer and Massey 2007; Hoxby 2004).

Conversely, academically talented students often leave college without obtaining a degree because they enrolled in postsecondary institutions for which they were "undermatched" or overqualified (Bowen et al. 2009; Roderick et al. 2011). These

findings reveal a significant policy challenge for affirmative action, as undermatched students are more likely to be underrepresented minorities.

The purpose of this study is to define affirmative action, estimate how many affirmative action students are admitted into elite colleges and universities, and assess the extent to which affirmative action and college match affect six-year graduation rates at selective postsecondary institutions across racial groups for first-time enrollees in the 2003-2004 academic year. This study differs from prior research because I do not define affirmative action as a percentage of minority enrollment at selective institutions. I define affirmative action as student admission into a selective college or university whose academic qualifications (SAT and GPA) are substantially below the average for that institution. This approach is used because qualifications can be applied across all races for a robust analysis of how much academic ability impacts minorities and non-minorities at all levels of institutional selectivity. If affirmative action assesses aptitude, it is conceivable that students of each racial group – including whites and Asians, groups not often associated with race-based policies – were admitted into selective institutions despite being underqualified.

I will also evaluate the relationship between mismatch and graduation rates for each race. I will investigate the extent to which students with low academic qualifications are overrepresented at top tier schools. Overrepresentation would suggest that admission into elite colleges for reasons other than traditional academic criteria is present for these enrollees. In addition, I will examine if overmatched students fare better at schools that surpass their academic capabilities. I will also assess the predicted graduation rates for

highly qualified students of all races who attend less selective institutions, in accordance with prior research that cautions against undermatching for minority students.

The rest of this study is presented in the following manner: Section 2 describes the rise of affirmative action in the labor and higher education markets, reviews the academic and legislative literature related to affirmative action, and introduces college matching theories. Section 3 conceptualizes models of affirmative action and college match at selective postsecondary institutions. Section 4 contains the data and methodology used to test the affirmative action and college match models. Section 5 provides estimates of the number of students admitted by affirmative action at selective colleges and universities along with an examination of the degree to which matching student aptitude with institutional selectivity affects six-year degree completion rates from 2003-2009. Section 6 discusses the importance of defining affirmative action and developing policies that benefit intended target populations and concludes this study.

THE LITERATURE ON AFFIRMATIVE ACTION

The literature on affirmative action is expansive. I will approach the literature in four sections. First, I will begin with an evaluation of how affirmative action came about in the labor sector, and, by extension, the postsecondary education market. Second, I will examine the role that higher education plays in social and economic mobility. Third, I will provide an analysis of the legal response to affirmative action implementation in higher education. To conclude, I will present the social science work on affirmative action and college matching, an emerging body of literature related to affirmative action research. These works examine theories associated with college choice as well as the extent to which enrolling in a university that reflects one's own qualifications impacts higher education completion.

Affirmative Action Legislative History

In developing an exceptional democracy, the United States has embraced five attributes: social egalitarianism, liberty, laissez-faire, populism, and individual merit. Personal achievement and upward mobility, linked with the common assumption that all citizens have equal access to resources and opportunities are the foundation of the American Creed. Nonetheless, throughout the history of the republic, the treatment of blacks has been the principal discrepancy in American ideology (Lipset 1995). From the 1600s until the mid-1860s, blacks were slaves. For the next hundred years, black people

were denied access to employment and education through both explicit and implicit Jim Crow policies. When blacks were able to secure employment in established mainstream businesses, they were often funneled into low-paying, short-term jobs that awarded promotion based on strict seniority classifications, disqualifying black employees from the opportunity to advance within this employment system (Shaw 1988). Myrdal (1962) posits that white people across the nation believe in the American Creed, though their prejudice is contradictory, as blacks have not enjoyed the social egalitarianism, liberty, and the freedom to be evaluated by individual characteristics that have been afforded to whites.

Engberg (2004) asserts that racism stems from intergroup bias, a systematic tendency to evaluate one's own membership group more favorably than out-groups and their members. Allport (1954) notes in *The Nature of Prejudice* that it is difficult to pinpoint the cause of discrimination since it may be inspired by many factors including but not limited to fear, aggression, economic exploitation, and social norms. Allport surmises that prejudice, "a product of fears of the imagination" (p. xv), is rooted in the ego and serves the psychological need for social acceptance through value expression. While one could prefer egalitarianism and equality for all members of society, it is easier to satisfy the ego by upholding the prevailing cultural system.

Historically, black people have been assessed by group traits such as race and ethnicity in order to appraise both individual and group qualities and abilities. To contrast, whites have been evaluated based on individual characteristics and performance. White, able-bodied men of means were seen as the "benchmark men" – the standard to

which all other members of society were held (Thornton 2001). The historical omission of blacks and other groups from compensated labor, powerful judicial appointments, and academe implied that the position or perspective of the benchmark men was considered to be universal since it was the dominant, if not only, standpoint. Myrdal (1962) suggested that if blacks would demand and defend equal rights and protection for themselves, whites would realize racial inequity violates the Creed and end discrimination. To some extent, the educational, economic, and political gains from the civil rights movement proved Myrdal prophetic.

In the 1950s, the inferior socioeconomic conditions for blacks gained political appeal from a broad coalition of business elites and bipartisan legislators (Chen 2009; Jencks 1993). Stakeholders pushed to counterbalance the legacy of systemic discrimination against blacks in political, financial, and scholarly institutions. From the 1960s onward, lawmakers have sought policy solutions at the group level to remedy the economic and education gap between blacks and whites. These efforts have been named affirmative action. The term has had many meanings, but it generally refers to group-level initiatives used to increase participation from underrepresented minorities in the labor market and in postsecondary education.

The phrase affirmative action was first used to describe Executive Order 11246¹ from the Johnson administration that instructed government contractors to remedy past systematic economic exclusion by incorporating larger numbers of blacks into the labor force. The purpose of the policy was to equalize employment opportunities for the

¹ Executive Order 11246 is a follow-up to the 1953 Executive Order 10479 signed by President Eisenhower, which created the anti-discrimination Committee on Government Contracts. EO 10479 was an extension of the 1941 Executive Order 8802, issued by President Roosevelt.

formerly segregated blacks by considering the very characteristics that were used to prohibit them from competing for jobs in the mainstream or traditional labor force (Duncan 1982; Shaw 1988).

Legislators found affirmative action to be an appropriate method to overcome imperfect information between employers and employees. By hiring more black workers, employers would find blacks to be as qualified as whites and, over time, eradicate institutional racism (Holzer and Neumark 2000). Ezorsky (1991) categorizes this notion of affirmative action as a type of “corrective justice” that may diminish or even eliminate current and future discrimination through employing blacks in visible and power professional settings. Affirmative action was designed to equalize promotion opportunities and promote egalitarianism in a wide range of sectors (Weisskopf 2004). Nonetheless, early affirmative action policies did not produce a rapid increase in black workers in the labor force due to the voluntary nature of program implementation.

Quotas were introduced by the Nixon administration in 1969 to further boost black participation in the workforce. The targeted hiring tactic required an established number of black employees, ensuring employers obeyed the law. Still, critics argued that the anti-discrimination protections in Title VII of the 1964 Civil Rights Act explicitly outlawed quotas, as the likelihood of being hired would be strongly related to race (Jencks 1993). Affirmative action skeptics viewed the Philadelphia Plan, the commonly known description of Nixon’s quota initiatives, as depriving individuals – white men in particular – of a potential benefit or opportunity in order to enhance black prosperity (Shaw 1988). To be sure, quota opponents were concerned that hiring patterns for

desirable open positions would shift away from better-qualified white men in favor of unqualified or underqualified black workers (Agocs and Burr 1996). Affirmative action challengers predicted quotas would displace qualified white workers, creating production inefficiencies and inciting deeper intergroup biases that could lead to social unrest (Wilson 1987; Wilkinson III 1979; Holzer and Neumark 2000). Indeed, American Federation of Labor and Congress of Industrial Organizations (AFL-CIO) polling data from 1973 reported that white, blue-collar union members throughout the Philadelphia metropolitan area feared that quotas would instigate social changes that would cost them employment and income security (Lipset 1995).

After several decades of middling success in integrating more black workers into the traditional labor force and eliminating intergroup bias, the Clinton Administration opened an inquiry on race-based policy initiatives. In 1995, the Clinton administration ordered investigators to review federal affirmative action policy. The commission found that no clear definition for affirmative action exists, leading to misperceptions about intentions and outcomes (Swain 2001). These miscommunications are problematic as affirmative action can be defined, constructed, and implemented based on ideology (Reyna et al. 2005; Burns and Schapper 2008). For example, the Federal Reviewers defined affirmative action as considering previously excluded groups – women and minorities – in decision-making or resource allocation (Swain 2001; Smelser 2001; Crosby 2004). Some scholars classify affirmative action as considering previously excluded groups – women and minorities – in decision-making or resource allocation in order to increase representation from these underrepresented groups (Swain 2001; Sterba

2004; Kurlaender and Grodsky 2013; Card and Krueger 2005). Fryer and Loury (2005) describes affirmative action as a “shift in demand for the services of persons at various skills levels in affected groups” and can include the private, public, and higher education sectors (p. 153; p. 158). Other researchers have positioned race-based initiatives as a range of government and industry programs that offer preferential treatment to members of specific groups thought to be disadvantaged because of past and present discrimination at the expense of both in-group (those who have not experienced discrimination) and out-group (those who experienced discrimination) members (Sander 2004; Michaels 2006; McHarg and Nicolson 2006; Menache and Kleiner 1999).

Affirmative action champions claim that blacks are entitled to rights at the group level as a way of reconciling past injury at the group level. They also claim that these group treatments are legally and constitutionally salient because the 14th Amendment and other antidiscrimination laws like the Civil Rights Act of 1964 and other equal opportunity provisions attempt to prevent socioeconomic segregation based on race (Wilson 1987). Challengers to race-based initiatives derive their belief from the political standpoint that suggests that rights belong to individuals; groups have no inherent entitlements, asserting that individual rights are “no greater than the composite rights of the group members” (Brest and Oshige 1995, p. 861). Affirmative action opponents believe their argument is correct because they think the dominant political discourse, constitutional traditions, and laws reflect a culture of individualism rather than collectivism or egalitarianism.

The Voting Rights Act, Fair Employment Act, Aid to Families with Dependent Children, and Head Start are among many programs that were created to provide additional economic opportunities for the poorest members of society. The intent of these initiatives was to provide access to integrated and well-financed training for minorities and the poor so that they would acquire the knowledge and skills needed to be attractive candidates for employment (Chambers et al. 2005; Lipset 1995). Nevertheless, these efforts have not always produced the intended results. Both federal and state policies for program implementation vary. Moreover, the scope of most programs is not long-term. Many programs provide short-term avenues for upward mobility such as job searches, vocational training for one year or less, or employment that may be subsidized or unsubsidized (London 2006). Additionally, some Federal policies restrict over-investment in tertiary education enrollment as a pathway for upward mobility. Mazzeo et al. (2003) assert that the Temporary Assistance for Needy Families (TANF) has seen its recipients experience a decline in postsecondary enrollment. TANF recipients are required to work 30 hours per week; however, vocational training can only be applied for 12 months and can only count for 30% of the workload. Employment, not education, is the guiding focus of these programs as a pathway to upward socioeconomic mobility.

The Role of Higher Education in Social Mobility

In the United States, postsecondary education is fundamental to social and economic mobility. Responding to the increase in skilled labor, employment growth rates for the high-skilled sector have risen steadily since the 1980s while middle and low-skilled jobs have experienced declines. Beginning in the 1990s, the total share of

employment rose for those with the loftiest and lowest qualifications yet continued to fall for middle-skilled employees. Economists argue that technological advances coupled with increased demand for higher education participation have created this occupational structure². Computerization is an effective substitute for routine tasks and complements workers who perform nuanced problem solving. While technology has had little effect on low-skilled manual and service jobs, computing power has been rendering complex but repetitive middle-skilled work obsolete (Brink 2013). Occupational upskilling sends the market signal that having expertise is of high economic and human capital value. To date, the best way for employers to determine if potential employees have the requisite proficiency or expertise is through postsecondary education.

As a result, college completion has been a prime wage determinant. The current postindustrial economy rewards college graduates with high skills. In 1967, about half of all high school dropouts were in the bottom tier of the income distribution. Today, that figure is above 60%. To contrast, 86% of college graduates are in the top income tiers; this percentage has remained steady since 1967 (Kahlenberg 2010).

In 1965, President Lyndon Johnson signed the Higher Education Act (HEA) as part of the Great Society policy initiative. The purpose of this law was to provide additional educational and financial access and resources³ to America's postsecondary institutions and its students. In the proceeding decades since the passage of the HEA, tertiary enrollment has seen substantial increases. Full-time equivalent (FTE)

² It is important to note that most literature has not documented long-term changes in the labor market for those with the best qualifications since the Great Recession.

³ The financial aspect of the HEA is detailed in Title IV.

undergraduate enrollment rose from approximately 6 million in 1971-1972 to the current⁴ 14 million (Baum and Payea 2012; Dynarski and Scott-Clayton 2013).

Since the higher education system is also a mass system (Thelin 2004), affirmative action has been included in admission and enrollment decisions in postsecondary education. Program enactment has been problematic because like in the labor sector, affirmative action programs and their implementation are often based on ideological preferences. Though the institution may not be a proven discriminator, the institution may feel that laws or policies are unjustly applied to them. Brest and Oshige (1995) note that to benefit from these programs, eligibility is based on being a member of a group that has previously experienced injustice, not based on individual or personal racial or discriminatory injury. This type of “distributive justice” is indifferent to how the diminutive status came to be, whether it is from happenstance or blatant or outright systematic or institutional discrimination (Grozsky 1991). Nonetheless, affirmative action opponents often note that the educational and occupational burden is on the displaced white candidates, those who would have been accepted if not for this policy. While legislation has played an integral role in establishing race-based programs, State and Federal courts have shaped the trajectory of affirmative action policy in not only the labor sector but also in primary, secondary, and higher education. Much of the scholarship regarding affirmative action draws upon Court analysis.

⁴ This enrollment figure is contested. Baum and Payea estimate total undergraduate enrollment to be approximately 25.5 million whereas Dynarski and Scott-Clayton put this figure at 14.2 million. It is most likely that Dynarski and Scott-Clayton are estimating the enrollment numbers of four-year postsecondary students while Baum and Payea are accounting for undergraduates at both two-year and four-year colleges and universities. Since the focus of this analysis is on four-year institutions, I have used the approximation provided in Dynarski and Scott-Clayton.

Legal Response to Affirmative Action in Higher Education

The courts have been integral in molding affirmative action initiatives in primary, secondary, and tertiary education. In 1950, the Supreme Court ruled in *Sweatt v. Painter* that the state of Texas could not prohibit blacks from attending the white-only University of Texas Law School, challenging the “separate but equal” clause set forth in the *Plessy v. Ferguson* judgment of 1896. Establishing a black-only law school as well as excluding blacks from the flagship State university violated the equal protection provisions in the Fourteenth Amendment (Long 2007). The landmark 1954 *Brown v. Board of Education* decision ended the legal segregation of primary and secondary public schools set forth in *Plessy v. Ferguson*.

The ratification of the Civil Rights Act of 1964 allowed blacks new access to a desegregated higher education system. Nevertheless, postsecondary admissions and enrollments for minorities were sparse outside of the Historically Black Colleges and Universities (HBCU), as they were designed to be separate but equal alternative to traditional colleges and universities. In the late 1960s, elite colleges and universities developed affirmative action programs to lift black and, to some extent, Hispanic enrollment rates. The acceleration of these initiatives waned during the following decade as white students rejected from selective institutions identified affirmative action as the culprit.

DeFunis v. Odegaard (1974) was the first case to reach the Supreme Court that challenged the use of race-based admissions in higher education. Plaintiff Marco DeFunis was twice denied admission into the University of Washington Law School. To be considered for one of the 150 available spots for incoming students, administrators used a

combination of the Law School Admission Test (LSAT) and undergraduate grade point average (UGPA) to construct an index that predicts, for first-year admits, the likelihood of making the grades necessary for first-year matriculation and program completion. The highest average recorded was 81. Over 90% of students with a predicted first year average (PFYA) above 77 were admitted. Conversely, nearly all students with a PFYA below 74.5 were rejected. DeFunis received a 76.23. Of the thirty-seven minorities accepted to the program, all but one had a lower PFYA than DeFunis, and three scored below the typical cutoff point of 74.5. DeFunis petitioned the trial court to admit him to the entering class of 1971. The court ruled in his favor, and he enrolled that fall. The University of Washington appealed; the State Supreme Court reversed the lower court's decision in 1972, upholding the University's affirmative action policy. At this time, DeFunis was enrolled in his second year of law school. By the time the case reached the Supreme Court in 1974, DeFunis was within a few months of degree completion. The Court rendered the case moot for two reasons. One, the University of Washington Law School could not deny him graduation, as he was academically qualified to graduate. Two, the question could not be reviewed since DeFunis would not experience this situation again; future plaintiffs should receive full review of their complaint. Foreshadowing future obstacles for affirmative action, Justice Douglas, opposing the moot decision, declared that even "benign" racial treatment was unconstitutional; all people should be assessed individually, not as a group (Wilkinson 1979).

Four years later, *Regents of the University of California v. Bakke* (1978) provided a pivotal yet inconclusive decision about the ways in which universities can apply race to

achieve diversity. The University of California at Davis Medical School allotted 16 of the 100 available enrollment slots solely for ethnic minorities. The plaintiff, Alan Bakke, sued the University of California (UC) system after being denied a spot to both the 1973 and 1974 incoming cohorts, citing violation of the Equal Protection Clause in the Fourteenth Amendment. In the plurality opinion, the Court struck down the Department's admission process. Four justices stated that setting aside a specific number of seats for minority students was a quota, violating Title VII of the 1964 Civil Rights Act⁵. Another four justices⁶ ruled that Title VII permitted the use of race-based considerations for admitting formerly excluded minorities. Writing the plurality judgment, Justice Powell found that eliminating students from the admissions process because of race was unconstitutional; however, race could be used as one of many factors in an admissions decision as diversity was a compelling state interest.

