Assessing a New Approach to