In the *Hopwood v. Texas* decision, the Fifth Circuit stated that treating past and current discrimination is the only justification for affirmative action; diversity is not a sufficient reason for using these policies. The Supreme Court refused to hear the case as the case was not within its jurisdiction⁷. Per the judgment in *Hopwood*, the state of Texas eliminated race-based recruitment, admissions, and financial aid at both public and private colleges and universities (Long 2007; Helms 1999). After these restrictions were implemented in 1997⁸, the public flagship institutions experienced steep drops in black

⁵ Justices Stevens, Stewart, Rehnquist, and Chief Justice Burger derived this conclusion. For more information, see *Regents of the University of California v. Bakke*, 438 U.S. 265, (1978).

⁶ Justices Brennan, White, Marshall, and Blackmun supported the notion that race should be used as a criterion for higher education admissions. For details, see *Regents of the University of California v. Bakke*, 438 U.S. 265, (1978).

⁷ In 2013, the Supreme Court came to a similar conclusion in *Fisher v. Texas*.

⁸ Texas A&M began dismantling affirmative action in 1996 as *Hopwood* was being decided. See Card and Krueger (2007) for more details.

and Hispanic enrollment. At the University of Texas, black and Hispanic enrollment rates fell 5 and 7 percentage points, respectively, as compared to non-minority white and Asian student enrollment rates from 1995 to 1997. Rates fell another 4 percentage points for black students and 5 percentage points for Hispanic undergraduates from 1997-2001. Between 1995 and 1997, Texas Agricultural and Mechanical University (Texas A&M) experienced a 33% decline in the proportion of minority-identified entering freshmen (Card and Krueger 2007). To combat declining black and Hispanic admissions and enrollment, the state of Texas created a policy that guaranteed entry to any in-state public institution for high school students who graduate in the top 10 percent of their class. The point of the plan was to counteract segregated high schools by enrolling a proportional representation of all races at flagship colleges and universities.

Since no Court had invalidated race-based admissions, academically selective institutions continued to seek policies that would boost diversity while providing an adequate remedy for the disenfranchised; however, beginning in the 1990s, state governments across the country enacted policies that ruled affirmative action unconstitutional.

In 1995, the University of California (UC) Board of Regents enacted SP-1, a resolution that ended racial consideration in university admissions. The following year, voters passed the California Civil Rights Initiative (Proposition 209), banning the use of sex, race, national origin, and ethnicity in employment and university enrollment considerations (Long 2007). Minority admissions rates dropped from 45-55% in 1995-1997 to just 20-25% from 1998-2001 at the most selective University of California

schools (Card and Krueger 2007)⁹. Modeling the University of Texas program, in 1999, the Board of Regents approved a program that offered admission to high school students who graduate in the top Nth percent of their class, depending upon the university of enrollment. (Long 2007; Rose 2005).

Following California, voters in the state of Washington passed I-200, banning race-based hiring and enrollment considerations at public institutions. After affirmative action was banned in Washington, black postsecondary enrollment decreased by 28%. In Florida, Governor Jeb Bush issued the “One Florida” plan in 1999, eliminating affirmative action. Before the affirmative action ban in Florida, blacks and whites were admitted into the flagship institutions at the same rate. In the following years, black admissions rates fell 37%, and black enrollment dropped 44% (The Journal of Blacks in Higher Education 2001-2002). In the 2001 *Johnson v. Board of Regents of the University of Georgia* case, the Eleventh Circuit Court of Appeals found the freshman admissions policy at the University of Georgia unconstitutional, as it did not narrowly tailor race considerations to achieve diversity. Though blacks make up 29% of the population in Georgia, they only represent about 5% of students at the University of Georgia, the most prestigious public university in the state. Of the 50 state flagship universities, the University of Georgia has the smallest black enrollment as compared to the state black population (The Journal of Blacks in Higher Education 2001-2002)¹⁰.

To boost black, Hispanic, and low-income admissions and enrollment, states crafted policies that guaranteed entry to any in-state public institution for high school

⁹ The top three schools are the University of California at Berkeley, University of California at Los Angeles (UCLA), and the University of California at San Diego (UCSD).

¹⁰ Figure based on 2001-2002 data estimates.

students who graduate in the top Nth percent of their class. The point of the plan was to counterbalance segregated high schools by enrolling a proportional representation of all races and socioeconomic backgrounds at flagship colleges and universities. In 1999, the University of California Board of Regents approved a program that offered admission to high school students who graduate in the top Nth percent of their class, depending on the institution of enrollment (Rose 2005). In 2001, Florida allowed admission to public colleges and universities to any in-state student who graduated in the top 20% of his or her class.

Some selective university systems were still looking to increase minority participation. A number of institutions shifted toward a holistic admissions assessment that considered, among other factors, race, grades, standardized test scores, essays, and interviews. The University of Michigan, the state's flagship university, was no exception. Its affirmative action policies led to two Supreme Court cases that questioned the merits of affirmative action in the state.

In the landmark 2003 *Grutter v. Bollinger* case, plaintiff Barbara Grutter sued the University of Michigan Law School¹¹ under the Equal Protection Clause of the Fourteenth Amendment and Title VI of the 1964 Civil Rights Act when she was denied admission into the school. The prestigious institution receives more than 3,500 applications and admits approximately 350 of the most qualified applicants from disparate backgrounds each year. Grutter was waitlisted and ultimately denied admission to the Law School with a 3.8 GPA on a 4.0 scale and a 161 out of 180 on the Law School

¹¹ President Lee Bollinger is the defendant in this case, not the University of Michigan.

Admissions Test (LSAT). Grutter claimed the school rejected her because the University applied race as the primary factor for admissions consideration.

The University asserted that the state and the institution had a compelling interest in fostering a “critical mass” of diversity. The District Court ruled in favor of Grutter, finding the Law School’s race-based process unconstitutional. The Sixth Circuit overturned this decision. Citing Justice Powell in *Bakke*, the precedent held that racial considerations used by the University were both narrowly tailored and a compelling state interest. In a 5-4 vote, the Supreme Court affirmed the judgment of the Sixth Circuit in favor of the University. Writing for the majority, Justice Sandra Day O’Connor voiced hope that affirmative action would no longer be needed in 25 years¹².

The undergraduate admissions office at the University of Michigan also used affirmative action in order to enroll minority students in greater quantities. The University used the following qualifications to rank applicants: high school quality, GPA, standardized test scores, legacy status, race, curriculum strength, leadership/extracurricular activities, and geography. The University of Michigan considered underrepresented minorities to be blacks, Hispanics, and American Indians and awarded affiliation with one of these racial groups 20 points on the 150-point qualification scale. To contrast, a perfect standardized test score was worth 12 points. In order to be admitted, applicants needed 100 points (*Gratz v. Bollinger* 2003). Jennifer Gratz and Patrick Hamacher, applied for admission to the University’s College of Literature, Science, and the Arts (LSA) in 1995 and 1997, respectively. Gratz had a 3.8

¹² Though part of the majority decision, Justices Ginsburg and Breyer did not concur with the statement that affirmative action might not be necessary in 25 years.

GPA on a 4.0 scale and a 25 out of 36 on the American College Test (ACT). Hamacher had a 3.0 GPA on a 4.0 scale and a 28 on the 36-point ACT scale. Both were denied admission¹³. Like *Grutter*, *Gratz v. Bollinger* cited grievance under the Equal Protection Clause of the Fourteenth Amendment and Title VI of the Civil Rights Act of 1964. In 2003, the Supreme Court ruled in a 6-3 decision that the 20-point allocation for race was a measure of group diversity contributions, not based on individual assessment and was therefore unconstitutional.

To shift the notion that affirmative action eschews quantitative metrics in favor of strict race-based practices while still enrolling a proportional representation of minority students, state flagships have turned to top Nth % class rank provisions. Nevertheless, opponents of these policies still found that the initiatives were neither color-blind nor sufficiently narrowly tailored.

In the 2013 *Fisher v. University of Texas* case, plaintiffs Abigail Fisher and Rachel Michalewicz¹⁴ alleged that the University of Texas at Austin had denied them admission in violation of the Equal Protection Clause of the Fourteenth Amendment. The University of Texas guarantees admission to students who graduate in the top 10% of their graduating class. When the plaintiffs filed suit in 2008, 81% of the entering freshmen were admitted under this rule. Fisher did not graduate in the top 10% of her class. The University evaluates students who do not graduate in the top 10% based on race, leadership/extracurricular activities, GPA, and standardized test scores. Fisher

¹³ Gratz was placed on the waiting list, but withdrew from the waiting list and attended the University of Michigan at Dearborn instead. All students placed on the waiting list in the spring of 1995 were subsequently admitted for the fall term.

¹⁴ Michalewicz withdrew her petition in 2011.

graduated with a 3.59 GPA and an 1180 on the SAT¹⁵. She also volunteered for Habitat for Humanity, played in the orchestra, and participated in math competitions. In 2009, the District Court ruled that the University applied race-based considerations in a manner keeping with *Grutter*. . The Fifth Circuit found that Fisher could only petition if the University’s racial considerations were not made in “good faith”. Attention reemerged in 2013 when, in a 7-1 decision¹⁶, the Supreme Court negated the Fifth Circuit Court’s decision in favor of the University and found that the lower court had not sufficiently applied strict scrutiny pertaining to race in admissions considerations expressed in 1978 in *Regents of the University of California v. Bakke* and reiterated in the 2003 *Grutter v. Bollinger* ruling.

Although prestigious postsecondary schools matriculate low-income students, enrollees from rural areas, athletes, and children of alumni, often referred to as “legacies”, programs that recruit these students are often viewed with less skepticism (Massey and Mooney 2007). While *Bakke* and *Grutter* upheld the constitutionality of applying race as one of many admissions criteria, these and other cases highlight that entry into elite higher education institutions has never been based solely on academic merit – before or after race was used as an admissions criterion (Fetter 1995; Tahmindjis 1997; Zwick 2002; Tomei 2003).

The Court decisions contend that diversity is needed on college campuses in order to decrease racial stereotypes while increasing cross-cultural understanding in postsecondary education as well as in American society. In *Grutter*, the majority

¹⁵ The 25th and 75th SAT percentiles for the 2008 incoming class were 1120 and 1370.

¹⁶ Justice Kagan recused herself.

concludes that the Equal Protection Clause "does not prohibit the law school's narrowly tailored use of race in admissions decisions to further a compelling interest in obtaining the educational benefits that flow from a diverse student body (p. 307)." Citing prominent social science literature (Bowen and Bok 1998; Orfield and Kulaender 2001; Chang et al. 2003), Justice Sandra Day O'Connor posits in the *Grutter* ruling that diversity is a compelling state interest and its implementation at selective colleges and universities "better prepares students for an increasingly diverse workforce and society, and better prepares them as professionals (p. 330)." Though the Courts have constructed the legal framework for affirmative action in postsecondary education, none of the decisions underscore whether or not race-based policies benefit the intended recipients.

Affirmative Action, College Choice, and College Match

To be sure, legislation has been an important tool in creating programs that increase human capital for minorities and the poor. Nonetheless, law has taken precedent to policy in shaping affirmative action, particularly in higher education. Similar to the court decisions, researchers are divided into supporters and critics. Academics, along with Court officials, have been tasked with determining what affirmative action means, what it does, and how it works. Paralleling court rulings, research is tasked with determining the costs and benefits of both current and future race-based admissions and enrollment regulations. Affirmative action is a contested policy venture because its effects are not widely understood.

A rising body of literature examines how potential postsecondary students choose the university they attend and the extent to which this educational choice impacts

persistence and completion rates (Somers and Cofer 2004; Goldrick-Rab 2006; Murray 2009; Carnevale and Rose 2011; Dowd and Coury 2006). This literature is tangential to affirmative action as both supporters and opponents of affirmative action assert that students who choose to attend the appropriate college given their academic capabilities will be more likely to persist and complete than those who do not attend a college that matched their abilities.

The college choice construct is the sequence of decisions a student makes before and after entering a college or university. Choice begins with forming the aspiration to enter a postsecondary institution. Next, the student makes the decision to attend and picks his or her desired school. Then the student selects a course of study. Last, these choices influence the decision to persist and complete.

Community colleges enroll more students than any other postsecondary sector. About 50% of college students attend two-year institutions (Bailey and Alfonso 2005). These schools are more likely to matriculate students over the age of 25, have parents who did not receive a postsecondary education, be enrolled part-time, enroll in an occupational program, and obtain a certificate instead of an Associates degree or transfer to a four-year college or university (Calcagno et al. 2007). Moreover, low-income students are disproportionately more likely to choose community colleges than any other institution type as these students are more price sensitive than their four-year counterparts (Dowd and Coury 2006). Community colleges are a popular choice for continuing students since only 4% of two-year institutions have at least one admissions requirement. Since most two-year schools are open enrollment, almost all students who wish to attend

may do so. Nevertheless, many students who enter community colleges are not prepared for the scholarship required for persistence and completion. In academic year 2006-2007, only 6% of community college students who enrolled three years prior had graduated. 45% left two-year institutions without receiving a degree or certificate. 50% of community college students who enrolled three years prior were still attending a two-year institution (Provasnik and Planty 2008). Students from selective institutions are more likely to persist and complete than enrollees at other colleges and universities.

The higher education pipeline is complex. Students can choose to enroll at one or multiple schools while attempting to complete a degree. For example, high achieving community college students may transfer to four-year institutions in pursuit of a Bachelor's degree. While the traditional pathway to completion is enrolling and persisting at one institution, 47% to 50% of all undergraduates that begin at a four-year institution transfer to at least one other college or university (Goldrick-Rab 2006). First-year academic performance is a strong predictor of transferring, stopping out, and attrition. Students who perform poorly are four times more likely to engage in interrupted movement (stopout). These students are nearly five times more likely to be from low socioeconomic (SES) and minority backgrounds. Moreover, low-income and minority students are more likely to move down to community colleges rather than complete a four-year degree, further increasing socioeconomic disparities at selective campuses.

College choice is also influenced by family background, environmental and educational experiences, and postsecondary finance policy. Policy effects include but are not limited to information distribution, financial aid, price, and debt forgiveness. To be

considered for federal – and in many cases institutional – aid, potential students must detail their ability to pay for college. Need or ability to pay is measured by expected family contribution (EFC). This variable takes into account dependency status, number of family members, and family assets and income (McPherson and Schapiro 2006; Johnson 2011; Hill and Winston 2006; Dynarski and Scott-Clayton 2013; Turner 2012; Long 2008; Schwartz 2004; King 2002). Indeed, 64% of low-income students chose a college because of low tuition prices, financial aid availability and repayment, or both (Allen et al. 2008). Belley and Lochner (2007) assert that low-income students may be dissuaded from attended high-priced, selective institutions due to limited borrowing opportunities. These financial constraints raise the marginal cost of attendance. The income differential between poor and wealthy families benefits high-income students, as their parents are able to purchase more education.

Socioeconomic differences in persistence and completion are not restricted to income. First-generation students also face challenges in matriculating at prominent four-year institutions. 31% of the college student population is the first in his or her family to enroll in tertiary education (Somers et al. 2005). Sharing similar characteristics to other minority groups, first-generation students from low-income and multiethnic backgrounds are less likely to persist and complete than white and high-income students. Like low-income students, financial constraints hinder enrollment and persistence. Debt burden reduces the likelihood of completion by 10 percentage points for those with loans in excess of \$5,000 per year, by about 14 percentage points for those with loan amounts between \$1,000 and \$5,000 per year, and by approximately 13 percentage points for

those with low debt amounts (Somers et al. 2005). These figures are similar to low-income and minority persistence rates. Though high-income status, high GPA, and standardized test performance are significant predictors of college success for most groups, these metrics are not significant predictors of within-year and total persistence for first-generation students.

Academic, behavioral, and family environments are also related to secondary and postsecondary choice and attainment (Le et al. 2005). Robbins (2004) conducted a meta-analysis of 109 studies that focus on the high school environmental factors that predict college outcomes and identified nine statistically significant constructs that pertain to secondary and postsecondary success: academic goals, institutional commitment, self-efficacy, general self-concept, academic skills, environmental support, social integration, contextual influences, and motivation. In addition, Robbins found that psychosocial and academic support are the indicators most likely to encourage or deter students from completing high school and college. Palardy (2013) concurs by concluding that motivational measures such as social and academic engagement and interacting with peers with higher education attainment goals are related to academic achievement, specifically for students from minority and low-income backgrounds. 50% of students enrolled at low SES schools had a friend or peer who dropped out of high school before graduation. Moreover, these students are one standard deviation less likely to have friends and classmates who want to go to college, which may affect the determination of other students and peers to finish high school and enroll in postsecondary education (Allen et al. 2008).

Paulsen and St. John (2002) aptly note that recent postsecondary students are diverse in age, socioeconomic status, and pre-college experiences. Developmental theory supposes that students have had unimpeded access to and opportunities for postsecondary advancement. Nonetheless, prior research has demonstrated that many minority and low-income students differ from their white and high-income counterparts in pre-college experiences. Paulsen and St. John offer the change theory. They believe that a focus on background inputs, processes, and outputs for both traditional and non-traditional¹⁷ students provides additional insight into the barriers to access, persistence, and completion for low-income and minority students.

According to the College Board, being “college ready” means having a standardized test score that predicts a 65% probability of having a first-year GPA of 2.7 or higher. While 65% of high schools deem graduating students as “college ready” by internal metrics, Murray (2008) hypothesizes that only 9% - 12% of high school graduates reach this benchmark based on their standardized test scores and grades alone. Indeed, of all students enrolled at postsecondary institutions from 2004 – 2009, 9% received a certificate, 9% completed an Associate’s degree, and another 31% graduated with a Bachelor’s degree. Nevertheless, 15% were still enrolled without having completed a degree, and the remaining 35% dropped out (Radford et al. 2010).

There is wide consensus that the majority of race-conscious enrollment plans are confined to the most selective postsecondary institutions, about 20-30% of colleges and universities (Bowen and Book 2000; Bergmann 1994; Card and Krueger 2005; Fryer et

¹⁷ Traditional students are postsecondary entrants who begin immediately after completing high school, are under age 25, and are financially dependent upon their parents.

al. 2008; Fryer and Loury 2005; Sander and Taylor 2012). Admissions counselors are tasked to admit promising students from diverse backgrounds that are most likely to make positive contributions to both the workforce and society. To wit, policymakers are charged with developing programs that benefit the intended recipient.

Supporters of race-based interventions claim that without such programs, economic and social advancement for minorities would be limited due to structural barriers, as institutions would be reluctant to admit students with unknown qualifications and characteristics (Bergmann 1994; Bowen and Bok 1998; Cameron and Heckman 2001).

Moreover, affirmative action proponents report that minority students who enroll at prestigious schools enjoy the same graduation and job placement benefits as white colleagues. Bowen and Bok (1998) evaluate the 1989 College and Beyond (C&B) database, survey data that assesses admission, enrollment, persistence, and attainment metrics of students attending 23 academically selective institutions from 1976 to 1995. The rationale for exploring the academic and economic outcomes of students enrolled at selective schools is that affirmative action is theorized to be restricted to only the top 20%-30% of postsecondary institutions. The authors conclude that race-conscious admissions policies benefit black students at selective schools through higher graduation rates, graduate school enrollment, and post-graduation income as compared to black students not enrolled at selective universities.

Indeed, beneficiaries of affirmative action at elite institutions go on to have lucrative careers like their peers. From survey data collected from 1983-1992 graduates

from the University of Michigan Law School, Lempert et al. (2000) uncovered that white and minority students completed law school at nearly the same rate. Moreover, there was little difference in the percentage of whites and minorities who passed the bar exam. To wit, the vast majority of minorities surveyed attributed their career advancement to the name recognition of their alma maters. Black graduates were also more likely to mentor their peers, serve on non-profit boards of directors, and take more pro bono assignments than their white classmates. Since affirmative action policies were implemented at the University of Michigan Law School, 85% of minorities surveyed attributed their career advancement to institutional prestige. In many cases, the outcomes for minorities who enrolled in the Law School mirror those for whites. 96% of minorities and about 99% of white students graduated. Moreover, about 96% of minorities and about 98% of white graduates passed the bar exam in at least one state. Blacks who graduate from prestigious programs are more likely to mentor their peers, serve on non-profit boards of directors, participate in civic engagement, and take more pro bono assignments than their white peers.

Affirmative action challengers contend that a prime flaw with race-based policies is that colleges admit students with low scholastic aptitude. Sander (2004) investigates the impact of affirmative action at prestigious law schools from 1970 to 1996 and concludes that though black students fare well in GPA, job placement, and civic participation, a significant performance gap relative to their white classmates still exists. Sander posits that the black students at elite law schools would experience improved

performance outcomes if they had been matched with law schools more suited to their academic qualifications.

College matching literature explores the ways in which students of varying academic qualifications sort into colleges of different selectivity levels. College students fall into two groups – the matched and the mismatched. Matched students attend a college or university that is an accurate reflection of academic qualifications whereas mismatched students enroll at a university that is either substantially above or below their own pre-college academic qualifications. For example, if Student A had a high school GPA of 4.0 and a score in the top percentile in standardized testing and attended a college that accepts students of similar aptitude, Student A would be considered well-matched. If Student A were to attend a college in which the average student had an incoming GPA of 2.0 and a score in the bottom 25% of standardized test scores, Student A would be mismatched, or more specifically, undermatched. To contrast, if a student whose academic qualifications are far below the mean of the institution of enrollment, this student would be considered overmatched.

College matching research is important to the literature on affirmative action as scholars on both sides of the affirmative action divide caution against mismatch of both types.

Affirmative action opponents view affirmative action policies that produce mismatch as an inefficiency in the higher education market. Overmatch can be seen as similar to affirmative action theories that describe affirmative action as less-qualified student enrollment into the most rigorous undergraduate institutions. Some scholars

attribute the performance gap between black and white students to overmatch, the theory that students who are placed in universities too far above their demonstrated ability are more likely to experience adverse postsecondary outcomes like stopout and attrition (Alon and Tienda 2005; Anderson 2007; Arcidiacono 2004; Sander 2004). While research does show that mismatched students earn lower grades and accrue credits more slowly (Sander and Taylor 2012; Sander 2004), there is little evidence these students dropout more than white undergraduates (Dillon and Smith 2013; Fischer and Massey 2007). Moreover, there is no proof that the academic index metrics used to assess incoming freshmen are related to outcomes such as wage premiums, civic participation, and job satisfaction (Fischer and Massey 2007; Bowen and Bok 1998; Kurlaender and Grodsky 2013; Card and Krueger 2005).

Bowen et al. (2009), Roderick et al. (2011) and others note that academically talented students often leave college without obtaining a degree because they enrolled in postsecondary institutions for which they were “undermatched” or overqualified. These findings reveal a significant policy challenge for affirmative action, as undermatched students are more likely to be underrepresented minorities.

CONCEPTUAL MODEL

This chapter develops research questions and conceptual models relevant to assessing the impact of affirmative action and aptitude matching on college outcomes for postsecondary students. The models are derived from an extensive review of the literature on the history and policy development of affirmative action, the process of college matching, and other factors that influence college outcomes. Before proceeding with the development of the research questions and the conceptual model, I will briefly summarize the key points in the literature review that will motivate the conceptual models.

Affirmative Action in Higher Education

The issue of affirmative action in higher education has developed through policy decisions, court actions, and social science research over many decades. Since the 1960s, some selective colleges and universities have created affirmative action programs in order to offer academic access to minority students. There have been many legal and policy challenges to race-based higher education admissions policies. In the recent *Fisher v. University of Texas* (2013), the Supreme Court negated a lower court decision in favor of the University, finding that a lower court decision in favor of the University had not sufficiently applied strict scrutiny pertaining to race in admissions considerations, as expressed in *Grutter v. Bollinger* (2013).

When affirmative action policies were first crafted, most postsecondary students were recent high school graduates who were white, under the age of 24, from middle and high-income families, and were financially dependent upon their parents (Dynarski and Scott-Clayton 2006). Current postsecondary students are diverse in age, race, socioeconomic status, and pre-college experiences (Paulsen and St. John 2002). As the higher education system has expanded, institutions admit students with varied academic qualifications and socioeconomic backgrounds. Indeed, selective colleges and universities admit and matriculate low-income students, out of state students, legacies, and athletes, though programs that recruit these students are often viewed with less skepticism than race-based initiatives (Massey and Mooney 2007). While the constitutionality of applying race as one of many admissions criteria was upheld in *Grutter*, these and other cases highlight that academic qualifications have never been the sole criterion for entry into elite higher education institutions – before or after race was used as an admissions factor (Fetter 1995; Tomei 2003; Tahmindjis 1997; Zwick 2002).

The literature on affirmative action in higher education evaluates many postsecondary outcomes ranging from the academic – admission, persistence, and completion – to civic activities such as community service, mentoring, and voting. Both supporters and critics of affirmative action note that black students who enroll in elite colleges have higher grades, civic participation, and post-graduation job placement rates compared to black students enrolled in less selective institutions (Schwartz 2004; Anderson 2007; Alon and Tienda 2005; Bowen et al. 2009; Sander 2004; Cahn 1993). Lempert et al. (2000) report that black students enrolled at the prestigious University of

Michigan Law School from 1983-1992 graduated and passed the bar exam at about the same rate as their white peers. In addition, black graduates were more likely than white graduates to take pro bono assignments or serve as a mentor. Affirmative action opponents point to academic performance gaps between white and minority students as a flaw in race-based admissions policies. Scholars hypothesize that students that attend a college or university far below or above their demonstrated ability may face negative academic postsecondary outcomes (Arcidiancono 2004; Sander and Taylor 2012; Roderick et al. 2011).

In this chapter, I will propose research questions and conceptual models that examine the effects of affirmative action and college match on postsecondary outcomes, controlling for other factors that may effect outcomes. The model will be applied separately for each racial group.

Conceptual Framework and Research Questions

The primary elements of the conceptual framework for this dissertation are drawn from Bowen and Bok (1998) and Sander (2004). An empirical examination of the effects of affirmative action at elite colleges and universities presented by Bowen and Bok (1998) conclude that beneficiaries of affirmative action enjoy higher undergraduate graduation rates, increased enrollment in graduate school, and a boost in post-graduation income relative to their black peers at less selective institutions. Studies conducted by Kurlaender and Grodsky (2013), Lempert et al. (2000) and others also attribute affirmative action to improved undergraduate completion rates, graduate school enrollment, voting, and community service involvement for minority students. These

works support a conceptualization of affirmative action having a potential positive effect on graduation rates.

Sander (2004) conceptualizes affirmative action as detrimental to the degree completion process for minority students, pointing to achievement gaps at selective campuses as a deficiency in affirmative action policies. Sander suggests that these gaps may close if students attended institutions that matched their academic ability. This approach considers college matching theory (Roderick et al. 2011; Bowen et al. 2009; Sander and Taylor 2012; Arcidiacono 2004), which describes the ways in which student postsecondary enrollment decisions affect graduation rates.

Building on these studies, I offer the following research questions:

1. To what extent does affirmative action affect college outcomes?
2. To what extent does college aptitude matching affect college outcomes?

Defining the Primary Theoretical Variables

The primary theoretical variables for this study consist of postsecondary outcomes as the dependent variable and both affirmative action and college matching as the primary independent variables of interest.

In this model, the college outcome of interest is degree completion. The definition of degree completion can be perplexing (Tinto 1982; Goldrick-Rab 2006; Bean and Metzner 1985). For example, should a person who completes a certificate program be considered a dropout because the student did not receive a degree? What if a student stops out or transfers to another institution? For the conceptual framework developed here, degree completion occurs if a student has graduated from a selective college or

university within six years of enrollment. A benefit of this definition is that students who transfer or stopout are not considered dropouts. According to the Beginning Postsecondary Students Longitudinal Survey (BPS 2009), a college or university is considered to be selective if its undergraduate institution offers a bachelor's degree and applies standardized test scores as an admissions criterion. Several studies indicate that affirmative action policies are most likely to exist at selective campuses (Bowen and Bok 1998; Long 2007; Bergmann 1994; Fryer and Loury 2005; Sander and Taylor 2012).

Defining affirmative action can also be difficult (Reyna et al. 2005; Swain 2001). In general, affirmative action is associated with race-based admissions policies (Thornton 2001; Sterba 2004). Race is a student background variable often considered a factor that may influence college completion rates (Perry et al. 2003; Reardon et al. 2012; Orfield and Kurlaender 2011). Many studies show that white and Asian students enjoy high graduation rates relative to their black and Hispanic peers (Rose 2005; Fryer and Loury 2005; Kahlenberg 2010; Long 2007). Affirmative action is also cited as an indication of an academic achievement gap between well-qualified and less qualified students (Sander and Taylor 2012; Sander 2004). For this model, academic qualifications include standardized test scores (SAT) and high school grade point average (GPA). Several investigations have found a positive relationship between high SAT scores and college completion (Alon and Tienda 2005; Anderson 2007; Arcidiacono 2004). Other studies report no relationship between SAT performance and attrition (Dillon and Smith 2013; Fischer and Massey 2007). Good grades in high school are often considered to have a positive relationship with college completion (Bailey and Alfonso 2005; Dobbie and

Fryer 2009; Ravitch 2010). As a response, colleges and universities have implemented policies that grant admission to high school students who graduate at the top of their class (Rose 2005). I define affirmative action as student admission into a selective institution whose academic qualifications (SAT and GPA) are well below the average for that college or university. This approach can be used because qualifications can be applied for each race.

College matching refers to the ways in which students of varied academic qualifications sort into postsecondary institutions of different selectivity levels (McPherson and Schapiro 2006; Bowen et al. 2009; Roderick et al. 2011). In this study, college match is defined by the “fit” between selectivity and academic qualifications. Many studies attribute improved college completion to institutional selectivity (Hoxby 2009; Bowen et al. 2009; Loury and Garman 1995; Rose 2005; Roderick et al. 2011). A student is considered to be “matched” if the person enrolls at a campus whose academic qualifications reflect his or her capabilities whereas a person is considered to be “mismatched” if he or she does not attend a school of corresponding aptitude. Mismatch can occur if: (a) a student is enrolled in an institution at which he or she is overqualified (“undermatch”) or; (b) a student is enrolled in an institution at which he or she is underqualified (“overmatch”). For this conceptual model, college matching is applied for each racial group.

Defining Control Variables

In order to assess the impact of affirmative action and college matching on postsecondary completion rates, other factors that affect graduation rates should be

considered. There is an extensive literature on these relationships summarized in previous sections of this study. For this conceptual framework, these relationships are applied as control variables that are incorporated into the analytic model in order to assess the effect of the primary independent variables.

Various factors have been associated with postsecondary completion, and these additional variables serve as controls in the analytic model. Four of these factors and their associated variables have been selected for this analysis. First, student and family background variables identify the socioeconomic characteristics that may influence college persistence and completion. The second factor related to postsecondary completion is pre-college academic experiences – other than SAT and GPA – such as the number of academic courses taken in high school. Next, institutional characteristics aside from selectivity may affect college completion. Last, college completion may be affected by various student performance characteristics during college.

Student and Family Background

Two student demographic variables – age and gender – are included in the model. In addition, three family demographic variables are expected to affect the degree completion process for postsecondary students. These variables are dependency status, parents' education, and income.

Most studies that associate the relationship of age and degree completion found that age was not a major factor that predicted attrition or completion though some traits that may be associated with age such as part-time enrollment status, hours of employment

outside of school, and family or household responsibilities may influence graduation rates (Calcagno et al. 2007; Dowd and Coury 2006).

There is wide consensus that women have enrolled in and graduated from colleges and universities in large numbers relative to their male peers (Skomsvold et al. 2011; Paulsen and St. John 2002; Radford et al. 2009). Current figures estimate that the majority of enrolled full-time and part-time students are female (U.S. Department of Education 2009).

Dependency status refers to individual and family information that is reported to the university by the applicant, often used to determine financial aid allocation (U.S. Department of Education 2009). A student may be classified as dependent or independent. In general, dependent students are under the age of 24, unmarried, and have no children. Students are considered to be independent if they are over 25, a veteran, serving active duty, married, or have children. Being a dependent student has been shown to have a positive relationship with degree completion (Bettinger 2004; Belley and Lochner 2007; Ellwood and Kane 2000).

Parents' educational attainment is a family demographic variable that has been discussed as a possible factor that predicts postsecondary completion rates (Bailey and Dynarski 2011; Light and Strayer 2000). Skaling (1971) finds that parents' education is the most significant of the family socioeconomic status (SES) variables that predicted college completion for students at four-year colleges and universities. Others note a positive relationship between parents' educational attainment and student persistence (Tinto 1975; Somers and Cofer 2004).

Income is a family SES variable often associated with college completion (Ellwood and Kane 2000; Schwartz 2006; Grodsky and Jackson 2009). Many studies indicate that as income – a human capital variable related to family SES – increases, so too do student completion rates (Palardy 2013; Paulsen and St. John 2002; Kahlenberg 2010).

Pre-College Academic Qualifications

Two additional pre-college academic qualification variables other than SAT and GPA are considered: the courses a student took in high school (high school courses), and whether a student was required to take remedial courses upon enrolling at the postsecondary institution (remediation).

Palardy (2013) cites high school curriculum rigor as an important factor that affects postsecondary enrollment. High performance in difficult courses, mathematics in particular, may affect completion. Many high schools offer Advanced Placement (AP) and International Baccalaureate (IB) courses that are awarded college credit upon successful completion (The College Board 2014).

Remedial courses are offered to students as an attempt to boost the competencies of incoming students so that they have the skills needed to complete college-level work (Martinez et al. 2003). Baum and Payea (2010) estimate that in 2010, 78% of higher education institutions provided developmental or remedial education. Placement into remedial courses is often based on standardized test scores though if a student has not completed the prerequisite coursework, he or she may be required to take remedial courses before advancing to the next subject level (Ross et al. 2012; Palardy 2013; Dowd

and Coury 2006; Murray 2009). For example, a student who would require developmental courses at an elite institution may not need to be remediated at community college. Scott-Clayton (2012) reports that in 2011, 20% of four-year students and 52% of two-year enrollees took remedial courses.

In some instances, universities also consider community service participation, athletic activities, and club membership in high school as part of the student academic portfolio. These and additional pre-college academic considerations may also influence completion.

Institutional Characteristics and Financial Aid

Aside from selectivity, two university profile variables are included: whether the institution is public or private (institutional status) and the price of attendance (tuition). In addition, work study, grant allocations, and the amount of student loans received are included as financial aid variables.

Institutional status refers to if a college is public or private. Many of the most selective colleges and universities are private (Sander 2004; Bowen and Bok 1998; McPherson and Schapiro 2006) though enrollment has steadily increased at selective public flagship institutions (Jackson 2009).

The cost of attending and completing college is often cited as a factor that predicts college completion (Wolfram 2005; Hill and Winston 2006; Dynarski and Scott-Clayton 2013). Aid appropriations such as the Pell Grant, subsidized and unsubsidized loans, and various state financial aid plans provide financial resources to students who may

otherwise be priced out of higher education. Although, Somers et al. (2005) shows that loans may have a negative impact on college completion.

Additional institutional characteristics such as university size, location, and financial aid allocations may also influence graduation rates (Allen et al. 2008; Cellini and Chaudhary 2012; Gillen 2012; Johnson et al. 2013).

Student Performance in College

Two student academic performance variables – first-year GPA and last-year GPA – are included. In addition, two variables that describe the ways in which students interact with the university environment are expected to affect the degree completion process for postsecondary students. These variables are academic integration and social integration. Moreover, the field of study (major) a student chooses is also included in this analysis.

Grades during the first year of enrollment have been associated with college completion. (Rose 2005; Somers and Cofer 2004). Goldrick-Rab (2006) reports that a student with low grades is four times more likely to stopout than a student with a high first-year GPA.

Academic and Social Integration are continuous variables used to describe the frequency in which survey respondents participated in academic and social activities such as attending a study group or joining a club (BPS:04/09).

Academic integration refers to the ways in which students engage in academic activities with faculty and peers outside of the classroom. According to the 2009 Beginning Postsecondary Students Longitudinal Survey (BPS), academic integration activities include participating in study groups with classmates, meeting with an

academic advisor, or having academic or social interactions with professors or instructors outside of class. Terenzini (1977), the University of California (1980), Robbins (2004), and Kurlaender and Grodsky (2013) found persistence to be related to engaging in these activities.

Social integration is defined as the extent to which students interact with their social environment. Social integration activities may include participating in school clubs, attending fine arts performances, or being a member of an intramural or varsity sport (BPS 2009). Feeling like part of the university community has been shown to have a positive association with persistence and completion (Le et al. 2005; Robbins 2004; Palardy 2013).

Grades during the final year of enrollment have been associated with college completion (Allen et al. 2008; Chan and Eyster 2003). Rose (2005) notes that students with higher grades in the last year of enrollment are more likely to complete.

The link between the field of study students choose upon beginning their college careers and postsecondary outcomes has received considerable attention in the literature (Robst 2007; Roksa 2005; Kolvereid and Moen 1997). Several studies suggest that students who major in science or mathematics fields may benefit from this choice through higher graduation rates and higher pay after graduation (Grubb 1992; Rumberger and Thomas 1993; Arcidiacono 2004).

Additional student performance in college variables may include major, absenteeism, work-study, and study abroad (Cellini and Chaudhary 2012; Johnson et al. 2013).

Conceptual Models

The conceptual model for (1) affirmative action and (2) college matching is presented in Figure 1. The model indicates that the degree completion process will be influenced by four sets of variables. Though degree completion is influenced by the same four sets of variables, the other of impact may change for each analysis. When the model is applied to (1), the affirmative action analysis, pre-college academic qualifications in the form of SAT and GPA are the main area of interest. Well-qualified students are expected to graduate at a higher rate than students with lower scores. This is expected at institutions of all selectivity levels. Next, student performance in college is expected to have a considerable effect of postsecondary completion rates. The third group of variables expected to impact graduation rates relates to additional university characteristics such as whether or not the school is public or private or the cost of attending college. Finally, student and family socioeconomic characteristics may also be associated with completion.

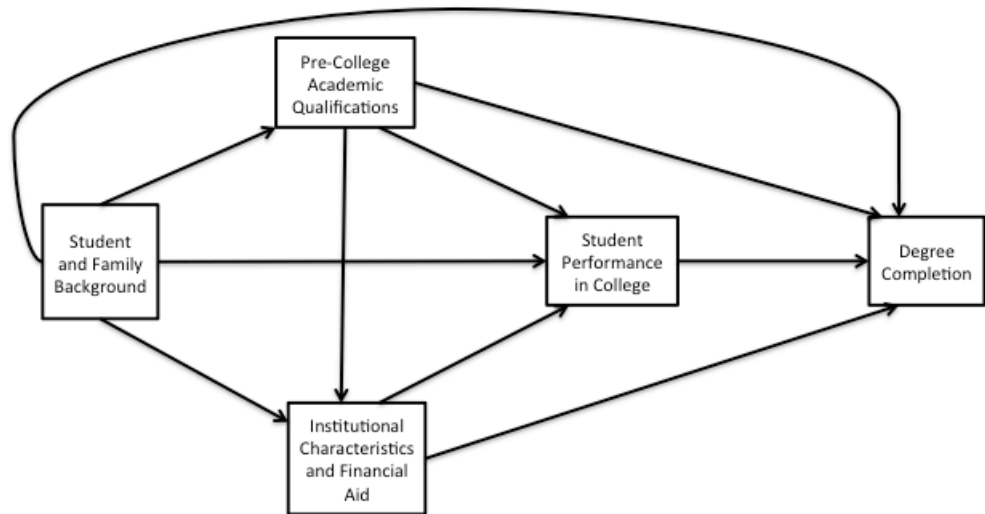


Figure 1 Conceptual Model of Postsecondary Completion

When applying the conceptual model to (2), the college matching analysis, the order of impact for the factors that predict college completion may change. For the college matching conceptual model, selectivity is considered to be the institutional characteristic of primary interest. A selective institution is defined as a BA degree-granting school that uses SAT or ACT scores as an admissions factor. In this model, selectivity is represented as an institutional trait. Selectivity along with pre-college

academic qualifications are expected to have a substantial impact on postsecondary completion. Next, student performance in college is expected to have a considerable effect on completion rates. Last, student and family demographic variables may influence degree completion. It is important to note that this model assumes that all of the students are well-matched, attending the university that best reflects academic qualifications.

Figure 2 presents a conceptual model that indicates that affirmative action and mismatch may occur in higher education admissions and enrollment; the representation of this interaction appears in Figure 2. Both affirmative action and aptitude matching are interactions between pre-college academic qualifications (SAT and GPA) and institutional characteristics (selectivity). As matching theory suggests that students who do not attend a college or university that reflect their academic qualifications will be less likely to graduate, mismatch may be a prominent factor that influences graduation rates, particularly for affirmative action students.

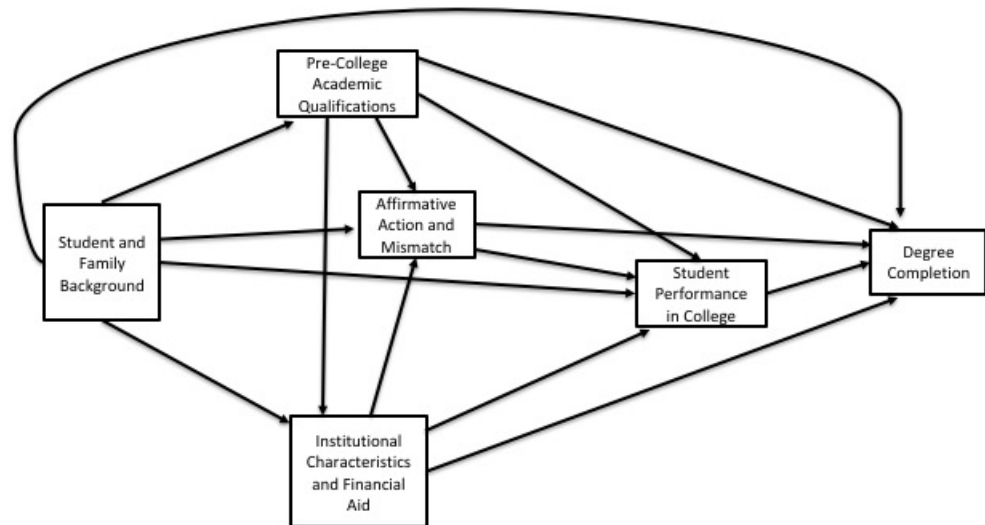


Figure 2 Conceptual Model of Postsecondary Completion: Affirmative Action and Mismatch

Affirmative Action and College Matching Hypotheses

This study investigates the extent to which affirmative action affects postsecondary completion rates. This analysis contributes to the literature by offering a definition of affirmative action based on pre-college academic qualifications that can be applied to each race. I hypothesize that a significant percentage of less-qualified students are admitted into top-tier colleges and that these enrollees will be less likely to graduate than their well-qualified peers.

I will also evaluate the ways in which matching student academic qualifications with institutional rigor affects six-year completion rates. If admitted students are enrolled at schools whose qualifications are far above (undermatch) or below (overmatch) the institutional average, they are mismatched. I posit that both forms of mismatch – overmatch and undermatch – will result in lower graduation rates than for the well matched.

DATA AND RESEARCH METHODS

This chapter describes the dataset, the sample for the analysis, and the statistical techniques used in this dissertation. The Beginning Postsecondary Students Longitudinal Study of 2003-2009 was used to explore how affirmative action and college matching affect degree completion rates during the six-year period of the survey. Before further discussing the data and sample, I will describe the analytic model specifications.

Method

The analytical focus of this study is on the effects of affirmative action and college matching on bachelor's degree completion within six years of enrollment at a selective postsecondary institution.

The following research topics are addressed in this dissertation:

1. Estimating the number of students admitted by affirmative action at selective four-year colleges and universities.
2. The relationship between being admitted by affirmative action and degree completion over the six-year survey period for each race.
3. How matching student aptitude with institutional selectivity impacts postsecondary completion rates.

Modeling Affirmative Action

The model for affirmative action for this study is drawn from Sander (2004). The study assessed the extent to which affirmative action and academic qualifications affected postsecondary outcomes for black students at elite law schools. A number of elite colleges and universities consider high school grade point average (GPA) as an admissions metric in addition to standardized test (SAT) performance (Kais and Hoffman 2004; Alon and Tienda 2005; Rendon 2000; Howell 2011; Light and Strayer 2000).

In general, GPA is measured on a 4.0 scale with 4.0 being the maximum score with 2.0 as the mean. The Standard Aptitude Test (SAT) and the American College Test (ACT) are the most widely used standardized testing instruments (College Board 2014). The SAT is normalized to a 1600-point scale whereas the ACT is assessed on a 36-point scale. For this analysis, the ACT has been normalized to the 1600-point scale used by the SAT, with 1600 being the highest score and 800 being the mean.

Both grades and standardized test performance are also considered for admission into graduate school. Sander (2004) indicates that the most prestigious law schools use a weighted average of undergraduate grades (UGPA) and the Law School Admissions Test (LSAT) scores in order to make admissions decisions.

Using the institutional mean UGPA and LSAT scores, Sander creates the following academic index (AI) to predict student performance once enrolled:

Equation 1 Academic Index: Theoretical Model

$$\text{Academic Index (AI): } 0.4UGPA + 0.6LSAT = 1000$$

In the Sander analysis, the academic index is normalized to a 1000-point scale. An institution with a mean AI of 1000 enrolled a cohort with a mean UGPA of 4.0 and a mean LSAT score of 180. This index can also be applied to student academic qualifications. A student with a perfect GPA and test scores will have an academic index of 1000.

In this study, I will estimate the academic qualifications of first-time postsecondary students with the following academic index:

Equation 2 Academic Index: Dissertation Model

$$AI: 0.4GPA + 0.6SAT = 1000$$

In this analysis, a student with a 4.0¹⁸ GPA and a 1600 SAT score will have an AI of 1000, while a student with a 2.0 GPA who has an SAT score of 800 will have an AI of 500.

Modeling Institutional Selectivity

The variable used to identify college matching in this study is selectivity. A college or university is considered selective if its undergraduate institution offers a baccalaureate's degree (BA) and applies standardized test scores as an admissions criterion. The model for selectivity for this study draws from Bowen and Bok (1998). The study focused on the long-term academic and socioeconomic effects of affirmative action at selective postsecondary institutions. Using the mean SAT score for each institution,

¹⁸ BPS reports HS GPA as a scale from 1-7 with 1 being a GPA between 0.5 to 0.9 and 7 being a GPA between 3.5 and 4.0. Since BPS does not provide a cut score for high school GPA, 3.75 was selected to represent students with the highest possible high school grades.

Bowen and Bok sorted colleges and universities into three tiers of selectivity: most selective, moderately selective, and minimally selective. The most selective schools, denoted as SEL-1, had a mean SAT score greater than 1300. The moderately selective (SEL-2) colleges had a mean SAT score between 1150 and 1300, while minimally selective institutions (SEL-3) had a mean SAT score below 1150 during the survey period.

In this study, institutions are sorted into three levels of selectivity based on the mean SAT score of incoming freshmen of the 2003-2004 academic year according to the Beginning Postsecondary Students Longitudinal Survey (BPS:04/09). More information about the dataset will be presented later in this chapter. The most selective colleges and universities have a mean SAT greater than 1200. These institutions are denoted as SEL-1. The second tier of colleges and universities has a mean SAT score between 1050-1199. These moderately selective schools are expressed as SEL-2. The third tier of minimally selective institutions has a mean SAT score below 1050; these institutions are labeled SEL-3. Table 1 describes the mean SAT score and percentage of students enrolled at selective schools for the 2003-2004 incoming class.

Table 1 Mean SAT Score and Percent Enrolled at Each Selectivity Level

Institution	Mean SAT Score	% Enrolled
SEL-1	>1200	28
SEL-2	1050-1199	58
SEL-3	<1050	14

SEL-2 schools enrolled more students than any other institution, enrolling almost 60% of postsecondary students admitted into selective schools. The most selective colleges and universities enrolled a little more than a quarter of postsecondary students at selective institutions for the 2003-2004 academic year. Minimally selective campuses enrolled about 15% of incoming freshmen.

The academic index can also be applied to the institution. A college or university with a high mean academic index enrolled a majority of students with high grades and SAT scores whereas less selective institutions may have a lower index as these schools admit students with varied academic qualifications. The most selective institutions (SEL-1) have a mean academic index of 757 for the 2003-2004 incoming first-year students. Moderately selective (SEL-2) institutions have a mean AI of 656, and the minimally selective SEL-3 colleges and universities have a mean AI of 602 for their 2003-2004 enrollees. Table 2 provides a summary of mean academic index scores for each level of institutional selectivity.

Table 2 Mean Academic Index Score and Standard Deviation by Selectivity Level

Institution	Mean Index Score	σ
SEL-1	757	118
SEL-2	656	118
SEL-3	602	130

Sander (2004) estimates that prestigious law schools award minority students a 120-point boost to their academic index. For this study, the standard deviation for the mean academic index at SEL-1 and SEL-2 colleges and universities is 118. I will round

this number to 120 for all three selectivity groups for the sake of simplicity and ease of calculation.

In this study, admission by affirmative action is defined as a student academic index score that is more than one standard deviation below the mean index for incoming freshmen at the institution. For example, at the most selective schools, students that have an academic index at or above 757 are considered most qualified and were not admitted by affirmative action. 2003-2004 incoming freshmen with an academic index between 637 and 757 are considered moderately qualified students. As these students have an academic index within one standard deviation of the SEL-1 mean, moderately qualified students are not considered to be admitted based on affirmative action. Enrolled students with an academic index below 637 are categorized as being admitted by affirmative action as these students have an academic index more than one standard deviation below the mean. At SEL-2 schools, a student categorized as “most qualified” will have an academic index at or above 656. Incoming freshmen at SEL-2 schools with an index between 536 and 656 are considered moderately qualified and are not considered to be admitted by affirmative action. Enrolled students with an academic index below 536 at SEL-2 schools are categorized as being admitted by affirmative action since their academic index is one standard deviation below the SEL-2 mean. At minimally selective institutions, enrolled students with an academic index at or above 602 are most qualified. Enrollees with an academic index between 482 and 602 are moderately qualified, and the affirmative action students have an academic index below 482.

For the college matching analysis, the academic index for SEL-1 institutions will be used to assess how pre-college academic qualifications impact six-year graduation rates at all levels of institutional selectivity. At SEL-1 institutions, students are considered well matched if they have an academic index at or above the SEL-1 academic index and attend an SEL-1 institution. A student is considered to be undermatched if he or she is enrolled at an institution whose mean academic index is below that of the student. For example, a student considered to be well-qualified at an SEL-1 college or university who attends an SEL-2 or SEL-3 institution is undermatched. Students are considered to be overmatched if they have an academic index below the institutional mean academic index. In this scenario, both moderately qualified and least qualified students by SEL-1 standards that attend SEL-1 schools are categorized as overmatched. While a student may be considered to be moderately qualified or least qualified at an SEL-1 institution, their academic qualifications may place them in a different category depending upon at which level of selectivity the student is enrolled. For example, a moderately qualified student at an SEL-1 institution may be classified as most qualified at an SEL-2 or SEL-3 school by their respective institutional standards.

Affirmative action is hypothesized to have a negative effect on degree completion. The negative effect of affirmative action on completion rates may exist since the academic qualifications of the affirmative action students are far below the institutional mean. Attending a university that matches student academic qualifications is hypothesized to have a positive effect on graduation rate, while mismatch of both types (overmatch and undermatch) is expected to have a negative effect on completion. Based

on the literature review, overmatching is hypothesized to produce student attrition because students enrolled at colleges or universities that far exceed their academic capabilities have lower probabilities of obtaining the credentials needed to graduate. Undermatching is expected to have a negative effect on degree completion because the most qualified students who attend universities without sufficient academic resources may dropout due to program or institutional dissatisfaction.

Analysis

The model used for this dissertation is drawn from Bowen and Bok (1998) and Sander (2004). Variables were selected based on the extensive literature on the effects of race-based policies on postsecondary outcomes for minority students (see Bowen et al. 2009; Roderick et al. 2011; Perry et al. 2003; Fryer and Loury 2005; Bailey and Dynarski 2011). The outcome in this study is college completion. Completion is defined as graduating from a selective college or university within six years of enrollment. The model is composed of four factors: student and family background, pre-college academic qualifications, institutional characteristics and financial aid, and student performance in college. The variables for the student and family background factor are: age (at the time of enrollment), race, gender, dependency status, parents' education, and family income. The pre-college academic qualifications variables are SAT, GPA, high school courses (number and type), and remediation. The university characteristic variables are selectivity, institutional status, tuition, work study, grants, and loans. The student performance in college variables are first-year GPA, academic integration, social integration, GPA in the final year of enrollment, and field of study (major).

Descriptive statistics are used to evaluate the selected variables and the relationships between them. A chi-square analysis tests for differences in the traits of students who enroll at selective postsecondary institutions. Logistic regression is used to describe the relationship and find the best fit between the dependent variable (degree completion) and the independent, explanatory variables. I will estimate the effects of the predictor variables – affirmative action and college match – on degree completion with multivariate controls.

Two logistic regression models are estimated:

Equation 3 Academic Index: Regression Model

$$\log\left(\frac{p_i}{1-p_i}\right) = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \varepsilon_i \quad (1) \text{ and } (2)$$

where p_i is the probability of degree completion for the affirmative action model in (1) and in the college match model in (2). X_1 is a vector that represents (1) academic index score, and (2) institutional selectivity. X_2 is a vector of student and family background variables including age and gender. X_3 is a vector of pre-college academic qualifications. X_4 is a vector of university characteristics like price of attendance. X_5 is a vector that represents student performance in college such as first-year grade point average and social integration. The estimated parameters are expressed as $\alpha, \beta_1, \beta_2, \beta_3, \beta_4,$ and β_5 , while ε_i is the random error term.

The magnitude of the effect of the predictor variables of affirmative action and college match is stated as the odds ratio. The standard errors are estimated based on the

weighting and the clustering of the sample (*Stata* 2014). Significant odds ratios are recorded as a representation of the change in probability of degree completion holding other variables constant (Dowd and Coury 2006; Cofer and Somers 2001).

To most accurately calculate the unbiased estimates and standard errors for the complex probability cluster design used in the BPS to examine student characteristics, balanced repeated replication (BRR) regressions were used. This technique was applied in an effort to capture the statistical impact of clustering, stratification, and the probability of being chosen to participate in the BPS study for each racial group. The BRR regression models for affirmative action and college matching follow the same equation used to estimate the weighted logistic regression models.

Data

The data used for this study is the 2003-2009 Beginning Postsecondary Students Longitudinal Study (BPS:04/09). The nationally representative survey is drawn from the National Postsecondary Student Aid Study (NPSAS), which investigates how students pay for college. BPS gathers an array of data including but not limited to educational and occupational goals, demographic and socioeconomic information, public and private financial aid allocations, and degree attainment. BPS captures the range of paths students take throughout their postsecondary careers and can be used to explore topics of policy significance such as the impact of loans on persistence and completion as well as the amount of postsecondary education needed to receive a wage premium in the labor market.

BPS:04/09 is the most recent iteration of the survey. BPS:04/09 survey participants were originally questioned at the end of the 2003-2004 academic year, their first in postsecondary education. The students were invited to complete two follow-up interviews at the end of the 2005-2006 academic year, the third year of postsecondary study, and in academic year 2008-2009, six years post-enrollment.

Sample

The sample was selected by first limiting the sample to students enrolled at institutions that award a BA degree and use standardized test scores as a criterion for admission ($n=7,820$). As the focus of this study is on postsecondary outcomes at selective institutions, for-profit universities, non-degree granting 2-year community colleges, and 4-year open enrollment institutions that accept but do not require standardized test scores were excluded ($n=7,620$). In addition, missing cases or cases with a zero were not included.

Limiting the analysis to black, white, Hispanic, and Asian students further reduced the sample. Enrollees who identified as American Indian or Alaska Native, Native Hawaiian or other Pacific Islander, or Other were excluded from the sample. The analytic sample N is approximately 7,260. Table 3 provides student enrollment percentages for each race by institutional selectivity.

Table 3 Percent Enrolled by Race and Selectivity Level*

Selectivity	Race			
	Black	Hispanic	Asian	White
SEL-1	29	27	52	26
SEL-2	54	54	43	61
SEL-3	17	19	5	13
(N)	(650)	(630)	(440)	(5,540)

*Weighted to reflect universe proportions; all N's in this and other tables are rounded to nearest 10

Of the black students enrolled at selective universities in 2003-2004, about 30% attended SEL-1 institutions. Over 50% of black students enrolled at moderately selective schools while 17% attended minimally selective colleges and universities. Hispanic students enrolled at SEL-1, SEL-2, and SEL-3 institutions at about the same rate as their black peers. White enrollment at the most selective institutions is slightly lower than black and Hispanic enrollment. Like black and Hispanic students, more white students enroll at moderately selective institutions than at the other selective schools. About 13% of white students enrolled at SEL-3 colleges and universities. Asian students are more likely to attend SEL-1 institutions than enroll at another campus. About half of the Asian students sampled in the survey attended a most selective college. 43% of Asian students enrolled at SEL-2 schools, and 5% attended a minimally selective college or university.

With regard to understanding the extent to which affirmative action and college matching impact degree completion rates for affected minority groups, one must first discern the distribution of academic qualifications across the racial groups and the institutional selectivity levels in order to determine how much affirmative action takes place at elite colleges and universities. Table 4 describes the mean academic index scores for the sampled students by race/ethnicity as well as institutional selectivity. Students are

sorted into three categories based on mean academic index score: most qualified, moderately qualified, and least qualified. Students who are considered to be most qualified have an academic index at or above the institutional average. Students who are considered to be moderately qualified have a mean index score within one standard deviation (120 points) of the mean index score for the institution; as their scores are within one standard deviation of the institutional mean, these undergraduates are not considered to be affirmative action students. Students with a mean academic score more than one standard deviation below the institutional mean are grouped as least qualified and are considered to be affirmative action students. For example, students who attended an SEL-2 institution and had an academic index of 656 or higher are sorted into the most qualified category.

As reported earlier in the Modeling Institutional Selectivity section of this chapter, the mean academic index on a 1,000-point scale for all students enrolled at the most selective institutions was 757. White students had a mean index score of 780, and Asian students had a mean index score of 784. Hispanic students had a mean score of 709. While this score is less than the mean academic index score of White and Asian enrollees at SEL-1 institution, students not typically associated with affirmative action, this score is within the 120-point standard deviation used to determine if affirmative action has been applied and is not considered to be affirmative action. The mean academic index for Black students at SEL-1 colleges and universities is 604; this score is below the threshold considered for affirmative action at SEL-1 institutions.

Table 4 Mean Academic Index by Race/Ethnicity and Selectivity

Selectivity	Black	Hispanic	Asian	White	All Students^a
Mean Academic Index					
SEL-1	604	709	784	780	757
SEL-2	550	604	653	672	656
SEL-3	509	547	620	626	602
(N)	(580)	(530)	(370)	(5,270)	(7,090)

Data: BPS:04/09

^a All Students also includes about 340 students from the “Other” racial category.

The mean academic index at SEL-2 institutions is 656. White students had the highest mean academic index score at 672. Asian students had a mean index score of 653. Hispanic and Black students had mean academic index scores of 604 and 550, respectively. No average index score for any racial group fell below the affirmative action threshold at SEL-2 institutions.

The mean academic index at SEL-3 institutions follows similar patterns to those at SEL-2 schools. The mean academic index at SEL-3 colleges is 602. White students had the highest mean AI score at 626, Asian students had a mean score of 620, Hispanic students had a mean index score of 547, and Black students had a mean academic index score of 509. Similar to SEL-2 campuses, no racial group had a mean academic index score below the affirmative action threshold for SEL-3 colleges.

The illustrative empirical analysis reported in Table 4 indicates that Black and Hispanic students, groups often associate with affirmative action, have mean pre-college academic qualifications that are lower than their White and Asian peers, which may result in overrepresentation of minority students with lower academic qualifications at selective postsecondary institutions. It is hypothesized that attending a college that does not match

incoming academic qualifications, also known as overmatching, is likely to lower postsecondary completion rates.

RESULTS

This chapter describes the findings pertaining to the extent to which affirmative action and college matching influence six-year postsecondary graduation rates at selective institutions. This chapter is organized into three sections. The first provides descriptive statistics for the first-time entrant student population. The second explores the relationship between affirmative action or matching and degree completion across racial groups and institutional selectivity, before introducing control variables. The third examines regression analyses that describe the statistical significance of affirmative action and matching variables on postsecondary completion after controlling for other factors that influence completion.

Descriptive Statistics

As reported in Table 5, about 64% of all students who were first-time entrants in the 2003-2004 academic year graduated within six years of enrollment. Regarding the demographic profile of this sample, on average students in the sample were 19 years old, and, not surprisingly just over half of the students were female. Nearly all students (95%) in the sample were financially dependent upon their parents. Parents of these students are definitely middle class or above, with parents averaging 15 years of education and having mean family income of nearly \$70,000.

Table 5 Variable Definitions and Descriptive Statistics

Variables	Measure	Mean/%	SD	Min	Max
<i>Dependent Variable</i>					
Graduation within 6 years	Percent	64.2	4.79	0	100
<i>Student and Family Background</i>					
Age in years	Mean	18.8	3.09	16	62
Male	Percent	44.5	0.50	0	100
Dependent student	Percent	95.3	0.42	0	100
Parents' education in years	Mean	15.1	2.44	10	18
Family Income ^a	Mean	\$ 69,103	\$ 40,977	\$ 3,000	\$130,000
<i>HS Academic Qualifications</i>					
Mean SAT	Mean	1,071	182.63	440	1,600
Mean GPA ^b	Mean	3.4	0.45	0.75	3.75
High School Courses	Mean	16.2	4.23	0	20
Remediation	Percent	17.4	0.38	0	100
<i>Institutional Characteristics and Financial Aid^c</i>					
Public	Percent	65.6	0.47	0	100
Tuition	Mean	\$ 11,441	\$ 9,126	\$ 104	\$ 39,509
Work Study	Mean	\$ 301	\$ 758	\$ 0	\$ 6,000
Total Grants	Mean	\$ 6,614	\$ 2,899	\$ 2,300	\$ 10,558
Total Loans	Mean	\$ 5,363	\$ 3,123	\$ 2,300	\$ 10,720
<i>Student Performance in College</i>					
First Year GPA ^b	Mean	2.9	0.75	0	4
Academic Integration	Mean	91.1	40.88	0	200
Social Integration	Mean	68.5	52.75	0	200
Last Year GPA ^c	Mean	5.4	1.20	1	7
<i>Major</i>					
Humanities	Percent	8.0	0.27	0	100
Social Science	Percent	7.2	0.26	0	100
STEM	Percent	17.8	0.38	0	100
Business	Percent	12.0	0.22	0	100
Other Professional Degree	Percent	26.3	0.44	0	100

Data: BPS:04/09, Subpopulation: First-time entrants in academic year 2003-2004 at selective institutions

N = 7,620 except about 7,200 for mean SAT and GPA

^a Family Income is considered to be parents' income if the student is dependent and student income if the student is independent.

^b The BPS study used different coding for the three GPA variables; for more information, see the BPS:04/09 *National Center for Education Statistics PowerStats* guide

^c The financial aid means are presented in dollars in this table, but logs are used in the multivariate analysis for tuition, total grants, and total loans.

Regarding academic qualifications, the mean GPA was 3.4. The sample completed about 16 of the 20 academic courses often associated with high school curriculum – four years of math, English, social studies, science, and foreign language courses. Only 17% of the students required remediation before proceeding with university-level curriculum.

There are several relevant institutional characteristics. About two-thirds of the first-time undergraduates enrolled at a public campus. The average cost of tuition at a selective college during the 2003-2004 academic year was a little more than \$11,000. As for financial aid, the students sampled who participated in work-study were awarded about \$300 per academic year. In addition, students in the sample who were awarded grants received about \$6,600 throughout their undergraduate careers while on average, students who obtained loans received about \$5,400 while enrolled.

Finally, the table shows a number of variables describing student performance in college. On average, students in the sample received a 2.9 GPA on a 4.0 scale after completion of their first year in college. On the academic integration scale, the average score is 91 and on the social integration scale the average is 69. The last year GPA average is 5.4 on a 7.0 scale¹⁹. Regarding major, 12% chose business, 8% humanities, 7% social sciences, and 18% chose a major in the sciences or mathematics.

Before examining the extent to which affirmative action and college matching impact degree completion rates for affected minority groups, a description of the distribution of academic qualifications across the racial groups and institutional

¹⁹ This GPA translates to a range of 2.75-3.24 on the traditional 4.0 GPA scale. For more information, see the BPS:04/09 *National Center for Education Statistics PowerStats* guide.

selectivity levels is provided in order to determine how much affirmative action takes place at elite colleges and universities. Much of the affirmative action research references Black and Hispanic students as the prime beneficiaries of affirmative action admissions policies in higher education. The results in Table 6 concur with previous studies that depict underrepresented minorities as the primary recipients of affirmative action.

Considering SEL-1 colleges first, while the majority of white and Asian students were considered to be most qualified according to their mean academic index scores, only 44 percent of Hispanic students and 20 percent of black enrollees were considered to be most qualified. Another 24 percent of black students and 34 percent of Hispanic students are moderately qualified and are not considered to be affirmative action students. Only 21 percent of Asian enrollees and 29 percent of white students were classified as moderately qualified. While only 7 percent of white students and 9 percent of Asian enrollees are least qualified, 22 percent of Hispanic students and more than half of black first-time entrants were classified as least qualified. The least qualified black and Hispanic students in the sample are considered to be affirmative action enrollees.

Table 6 Academic Index Categories: Enrollment Percentages by Race and Selectivity

	Black	Hispanic	Asian	White	All Students^a
SEL-1					
Most Qualified	20	44	69	64	60
Moderately Qualified	24	34	21	29	29
Least Qualified	56	22	9	7	11
(N)	(190)	(170)	(230)	(1,440)	(2,030)
SEL-2					
Most Qualified	36	43	58	61	57
Moderately Qualified	26	31	29	27	27
Least Qualified	38	26	13	12	16
(N)	(350)	(340)	(190)	(3,370)	(4,250)
SEL-3^b					
Most Qualified	52	45	68	67	63
Moderately Qualified	25	31	32	23	24
Least Qualified	23	24	0	10	13
(N)	(110)	(120)	(20)	(730)	(990)

Data: BPS:04/09

^a“All Students” includes percentage enrollments at the three groups of selective institutions for students from the “Other” racial category but does not include the numerical totals (N) for these students.

^bSEL-3 institutions will not be included in the affirmative action analysis as these schools are unlikely to use affirmative action; however, SEL-3 schools will be discussed in the college matching analysis.

Turning to SEL-2 institutions, the majority of white and Asian enrollees fall into the most qualified category while only 43 percent of Hispanic and 36 percent of black enrollees were considered to be most qualified. Across all racial groups, the distribution of moderately qualified enrollees at SEL-2 institutions is comparable, ranging from 26 percent for black undergraduates and 31 percent for Hispanic students. More black students were considered to be admitted by affirmative action than Hispanic enrollees, 38 percent compared to 26 percent.

Unlike the mean academic qualifications reported for black students at SEL-1 and SEL-2 institutions, the majority of black undergraduates at SEL-3 colleges and universities had index scores above the affirmative action threshold. At SEL-3 colleges

and universities, the majority of white, Asian, and black students had academic index scores at or above the most qualified cutoff score at 67%, 68%, and 52%, respectively. Nonetheless, only forty-five percent of Hispanic first-time enrollees were classified as most qualified. Much like both SEL-1 and SEL-2 institutions, the distribution of moderately qualified students at SEL-3 campuses is similar across racial group ranging from 23 percent for white students to 32 percent of Asian students. About one quarter of black and Hispanic students are least qualified, but no Asian students and only 10 percent of white students were in the least qualified group. Though SEL-3 institutions enroll students with vast differences in pre-college academic qualifications used to assess affirmative action, these colleges and universities are unlikely to use affirmative action enrollment policies. Therefore, SEL-3 institutions will not be included when addressing the two-way relationship between academic qualifications and degree completion in the affirmative action analysis. SEL-3 colleges and universities will be included in the college matching analysis as the previous table demonstrates the potential for a substantial percentage of students enrolled at SEL-3 students to be mismatched.

Estimating Six-Year Baccalaureate Degree Completion Rates

This section assesses the basic relationship between pre-college academic qualifications based on the academic index and six-year degree completion across the racial groups before adding control variables. That is, what is the basic evidence for the affirmative action and matching hypotheses without considering the potential impact of other correlates of degree completion?

Estimating the Effect of Affirmative Action for Six-Year Baccalaureate Degree Completion Rates

Tables 7 and 8 report results from the two-way test examining the affirmative action hypothesis, that is whether black and Hispanic students likely admitted by affirmative action have lower graduation rates than white or Asian students. Table 7 presents the affirmative action analysis at the most selective (SEL-1) colleges and universities, while Table 8 does the same for SEL-2 schools²⁰.

Table 7 begins by examining the six-year degree completion rates for black students, the group who has received the most attention in affirmative action discussions. The graduation rates for most qualified and moderately qualified black students – those not considered to be enrolled by affirmative action – were 73% and 85%, respectively. These results are fairly comparable to the completion rates of white enrollees at SEL-1 institutions, which were 87% and 82%, respectively.

To contrast, the graduation rates for the least qualified black students – enrollees in the affirmative action category – was significantly lower at only 47%, as compared to over 60% of the least qualified Asian and white students. Since fewer than half of the presumed black affirmative action students completed college within six years compared to 73% of most qualified and 85% of moderately qualified black undergraduates at SEL-1 institutions, this data confirms the affirmative action hypothesis for black enrollees at the most selective colleges and universities. That is, affirmative action black students are

²⁰ The SEL-3 Affirmative Action analysis was conducted, but few significant relationships were reported for the racial groups. Asian students were the only students with graduation rates at or above 50%; however, there were no “least qualified” Asian students at minimally selective schools thus there is no significant relationship between graduation rates and academic index score found for Asian students.

less likely to graduate than more qualified black students, at least before introducing control variables.

Table 7 Six-Year Completion Rates at SEL-1 Institutions by Race and Academic Index

Selectivity	Black***	Hispanic*	Asian*	White***	All Students^a
Mean Academic Index					
Most Qualified	73	55	82	87	81
Moderately Qualified	85	71	82	82	76
Least Qualified	47	45	61	63	53
All Students	61	59	80	84	72
(N)	(190)	(170)	(230)	(1,440)	(2,270)

Data: BPS:04/09

Differences significant at *** p<.001; ** p<.01; * p<.05

^a“All Students” includes percentage enrollments at the three groups of selective institutions for students from the “Other” racial category but does not include the numerical totals (N) for these students.

Turning to Hispanic undergraduates, another group who has received attention in affirmative action discussions, the six-year graduation rates for most qualified Hispanic enrollees was only 55% whereas 71% of moderately qualified Hispanic students enrolled at SEL-1 institutions finished college within six years of entry. The degree completion rates for Hispanic students not considered to be affirmative action enrollees is substantially lower than the graduation rates of white and Asian students, groups not often associated with affirmative action. In addition, the degree completion rates for most and moderately qualified Hispanic undergraduates at SEL-1 colleges are much lower than their most qualified and moderately qualified black peers, all else held constant. Still, the six-year degree completion rates for affirmative action Hispanic students at SEL-1 campuses was 45%, comparable to the 47% degree completion rate for least qualified black students. Much like for black undergraduates at SEL-1 colleges and universities,

this data confirms that the least qualified Hispanic undergraduates were less likely to receive a degree in six years than moderately qualified Hispanic students before including control variables, although they are only 10 percentage points less likely to graduate than the most qualified group.

Table 8 reports the two-way relationship between mean academic qualifications and six-year degree completion for students attending college at moderately selective campuses. For both most qualified and moderately qualified black students enrolled at SEL-2 institutions – groups not considered to be admitted by affirmative action –, the six-year graduation rate was 58%. These results also approximate those of white and Asian most qualified and moderately qualified undergraduates enrolled at SEL-2 campuses. Indeed, the degree completion rates for moderately qualified black enrollees was marginally higher than the 54% degree completion rate for moderately qualified Asian students. Nevertheless, the six-year graduation rates for the least qualified black students – the presumed affirmative action category – was significantly lower at only 39%. While the degree completion rate for least qualified white students is comparable at 44%, about 80% of least qualified Asian students at SEL-2 received a degree within six years of enrollment. Since fewer than 40% of the presumed black affirmative action students completed college within six years compared to 58% of most and moderately qualified black undergraduates, this data confirms the affirmative action hypothesis at SEL-2 institutions.

Table 8 Six-Year Completion Rates at SEL-2 Institutions by Race and Academic Index

Selectivity	Black**	Hispanic**	Asian	White***	All Students^a
Mean Academic Index					
Most Qualified	58	60	68	73	66
Moderately Qualified	58	57	54	60	57
Least Qualified	39	35	80	44	40
All Students	51	53	66	66	58
(N)	(350)	(340)	(190)	(3,370)	(4,250)

Data: BPS:04/09

Differences significant at *** $p < .001$; ** $p < .01$; * $p < .05$

^a“All Students” includes percentage enrollments at the three groups of selective institutions for students from the “Other” racial category but does not include the numerical totals (N) for these students.

For Hispanic undergraduates, the six-year graduation rates for most and moderately qualified Hispanic enrollees were 60% and 57%, respectively. These rates are comparable to the graduation rates of white and Asian students, as well as to their most and moderately qualified black peers. In addition, the six-year degree completion rates for affirmative action Hispanic students was 35%, much lower than their more qualified peers. Similar to black undergraduates at SEL-2 colleges and universities, this data confirms the hypothesis that affirmative action Hispanic students were less likely to graduate than more qualified Hispanic students before including control variables.

Estimating the College Matching Hypothesis for Six-Year Baccalaureate Degree Completion Rates

Tables 9 through 12 present results from the two-way test of the college matching hypothesis by examining the extent to which a relationship exists between academic qualifications and college completion across institutional selectivity for each racial group. This analysis assesses how mismatch – especially undermatching – can impact degree completion. Students are considered to be well matched if their academic qualifications are similar to the mean institutional average of the college or university in which they are

enrolled. The most overmatched students are the least qualified students at SEL-1 colleges, while the most undermatched students are the most qualified students at SEL-3 schools. Contrasting the affirmative action analysis, which highlights graduation rates for black and Hispanic undergraduates, groups most often associated with affirmative action, the mismatch analysis focuses on all of the racial groups in this study.

Table 9 presents the matching analysis for black students at SEL-1, SEL-2, and SEL-3 institutions. Again, the question is whether being enrolled at an institution that does not match student academic qualifications impacts degree completion. The primary mismatch cells are most qualified at SEL-3 schools, which implies undermatching, and least qualified at SEL-1 colleges, which implies overmatching. The matched cells are most qualified at SEL-1 schools, moderately qualified at SEL-2 schools, and least qualified at SEL-3 institutions.

The undermatched black students at SEL-3 schools have a very low graduation rate, just 23 percent, even though they have above average qualifications. This is far lower than the 73 percent rate for well-matched group, a statistically significant difference. This supports the undermatching hypothesis for black students, which cautions against highly qualified students attending less selective postsecondary institutions. With respect to the overmatched black students, the hypothesis is not supported. The least qualified black students at SEL-1 colleges have a 47 percent graduation rate, compared to only 31 percent for the matched students at SEL-3 institutions. The overmatched black students comprise the affirmative action group in the previous analysis. While these overmatched students have much lower graduation rates

than the most qualified black students at SEL-1 colleges, they do have a higher graduation rate than least qualified black students who attend SEL-3 schools. It would appear that the institutional influence trumps the overmatch influence, because graduation rates at SEL-3 schools are uniformly low: 23, 12, and 31 percent, respectively for most moderately, and least qualified students.

Table 9 Six-Year Completion Rates for Black Students by Academic Index and Selectivity

Selectivity	Most Qualified***	Moderately Qualified	Least Qualified	All Students
SEL-1	73	85	47	66
SEL-2	45	74	46	55
SEL-3	23	12	31	23
All Students	45	75	44	55
(N)	(120)	(130)	(390)	(650)

Data: BPS:04/09

Differences significant at *** p<.001; ** p<.01; * p<.05

Table 10 presents the matching analysis for Hispanic students at SEL-1, SEL-2, and SEL-3 institutions. Like their black peers, the undermatched Hispanic undergraduates at SEL-3 schools have a very low graduation rate, just 34 percent, despite having above average qualifications. Though this finding is substantially lower than the 56% completion rate for the well-matched group, this difference is not statistically significant. These results support the undermatching hypothesis for Hispanic students, which advises against well qualified students attending less selective colleges.

Table 10 Six-Year Completion Rates for Hispanic Students by Academic Index and Selectivity

Selectivity	Most Qualified	Moderately Qualified	Least Qualified	All Students
SEL-1	56	71	45	66
SEL-2	55	67	45	55
SEL-3	34	68	21	40
All Students	52	69	39	56
(N)	(220)	(160)	(250)	(630)

Data: BPS:04/09

Differences significant at *** p<.001; ** p<.01; * p<.05

Also similar to the overmatched black students, the overmatching hypothesis is not supported for Hispanic students. The least qualified Hispanic undergraduates at SEL-1 colleges have a 45 percent graduation rate, compared to only 21 percent for the matched students at SEL-3 institutions. The overmatched Hispanic students were sorted into the affirmative action group in the previous analysis. While these overmatched students have substantially lower graduation rates than the well qualified Hispanic students, they have a much higher graduation rate than the least qualified Hispanic enrollees who attended SEL-3 colleges.

Table 11 presents the results that evaluate the two-way association between six-year degree completion and pre-college academic qualifications for Asian students enrolled at selective postsecondary institutions, before the addition of control variables. Like their black and Hispanic peers, the undermatched Asian undergraduates at SEL-3 schools have lower graduation rates than their most qualified counterparts enrolled at an SEL-1 campus. The 60 percent graduation rate for the most qualified Asian students attending SEL-3 schools and the 65 percent rate for those at SEL-2 schools, are considerably lower than the 82 percent completion rate for the well-matched group, and

these are statistically significant differences.²¹ This finding supports the undermatching hypothesis for Asian students. Despite most qualified students enrolled at SEL-3 institutions having relatively high graduation rates, degree completion for well-qualified students at the most elite colleges is more than twenty percentage points higher.

Table 11 Six-Year Completion Rates for Asian Students by Academic Index and Selectivity

Selectivity	Most Qualified**	Moderately Qualified	Least Qualified	All Students
SEL-1	82	82	61	82
SEL-2	65	69	64	65
SEL-3	60	80	44	62
All Students	77	75	61	74
(N)	(230)	(120)	(90)	(440)

Data: BPS:04/09

Differences significant at *** p<.001; ** p<.01; * p<.05

Much like the overmatched black and Hispanic undergraduates, the overmatching hypothesis is not upheld for Asian students enrolled at selective institutions. For the least qualified Asian enrollees at SEL-1 colleges, 61% received a degree compared to only 44% at SEL-3 universities. Although the overmatched Asian undergraduates have substantially lower graduation rates relative to their most qualified peers, the overmatched Asian students have considerably higher graduation rates than their least qualified counterparts attending SEL-3 schools.

Finally, Table 12 reports the matching results for white students. Like their black, Hispanic, and Asian peers, the undermatched white students at SEL-3 schools have substantially lower graduation rates than their most qualified counterparts enrolled at an

²¹ There are only 16 most qualified Asian students attending SEL-3 schools, compared to 110 at SEL-2 schools, so the statistical significance may be influenced by the N at SEL-2 institutions for Asian students (see Table 6).

SEL-1 campus. The 37 percent graduation rate for most qualified white undergraduates attending SEL-3 schools is far lower than the 87 percent completion rate for the well-matched group, a statistically significant difference. Thus the undermatching hypothesis is confirmed for white students before addition of controls.

Table 12 Six-Year Completion Rates for White Students by Academic Index and Selectivity

Selectivity	Most Qualified***	Moderately Qualified***	Least Qualified***	All Students
SEL-1	87	82	63	82
SEL-2	71	74	52	70
SEL-3	37	57	38	45
All Students	74	74	50	70
(N)	(2,150)	(1,970)	(1,410)	(5,530)

Data: BPS:04/09

Differences significant at *** p<.001; ** p<.01; * p<.05

With respect to the overmatched white students, the hypothesis is not supported, a finding that is consistent across the racial groups. The 63 percent completion rate for least qualified SEL-1 students is decidedly higher than the 38 percent degree completion rate for the least qualified SEL-1 students, also a statistically significant difference.

One additional point is worth noting. The moderately qualified Hispanic, Asian, and white students attending SEL-3 institutions have considerably higher graduation rates, by 20 points or more, than the most qualified at SEL-3 schools (the undermatched) and the least qualified students at SEL-3 schools (matched). This variation is not anticipated by the current matching theory, and it might call for theory revision if replicated in other research.

Estimating the Effects of Affirmative Action with Control Variables

This section estimates the effects of affirmative action by assessing the relationship between academic qualifications and six-year degree completion for black and Hispanic students with control variables. Even though the two-way analysis tested affirmative action effects without controls, the uncontrolled analysis is repeated because of the use of logistic regression, so that the magnitude of uncontrolled effects (as odds ratios) can be compared to the effects after control variables are added.

It is important to note that the regression results presented in this chapter are from the data produced by the weighted logistic regressions. This technique corrects for the disproportionate sampling in the strata but not for the variability in other parameters. The BRR technique was unable to yield reliable standard errors in both the affirmative action and college matching analyses for the racial groups with small Ns when control variables were added to the analysis. It is unclear why this failure occurred; nonetheless, the following regression results in this chapter are to be considered provisional.

Tables 13 and 14 present the results from the affirmative action multivariate analyses²² for black and Hispanic undergraduates enrolled at SEL-1 and SEL-2 institutions²³. The regression results are shown for two models: the first model is a logistic regression analysis without control variables while the second model provides regression analyses that include the variables listed in Table 5. Many of the statistically

²² Statistical significance for both the affirmative action and college matching logistic regression analyses is based on BPS:04/09 weighted results. The balanced repeated replication (BRR) regressions were conducted but were not used for this section of this study. Results from these regressions can be found in Appendix A.

²³ Asian and white students are omitted from the affirmative action regression analysis as they were selected as the control group.

significant associations found in the two-way analysis between pre-college academic qualifications and degree completion are replicated in the uncontrolled model.

Table 13 reports the regression results for the affirmative action students who attended SEL-1 postsecondary institutions. Looking first at the uncontrolled model for black and Hispanic students, there is a negative and statistically significant relationship between being least qualified and degree completion before controls are added, as shown in Table 7. The odds ratio shows that the least qualified black students are 77% less likely to graduate than their better-qualified peers while least qualified Hispanic enrollees are 61% less likely to receive a degree than their better-qualified peers.

When control variables are added, important changes occur. For black students, the negative relationship strengthens: black students are 95% less likely to graduate from college than their more qualified peers, and this is a statistically significant difference. For Hispanic students, however, the affirmative action effect remains about the same strength after controls are added, but the relationship is no longer statistically significant.

Regarding the control variables for black undergraduates at SEL-1 schools, the logistic regression shows only four other variables have statistically significant effects on graduation rates: age, dependency, last year GPA, and major. Older students enrolled at SEL-1 institutions are 64% less likely to receive a degree than their younger peers, and being a dependent student has a strong negative association with degree completion. This latter finding is contrary to previous research suggesting that being a dependent student is positively related to degree completion.

Table 13 Affirmative Action Regression Results for SEL-1 Institutions

Variable	Black		Hispanic	
	Odds Ratio no controls	Odds Ratio controls	Odds Ratio no controls	Odds Ratio controls
Least Qualified ^a	0.23***	0.05***	0.39*	0.35
Male		0.91		0.30
Age in years		0.36*		0.36**
Parents' education in years		0.90		1.10
Family Income		1.02		1.01
Dependent student		0.01**		4.60
High School Courses		0.98		0.84
Remediation		0.73		0.55
Public		0.81		4.96*
Log of Tuition		1.14		4.49***
Work Study		1.00		1.00
Log of Grants		0.92		1.05
Log of Loans		1.03		1.04
First Year GPA		1.49		7.36**
Last Year GPA		2.55***		2.64**
Acad. Integration		0.99		1.02
Soc. Integration		1.00		1.00
Major				
Humanities		3.34		1.00 ^b
Social Science		0.23*		5.78
STEM		6.01*		5.51*
Business		1.68		0.33
<i>Model Specifications</i>				
Observations	170	160	170	150
Wald Chi-square	14.14	64.76	5.47	250.55
Prob > Chi-square	<0.001	<0.001	<0.05	<0.001
R ²	0.0817	0.4155	0.0248	0.5890

Data: BPS:04/09

Differences significant at *** p<.001; ** p<.01; * p<.05

^aat SEL-1 institutions vs. average or above average qualifications

^bHispanic students omitted.

Academic performance in the last year of enrollment has a strong positive association with degree completion. With regard to field of study, majoring in the Social Sciences is negatively related to degree completion while those who chose a STEM major were six times more likely to receive a degree than their peers.

For Hispanic students, even though the affirmative action effect is not statistically significant, six other control variables are significant. Age has a negative effect (much like for black students), while being in a public institution, tuition costs, first and last year GPA, and choosing a STEM major are all strongly and positively related to degree completion for Hispanic undergraduates enrolled at SEL-1 colleges.

Table 14 reports the regression results for black and Hispanic students who attended SEL-2 postsecondary institutions. Again, for the uncontrolled model, there is a negative and statistically significant association between being in the least qualified group and degree completion for black and Hispanic students before controls are included, as shown in Table 8. The least qualified black students were 48% less likely to receive a degree than their better qualified counterparts while least qualified Hispanic students were 64% less likely to complete college than their better qualified peers.

Important changes occur when the control variables are added. For black students, the negative affirmative action relationship is no longer significant. For Hispanic students, the likelihood of receiving a degree decreases further and retains statistical significance. After the addition of control variables, least qualified Hispanic students are 75% less likely to complete college than better qualified students.

Table 14 Affirmative Action Regression Results for SEL-2 Institutions

Variable	Black		Hispanic	
	Odds Ratio no controls	Odds Ratio controls	Odds Ratio no controls	Odds Ratio controls
Least Qualified ^a	0.52*	0.51	0.36***	0.25**
Male		1.18		0.88
Age in years		0.97		0.92
Parents' education in years		0.92		0.99
Family Income		1.03***		1.01*
Dependent student		0.77		1.00 ^b
High School Courses		0.98		1.01
Remediation		0.69		2.59*
Public		3.16		6.61***
Log of Tuition		1.87		2.08**
Work Study		1.00*		1.00
Log of Grants		1.24		1.16
Log of Loans		1.06		0.95
First Year GPA		2.44***		2.21***
Last Year GPA		1.27		1.47*
Acad. Integration		1.01*		1.00
Soc. Integration		1.01		1.00
Major				
Humanities		0.91		3.25
Social Science		1.08		1.19
STEM		0.63		1.83
Business		1.23		1.91
<i>Model Specifications</i>				
Observations	320	310	310	280
Wald Chi-square	6.00	70.60	10.76	121.44
Prob > Chi-square	<0.05	<0.001	<0.001	<0.001
R ²	0.0179	0.2935	0.0351	0.2636

Data: BPS:04/09

Differences significant at *** p<.001; ** p<.01; * p<.05

^a at SEL-2 institutions vs. average or above average qualifications

^b Hispanic students omitted.

With respect to the control variables for black undergraduates at SEL-2 colleges, the logistic regression reports only three variables have statistically significant effects on graduation rates: family income, first year GPA, and academic integration. All three variables are positively associated with degree completion for black students enrolled at SEL-2 institutions. Students with higher family incomes are three percent more likely to receive a degree than their less affluent peers. Black students at SEL-2 colleges who participated in academic integration activities were one percent more likely to complete college than their peers. Academic performance in the first year of enrollment has a very strong and positive association with degree completion.

For Hispanic students, in addition to the statistical significance of the affirmative action effect, six other control variables are also significant: family income, remediation, attending a public institution, tuition costs, first year GPA, and last year GPA. Much like black students, family income and first year GPA have a positive relationship with college completion. In addition, remediation, attending a public institution, tuition costs, and academic performance in the final year of enrollment are all strongly and positively associated with degree completion for Hispanic undergraduates enrolled at SEL-2 universities.

Estimating the Effects of College Matching with Control Variables

Finally, this section discusses the effects of college matching after introducing control variables. Like in the affirmative action analysis, the uncontrolled analysis is repeated so that the uncontrolled odds ratios can be compared to the odds ratios after control variables are added.

Table 15 presents the results from the college matching regression analyses²⁴ for each racial group²⁵ in order to assess the extent to which undermatching influences degree completion rates. The overmatching hypotheses are not tested using regression results, because the two-way analysis in Tables 9 to 12 show no support for the overmatching hypothesis; in every case, overmatched students in SEL1 schools perform significantly better than their counterparts in SEL3 schools.

Table 15 reports the regression results for undermatched students who attended SEL-3 postsecondary institutions: students who were academically qualified to attend SEL-1 institutions yet enrolled at SEL-3 colleges. A dummy variable is also included for those enrolled in SEL-2 institutions, so that graduation rates for both SEL-3 and SEL-2 undermatched students are compared to the well-matched students attending SEL-1 colleges.

Looking at the uncontrolled models first, statistically significant negative relationships exist for undermatched black students attending SEL-3 and SEL-2 schools as shown in Table 9. Undermatched black students attending SEL-3 institutions were 91% less likely to graduate than their well-matched peers attending SEL-1 colleges. In addition, highly qualified black students attending SEL-2 were 73% less likely to graduate than those attending SEL-1 schools. Although undermatched Hispanic students were less likely to graduate than their well-matched peers, the uncontrolled relationships are not statistically significant just as in Table 10.

²⁴ Statistical significance for both the affirmative action and college matching logistic regression analyses is based on BPS:04/09 weighted results. The balanced repeated replication (BRR) regressions were conducted but were not used for this section of this study. Results from these regressions can be found in Appendix A.

²⁵ White students are included in the college matching regression analysis as each racial group may be impacted by mismatch.

Table 15 College Matching Regressions for the Most Qualified Students: Undermatching at SEL-3 and SEL-2 Institutions

Variable	Black		Hispanic		Asian		White	
	Odds Ratio no controls	Odds Ratio controls	Odds Ratio no controls	Odds Ratio controls	Odds Ratio no controls	Odds Ratio controls	Odds Ratio no controls	Odds Ratio controls
SEL-3	0.09**	0.04	0.50	0.66	0.33	0.30	0.09***	0.40**
SEL-2	0.27*	0.26	0.99	1.42	0.28**	0.18**	0.36***	0.69
Male		5.69		0.36**		0.18*		0.94
Age in years		0.91		^a		0.81		0.94*
Parents' education in years		0.97		1.12		1.22		1.10*
Family Income		1.01		1.02*		1.00		1.01**
Dependent student		0.01*		0.29		0.03		1.12
High School Courses		0.71*		^a		0.90		1.03
Remediation		0.21		2.89		0.76		0.79
Public		6.18		1.67		1.84		1.89
Log of Tuition		11.93*		^a		1.57		2.06**
Work Study		1.00		^a		1.00**		1.00
Log of Grants		1.35		1.29**		0.87		1.06
Log of Loans		1.12		0.92		0.86		1.01
First Year GPA		2.94**		^a		1.41		1.95***
Last Year GPA		4.31**		2.26***		2.61		1.49***
Acad. Integration		1.04*		1.00		1.00		1.00
Soc. Integration		0.99		1.00		1.00		1.01**
Major								
Humanities		0.11		0.80		1.19		0.87
Social Science		0.11		0.99		1.00 ^b		2.05*
STEM		0.02*		1.81		1.79		1.14
Business		0.05*		1.11		9.89		1.01
<i>Model Specifications</i>								
Observations	110	100	200	200	210	190	2,010	1,930
Wald Chi-square	9.83	70.46	1.80	82.52	6.82	68.04	93.93	258.43
Prob > Chi-square	<0.01	<0.001	>0.05	<0.001	<0.05	<0.001	<0.001	<0.001
R ²	0.1202	0.6208	0.0109	0.2997	0.0591	0.4440	0.1004	0.3405

Data: BPS:04/09

Differences significant at *** p<.001; ** p<.01; * p<.05

^a Variables omitted due to collinearity

^b Asian students omitted.

For undermatched Asian students, those in SEL-2 schools are significantly less likely to graduate than SEL-1 schools, but the relationship is not significant for SEL-3 Asian students, possibly due to a very small N for this group. Finally, white students at both SEL-3 and SEL-2 campuses were 91% and 64%, respectively, less likely to receive a degree than their well-matched counterparts enrolled in SEL-1 universities. Both of these negative effects are statistically significant as they were in Table 12.

Once the control variables are introduced, important changes occur. For black students, the negative relationship strengthens for SEL-3 students, as they are now 96 percent less likely to receive a degree than their peers in SEL-1 schools. Nevertheless, this relationship is not statistically significant at the .05 level, although it does not miss by much ($p=.07$).

Interestingly, for Hispanic students, once control variables are included, the relationship for undermatched students attending SEL-2 institutions becomes positive, though the relationship is not statistically significant.

For Asian students, after controls, the relationship for SEL-2 students gets stronger and remains statistically significant. The relationship for SEL-3 students remains non-significant. For white students, the likelihood of graduation improves for undermatched students attending SEL-3 institutions after controls, but the relationship is still negative and significant. After controls, white SEL-3 students are 60% less likely to receive a degree than their peers at SEL-1. The relationship for SEL-2 students is no longer statistically significant after controls are introduced.

With respect to the effects of control variables, there are distinctly different patterns depending on the race/ethnic group. For black students, the logistic regression results show 7 control variables that have statistically significant effects on graduation rates: dependency status, high school courses, tuition costs, first year GPA, last year GPA, academic integration, and major. For black students who are most qualified academically, dependent students were 99% less likely to receive a degree than independent students, contrary to previous research that suggests that being a dependent student is positively related to college completion. Strong positive effects are found for tuition costs as well as academic performance in the first and final years of enrollment. Participating in academic integration activities was also positively associated with degree completion for the most qualified black students. Regarding field of study, majoring in STEM and Business were negatively related to degree completion for this group of black students.

For Hispanic students, although the undermatching effect was not statistically significant, six other control variables were significant. Receiving a loan has a negative effect on undermatched SEL-3 students whereas completing the core high school courses, attending a public college or university, tuition costs, participating in work-study, and academic performance in the first year of college were positively associated with receiving a degree within six years of enrollment.

The most qualified Asian students present a very different picture with respect to control variables. The only control variables significant for this group, after controlling for selectivity, were being male and participating in work-study. Being male has a strong,

negative effect. Male Asian students were 82% less likely to receive a degree than their Asian female peers. Receiving work-study funds was positively related to degree completion.

Regarding the most academically qualified white students, there are some similarities and some differences compared to most qualified black students. Like black students, both first and last year GPA and tuition costs were strongly and positively related to graduation rates. Unlike black students, family income, social integration, and majoring in the social and behavioral sciences were positively related to graduation rates for white students.

DISCUSSION AND CONCLUSIONS

This chapter discusses the findings presented in the previous chapter and concludes the study by providing policy implications for affirmative action and college matching as well as presenting recommendations for future research.

Previous studies of the effects of affirmative action on degree completion rates at elite postsecondary institutions reveal mixed results. Lempert and his colleagues (Bowen et al. 2009; Bowen and Bok 1998; Schwartz 2004) report positive effects for minority students while Sander and others (Jencks 1993; Sander and Taylor 2012) report negative effects. This study defines affirmative action as student admission into a selective college or university whose pre-college SAT and GPA scores are more than one standard deviation below the average of the institution in which he or she enrolled and finds that a substantial percentage of black undergraduates enrolled at the most selective colleges have far lower academic qualifications relative to their peers of other races. Only 20% of black students were considered to be most qualified compared to 56% being least qualified at the most selective institutions. Least qualified black students are overrepresented at SEL-1 and SEL-2 schools, while most qualified and moderately qualified black students are underrepresented at SEL-1 and SEL-2 colleges. Though more Hispanic students were sorted into the least qualified group as compared to their white

and Asian peers – 22% compared to 7% and 9%, respectively – Hispanic undergraduates do not appear to be the primary recipients of affirmative action in this study. At moderately selective institutions, more black students were sorted into the least qualified group than the most qualified category, though moderately selective colleges and universities admitted more well-qualified students of all other racial groups than least-qualified students. Although minimally selective institutions enrolled more well-qualified students than underqualified students across all racial groups, it is unlikely that affirmative action takes place at these institutions due to the less rigorous academic criteria required for admission and enrollment.

This study reports a negative and significant effect on degree completion for black enrollees who were classified as affirmative action students at SEL-1 colleges. Least qualified black students had about a 50% graduation rate at SEL-1 schools, which is about the same as the overall graduation rate for least qualified students at SEL-1 schools. While a negative relationship between degree completion and being least qualified at SEL-1 institutions was reported for Hispanic undergraduates, the association was not significant. A negative and significant relationship between degree completion and being least qualified at moderately selective colleges was reported for both black and Hispanic students. These findings support the theoretical premise that students with low academic qualifications admitted into the most elite colleges will be less likely to receive a degree than their well-qualified peers.

With regard to college matching, earlier studies of the effects of college matching on college completion rates at selective colleges and universities caution against

mismatch of both types – overmatch and undermatch, hypothesizing that both types of mismatch lead to lower degree completion rates (Bowen et al. 2009; Anderson 2007; Sander 2004; Alon and Tienda 2005). This study presents mixed results. In this study, being overmatched, or attending a university with academic qualification more than one standard deviation below the institutional mean does not result in lower completion rates for the overmatched relative to their well-matched peers at less selective institutions. This result holds true across the racial groups. For each racial group, least qualified students enrolled at SEL-1 colleges were far more likely to receive a degree than their well-matched peers at SEL-3 institutions. This finding diverges from the literature that presumes that going to a college above one's academic qualifications is detrimental to degree completion.

Being undermatched – attending a college in which the student is overqualified – is negatively associated with degree completion across the racial groups. The association between being most qualified by SEL-1 standards and attending an SEL-2 or SEL-3 school is negative and significant for black students before controls are introduced. While the relationship is no longer significant once controls are added, the association remains negative. For white undergraduates, the relationship between being undermatched and degree completion is negative and significant before introducing controls and remains significant for undermatched white students attending SEL-3 colleges. The association between being undermatched and degree completion is negative and significant for Asian students at SEL-2 colleges before and after controls are included. These results support

the literature that theorizes that attending a college below one's academic qualification has a negative impact on degree completion.

It is important to note that, in this study, moderately qualified students across the racial groups have similar, and in many cases, better graduation rates than their well qualified peers at both SEL-1 and SEL-2 colleges, which may call for adjustments to affirmative action theories and policies. For example, at SEL-1 universities, the completion rate for moderately qualified black students is 85%, 12 percentage points higher than their most qualified peers. In addition, the completion rate for moderately qualified Hispanic students at the most selective universities is about 15 percentage points higher than their well-qualified peers. At SEL-2 schools, most and moderately qualified black students graduate at the same rate. To contrast, least qualified black students at SEL-1 colleges are nearly 40 percentage points less likely to receive a degree than their moderately qualified peers. Moreover, least qualified Hispanic undergraduates at SEL-1 schools are approximately 25 percentage points less likely to receive a degree than their moderately qualified counterparts. At SEL-2 schools, least qualified black and Hispanic students are about 20 percentage points less likely to graduate compared to moderately qualified undergraduates. This result implies that more admissions opportunities should be available to students who, according to their academic qualifications relative to mean institutional standards, would be sorted into the moderately qualified category as they are likely to receive a degree. Only 24% of the black students admitted into SEL-1 colleges were moderately qualified whereas 56% of black students were considered to be least qualified at SEL-1 schools. For the other racial

groups, more moderately qualified students enrolled at SEL-1 institutions than their least qualified peers. In addition, fewer moderately qualified black students enrolled at SEL-2 campuses than their least qualified peers while SEL-2 colleges enrolled more moderately qualified students than least qualified undergraduates across the other racial groups. Considering that moderately qualified students are more far likely to graduate than their least qualified counterparts, if more moderately qualified students were enrolled at both SEL-1 and SEL-2 colleges, the overall graduation rates for black undergraduates at selective postsecondary institutions may increase considerably.

Enrolling well-qualified students into schools that match their academic qualifications may also improve graduation rates, particularly for black, and to some extent, white undergraduates. Most qualified black and white students who attended SEL-3 colleges were 50 percentage points less likely to receive a degree than their well-qualified peers attending SEL-1 institutions. The degree completion gap widens even further for moderately qualified black students who enrolled at SEL-1 and SEL-3 colleges. Only 12% of moderately qualified black students who attended SEL-3 colleges graduated compared to 85% of moderately qualified black students who matriculated at SEL-1 institutions. Undermatched Hispanic and Asian at SEL-3 colleges had much lower graduation rates than their most qualified peers enrolled at SEL-1 and SEL-2 colleges, though moderately qualified students of both races had similar graduation rates, no matter which types of selective institution they attended.

While research does show that mismatched black students earn lower grades and complete credits more slowly than well-matched students, there is little evidence these

students experience attrition at a higher rate than their white peers (Fischer and Massey 2007). Many of the differences in postsecondary outcomes for white and black undergraduates may be attributed to other factors than race such as family background, pre-college academic qualifications and experiences, and the availability of institutional resources, which vary within and across racial groups (Kurlaender and Grodsky 2013). Though mismatch may exist, there is no evidence that the academic index metrics used to assess incoming freshmen are related to other postsecondary outcomes such as wage premiums, civic participation, and job satisfaction (Card and Krueger 2003; Bowen and Bok 1998).

As black students have had an increased presence in higher education, admissions conversations may shift from race-based considerations to those of socioeconomic status since terms like “majority” and “minority” merely reflect temporary political judgments. Bergmann (1994) notes that the shift in discourse assumes that the legislation to remedy past unequal treatment has been successful. Nonetheless, the movement toward correcting class inequities may prompt changes in affirmative action metrics and implementation (Michaels 2006).

The stratification that exists in American high schools and in the labor force also appears in the university system, influencing the access, persistence, and completion rates for students in the lowest tiers of the socioeconomic distribution. Socioeconomic differences between high-income and low-income students explain about 50% of the high school graduation and college enrollment gaps (Ellwood and Kane 2000). College graduation rates for low-income students have increased just four percentage points since

the 1960s whereas high-income students have seen increases of eighteen percentage points (Bailey and Dynarski 2011).

Indeed, low SES high schools are almost three times more likely to be disproportionately black and Hispanic (Palardy 2013). Concerned that socioeconomic stratification in primary and secondary schools would negatively affect student outcomes, Coleman (1966) investigated the racial and financial equality of scholastic opportunity in America. The study found that socioeconomic composition was most strongly associated with academic achievement, more so than per pupil expenditures, race, teacher quality, or curriculum. Palardy (2013) notes that compositional effects are typically correlated. Low SES schools tend to have fewer quality teachers, less rigorous curriculum, and have fewer resources per student. Low SES schools were about five times more likely to enroll fewer than 600 students, and these high schools were also four times more likely to be in rural, underserved areas. Curriculum rigor is important since performance in difficult courses, mathematics in particular, is a strong predictor of postsecondary admission and enrollment. Palardy asserts that since Coleman's seminal work, the effects of high school socioeconomic composition have diminished. Currently, 70% of high school students who expect to complete high school do. 75% of white students intend to finish high school compared to 50% of black students and 53% of Hispanic students (Grotsky and Jackson 2009). In 1972, 58% of high school completers attended at least one postsecondary institutions compared to the current rate of 77% (Murray 2008; Kurlaender and Grotsky 2013); however, students who graduate from high SES secondary

institutions are 68% more likely than their low SES counterparts to enroll in four-year colleges and universities (Palardy 2013).

To be sure, financial aid is seen as a tool to improve higher education participation rates for students who would otherwise be unable to afford access to postsecondary education (Turner 2012). Hauptman (2013) notes that tuition and fees have increased more than twice the rate of inflation over the past thirty years. In the 2012-2013 academic year, FTE undergraduates at public four-year institutions received \$5,750 in financial aid; these students paid an average of \$2,900, a fraction of the estimated average rate of \$8,665 for a public undergraduate education (Baum and Ma 2012).

Federal aid has made economic barriers to postsecondary entry low despite rising tuition costs. Even with the expansion of financial aid, there is a considerable amount unmet need, especially for low-income and minority students. Information asymmetry may drive need and cost discrepancies. Awareness of financial aid programs is lowest among low-income and minority students, those who stand to benefit most from tertiary access. Long (2008) suggests that low-income students and parents greatly overestimate the cost of attendance since low SES high schools often do not provide financial counseling. Equipping these groups with the knowledge needed to navigate the aid system may increase higher education participation from low-income and minority students.

Supporters of the current financial aid system claim that aid allocations increase access to higher education for low-income students (Long 2008; King 2002). It is estimated that without federal aid, low-income enrollment would be reduced by 20%-

40% for low-income students and by approximately 7% - 20% for middle-income enrollees (Long 2008; Leslie and Brinkman 1987)²⁶. Moreover, students who are most at risk of stopping out and dropping out are dependent upon financial aid provisions. Long (2008) estimates that with every \$1,000 increase in fees, the probability of within-year persistence for poor and working class students declines 16% and 19%, respectively.

While aid programs intended to benefit low-income undergraduates reduce the costs incurred by the student, students may still be priced out of the higher education market because the increase in tuition is generally lower than the subsidy provided through financial aid (Wolfram 2005). King (2002) notes that without extensive financial aid provisions, students may be priced out of their first-choice institutions, potentially causing academic mismatch.

Although the policy conversation may turn toward addressing on-campus racial disparities by accepting more students from disadvantaged socioeconomic backgrounds, this shift may be problematic as there is no consensus that amending affirmative action to include only those from lower socioeconomic backgrounds will reduce admissions inefficiencies or increase black enrollment (Fryer et al. 2008). The comparison of race-conscious policies to socioeconomic programs assumes that being poor and being black are synonymous.

Limitations

The statistical modeling in this study does not consider several factors. First, the sample considered for this study is time-censored, meaning that some students are still

²⁶ Long derives these figures from a study conducted by Leslie and Brinkman (1987).

enrolled and working toward degree completion. Second the study does not control for variation among school size, type (i.e. specialized teaching institution, PhD degree granting, etc...), or geographic location. Third, no controls exist for employment or economic conditions, factors that may have influence degree completion rates as the survey used for this study took place immediately before and during a significant economic downturn. Although the BPS survey is designed to produce a sample that is representative of students across the nation, minority students were not oversampled, meaning that the outcomes described in this study may not fully represent the experiences of minority students enrolled at selective colleges as some effects may have been insignificant due to the much smaller sample size of these groups. Finally, the regression results presented in this chapter are from the data produced by the weighted logistic regressions, not from the BRR technique. BRR regressions were unable to yield reliable standard errors in both the affirmative action and college matching analyses for the racial groups with small Ns when control variables were added to the analysis. Though it is unclear why this problem arose, the findings for the minority groups must be considered provisional.

Conclusion

Numerous studies and court cases have been conducted that assess the extent to which affirmative action exists and its effects on postsecondary outcomes (Fischer and Massey 2007; Sander 2004; Bowen and Bok 1998; Lempert et al. 2000). These and other works address frameworks and policy implications for determining how and when affirmative action and related non-merit based admissions practices should be applied.

The tension between the courts to provide the framework for race-based admissions policies and the responsibility of scholarship to address the extent to which policy benefits its intended targets is well recognized. Most analysts today accept that affirmative action is a facet of higher education admissions, though many contend that affirmative action is a policy treatment that could and should decrease, and over time, be eliminated.

Yet the evidence of the efficacy of affirmative action is inconclusive, with several scholars noting its short-term and long-term benefits such as higher wages for graduates and increased civic participation and others pinpointing performance gaps as evidence of inefficiency. In addition, there is little empirical research that assesses the effects of college matching on degree completion and other long-term postsecondary outcomes such as job placement, wages, and civic engagement. As the effects of affirmative action present inconsistent results, and little is known about college matching, more work is needed in these areas.

This study presents a review of the affirmative action and college matching literature, offers a definition for affirmative action as well as provides results regarding how affirmative action and college matching influence degree completion. It is important to note that the findings for minority students are provisional since the BRR regressions were unable to produce reliable standard errors. This study defines affirmative action as student enrollment into a university with academic qualifications far below the institutional mean. The results indicate that a little more than half of the black students at

the most selective colleges and about 40% of the black undergraduates at moderately selective universities fall into the affirmative action category.

With respect to affirmative action policies, while the data in this study reports that affirmative action students have lower graduation rates at SEL-1 colleges relative to their most and moderately qualified peers, it is also true that the graduation rates for least qualified students do not improve at SEL-2 universities and decline further for least qualified enrollees at SEL-3 institutions, as shown in Table 9. This discovery is contrary to Sander's recommendation, which claims that affirmative action students would have improved postsecondary outcomes if they attended less selective institutions. Therefore, this study does not find that affirmative action students should be excluded from more selective colleges on the basis that these students would fare better at colleges suited to their academic qualifications.

It has been noted in previous sections of this study that the policy application of affirmative action is not consistent across higher education institutions. If most selective and moderately institutions are looking to admit a larger proportion of black students who are likely to receive a degree, a policy solution would be to increase the percentage of black students considered to be moderately qualified by institutional standards.

One interesting finding is that graduation rates at SEL-3 colleges were low across the racial groups and for each academic qualification level, suggesting that undergraduates of all academic qualifications enrolled at SEL-3 institutions, would be more likely to receive a degree if they had attended a more selective college. Across all racial groups, being overmatched did not have a negative effect on degree completion.

Nonetheless, undermatch was negatively related to receiving a degree. If, as noted in the results presented here, overmatching does not reduce the likelihood of receiving a degree, these students may be at risk of not completing college if they enroll in less selective institutions. The impact of extending admissions opportunities at the most elite campuses to students other than the best qualified, particularly to more moderately qualified students should be further examined as a policy effort to improve degree completion rates for minority students.

APPENDIX A: BALANCED REPEATED REPLICATION REGRESSIONS

This appendix presents and discusses the logistic regression and balanced repeated replication (BRR) statistical techniques used for the affirmative action and college matching analyses shown in Chapter 5.

The BPS survey uses multistage and complex probability cluster design in order to analyze the characteristics of the students sampled for the survey. To most accurately compute the unbiased estimates and standard errors for the sampling design for this study, balanced repeated replications (BRR) is a recommended technique which takes into account the statistical response of clustering and stratification as well as the unequal probability of being selected to participate in the study (Kish and Frankel 1970).

The results in Chapter 5 use weighted logistic regression, which corrects for disproportionate sampling of the various strata but not for variability in other sampling parameters. The reason logistic regression was used is that the BRR techniques failed when control variables were added. It is not clear why this happened, but the results in Chapter 5 must be considered provisional.

Affirmative Action BRR Models

Tables 16 and 17 present the results from the affirmative action BRR regressions for black and Hispanic undergraduates who enrolled at SEL-1 and SEL-2 colleges, respectively. Only the uncontrolled model results are presented as most of the BRR runs failed when control variables were entered, perhaps due to the relatively small sample sizes for black and Hispanic students in the BPS survey.

Table 16 the regression results for black and Hispanic students who attended SEL-1 postsecondary institutions. Referring back to Table 13 which presents the affirmative action logistic regression results for black and Hispanic students, the uncontrolled analysis for black students reports a negative and statistically significant relationship between being least qualified and degree completion for those enrolled at the most selective campuses. Least qualified black SEL-1 undergraduates were 77% less likely to receive a degree than their well-qualified peers. In the BRR results, black students are still 77% less likely to graduate than most qualified black SEL-1 students, though this relationship is no longer statistically significant. In the logistic regression analysis in Table 13, the association between degree completion and being least qualified for Hispanic enrollees is both negative and significant. The least qualified Hispanic students attending SEL-1 colleges were 61% less likely to receive a degree than their better-qualified peers. The probability of receiving a degree for least qualified Hispanic students enrolled at SEL-1 institutions improves somewhat in the BRR regressions, though the relationship is still negative. Least qualified Hispanic students are half as likely to receive a degree than their well-qualified peers in the BRR regressions. This result is not statistically significant.

Table 16 Affirmative Action Regression Results for SEL-1 Institutions

Variable	Black	Hispanic
	Odds Ratio no controls	Odds Ratio no controls
Least Qualified ^a	0.23	0.50
<i>Model Specifications</i>		
Observations	200	190
Population size	37,220	35,930
Replicaions	198	198
Design df	200	200
F(1, 197)	3.83	0.30
Prob > F	>0.05	>0.05

Data: BPS:04/09

Differences significant at *** p<.001; ** p<.01; * p<.05

^aat SEL-1 institutions vs. average or above average qualifications

Table 17 presents the results from the affirmative action BRR analysis for black and Hispanic undergraduates who attended moderately selective institutions. Though the results in the BRR regressions are not statistically significant, they are similar to the results reported in the logistic regression examination in Table 14. In the uncontrolled logistic regression model in Table 14, least qualified black students were 48% less likely to complete college than their well-qualified peers enrolled at SEL-2 colleges. This result was statistically significant. To contrast, least qualified black SEL-2 enrollees were 54% less likely to graduate than their most qualified counterparts, although this relationship was not significant. Similar results are reported for Hispanic undergraduates. In the uncontrolled logistic regression model, being least qualified was negatively and significantly associated with college completion for least qualified Hispanic SEL-2

students. Least qualified Hispanic SEL-2 undergraduates were 64% less likely to receive a degree than their well-qualified peers. In the BRR analysis, least qualified Hispanic students enrolled at SEL-2 institutions were 62% less likely to graduate than their better qualified peers attending moderately selective colleges.

Table 17 Affirmative Action Regression Results for SEL-2 Institutions

Variable	Black	Hispanic
	Odds Ratio no controls	Odds Ratio no controls
Least Qualified ^a	0.46	0.38
<i>Model Specifications</i>		
Observations	370	350
Population size	69,450	70,650
Replicaions	198	198
Design df	200	200
F(1, 197)	1.47	1.04
Prob > F	>0.05	>0.05

Data: BPS:04/09

Differences significant at *** p<.001; ** p<.01; * p<.05

^aat SEL-2 institutions vs. average or above average qualifications

College Matching BRR Models

This section examines the uncontrolled and controlled effects of college matching. The uncontrolled analysis is conducted for all of the racial groups in this study whereas the controlled odds ratios are computed for Hispanic and white students since the the majority of the repeated replications were successful for these racial groups.

Table 18 explores the results from the BRR undermatching analysis to estimate the extent to which undermatching affects college completion. That is, BRR regressions

were conducted to examine students with the academic talent to attend SEL-1 colleges but attending least selective (SEL-3) institutions. A dummy variable was included to denote students enrolled at moderately selective (SEL-2) universities. Like in the Results chapter, the overmatching hypothesis was not tested with regression techniques since the two-way tests did not support the overmatch theory.

Looking first at the uncontrolled BRR models, negative associations are reported for all racial groups, with statistical significance reported for undermatched white students. These results are comparable to the undermatching results shown in Table 15. While statistical significance was reported for undermatched black students, the percentage likelihood of receiving a degree is nearly identical in the BRR and logistic regressions. In the uncontrolled BRR model, undermatched black students attending SEL-3 and SEL-2 colleges were 89% and 69%, respectively, less likely to graduate than their well-matched peers. In the uncontrolled logistic model, undermatched black undergraduates at SEL-3 and SEL-2 schools were 91% and 73%, respectively, less likely to graduate than the most qualified students attending SEL-1 institutions.

Table 18 College Matching Regressions for the Most Qualified Students: Undermatching at SEL-3 and SEL-2 Institutions

Variable	Black	Hispanic		Asian	White	
	Odds Ratio no controls	Odds Ratio no controls	Odds Ratio controls	Odds Ratio no controls	Odds Ratio no controls	Odds Ratio controls
SEL-3	0.11	0.41	0.78	0.32	0.09***	0.37
SEL-2	0.31	0.98	3.24	0.41	0.36***	0.63
Male			0.92			0.93
Age in years			0.97			0.98
Parents' education in years			1.01			1.09
Family Income			1.00			1.01
Dependent student			3.64			0.85
High School Courses			1.24			1.04
Remediation			1.83			0.65
Public			2.77			2.25
Log of Tuition			1.76			2.18
Work Study			1.00			1.00
Log of Grants			0.99			1.06
Log of Loans			0.96			1.01
First Year GPA			4.86			1.85
Last Year GPA			1.49			1.54
Acad. Integration			1.01			1.00
Soc. Integration			1.00			1.00
Major						
Humanities			0.24			0.80
Social Science			0.80			3.03
STEM			1.21			0.98
Business			2.33			0.90
<i>Model Specifications</i>						
Observations	130	230	210	240	2,170	2,080
Population size	31,000	38,410	37,080	45,920	368,670	356,170
Replications	193	198	173	147	198	198
Design df	190	200	170	150	200	200
F(1, 197)	0.88	0.21	0.08	0.69	12.67	2.24
Prob > F	>0.05	>0.05	>0.05	>0.05	<0.001	<0.01

Data: BPS:04/09

Differences significant at *** p<.001; ** p<.01; * p<.05

Similar relationships were recorded for undermatched Hispanic students in the uncontrolled logistic and BRR regressions. Neither model reported statistically significant results, though both models recorded a negative association between degree completion and being undermatched for most qualified students attending SEL-3 and SEL-2 institutions. No significant relationships were reported in the controlled BRR model, which may be attributed to the small sample size. For Asian students, the undermatched students attending SEL-3 and SEL-2 colleges were 68% and 59%, respectively, less likely to graduate than their well-matched peers. These results were not statistically significant.

To compare, undermatched Asian students attending least selective and moderately selective institutions were 67% and 72%, respectively, less likely to graduate than their most qualified peers at SEL-1 colleges in the logistic model. Undermatching at SEL-2 schools was significant in the logistic model. Finally, for white undermatched undergraduates, the results reported in the uncontrolled BRR model were identical to those in the logistic model in Table 15. Undermatched white undergraduates at SEL-3 colleges were 91% less likely to finish college than their well-matched peers attending SEL-1 schools, and undermatched white students who attended college at an SEL-2 campus were 64% less likely to complete college than their well-qualified peers at the most selective institutions. Nonetheless, once the control variables were added in the BRR model, the statistical significance disappears for all of the variables in the study, although the negative relationship between being an undermatched student attending an SEL-3 or SEL-2 college and degree completion were similar.

APPENDIX B: CODEBOOK

Table 19 List of Variables Used for Study²⁷

Dissertation Variable	BPS Variable	Variable Label	Variable Definition	Source
Graduation within 6 years	PRLVL6Y	Attainment or level at least institution enrolled through 2009	Indicates the highest degree attained or if no degree had been attained, the level of the institution where the respondent was enrolled in the spring of 2009	BPS:04/06/09 student interview
Age in years	AGE	Age first year enrolled	Indicates respondent's age as of 12/31/2003. Financial aid applicants who were age 24 on or before this date were automatically determined to be independent students	CPS:04, NPSAS:04 student interview, NPSAS:04 CADE
Male	GENDER	Gender	Indicates the respondent's gender	NPSAS:04 student interview, NPSAS:04 CADE, CPS:04

²⁷ Source: National Center for Education Statistics PowerStats. Study Name: Beginning Postsecondary Students Survey, Beginning college students in 2003-04, followed through 2009 (BPS2009).

Dependent student	DEPEND	Dependency status 2003-04	Indicates the respondent's dependency status during the 2003-2004 academic year	CPS:04, NPSAS:04 student interview, NPSAS:04 CADE
Parents' education in years	PAREduc	Parents' highest level of education	Indicates the highest level of education of either parent of the respondent during the 2003-2004 academic year	NPSAS:04 student interview, CPS:04
Family income	INCOME	Total income by dependency (categorical) 2003-04	Indicates the total income in 2002 (categorical) for independent students, and parents' income for dependent students	CPS:04, NPSAS:04 student interview, NPSAS:04 CADE
Mean SAT	TESATDER	Admissions test scores (ACT or SAT)	SAT 1 combined verbal and math score, derived from either the SAT 1 combined verbal and math score or the ACT composite score converted to an estimated SAT 1 combined verbal and math score using a concordance table	College Board, ACT, NPSAS:04 CADE

Mean GPA	HCGPAREP	High school grade point average (GPA)	Indicates the high school grade point average on the standardized test date, according to self-report on test questionnaire	College Board, ACT
High School Courses	HCYSMATH	Highest level of high school mathematics	Indicates the highest level of math, English, foreign language, science, and social studies coursework the respondent completed or planned, according to self-report on standardized test questionnaire	NPSAS:04 student interview, College Board, ACT
	HCYSENGL	Years of English in high school		College Board, ACT
	HCYSLANG	Years of foreign languages in high school		College Board, ACT
	HCYSSCIE	Years of science in high school		NPSAS:04 student interview, College Board, ACT
	HCYSSOCI	Years of social studies in high school		College Board, ACT
Remediation	REMETOOK	Remedial course 2004: Any taken	Indicates whether the respondent took any remedial or developmental courses during the 2003-2004 academic year	NPSAS:04 student interview
Public	CC2000A	Carnegie code (2000) with control 2003-04	Indicates the control of selected types of institutions by Carnegie classification (2000 edition)	BPS:04/06 student interview, IPEDS:03

Tuition	TUITION2	Tuition and fees in 2003-04	Indicates the total amount of respondent's tuition and fees at the institution they attended during the 2003-2004 academic year	NPSAS:04 CADE, IPEDS:03
Work Study	TOTWKST	Total work study 2003-04	Indicates the total amount of all work-study awards the respondent received during the 2003-2004 academic year	NSLDS, NPSAS:04 CADE, NPSAS:04 student interview
Total Grants	TOTGRT	Total grants 2003-04	Indicates the total amount of all grants and scholarships the respondent received during the 2003-2004 academic year	NSLDS, NPSAS:04 CADE, NPSAS:04 student interview
Total Loans	TOTLOAN2	Total loans (including PLUS) 2003-04	Indicates the total amount of all loans (including federal PLUS undergraduate loans) to parents that the respondent received during the 2003-2004 academic year. Equal to the sum of total loans to respondents and PLUS undergraduate loans to parents	NSLDS, NPSAS:04 CADE, NPSAS:04 student interview

First Year GPA	GPA	Grade point average 2003- 04	Indicates the respondent's cumulative Grade Point Average (GPA) for the 2003-2004 academic year	NPSAS:04 CADE, NPSAS:04 student interview
Last Year GPA	GPA09	Grade point average estimate 2009	Respondent's estimated grade point average	BPS:04/09 student interview
Academic Integration	ACAINX04	Academic integration index 2004	This variable indexes the overall level of academic integration the respondent experienced at the first institution he/she attended during the 2003-2004 academic year	NPSAS:04 student interview
Social Integration	SOCINX04	Social integration index 2004	This variable indexes the overall level of social integration the respondent experienced at the NPSAS institution during the 2003-2004 academic year	NPSAS:04 student interview
Major	MAJORS12	Major during first year 2003-04 (condensed)	Respondent's major or field of study (condensed version) during the 2003-2004 academic year	NPSAS:04 student interview, NPSAS:04 CADE,

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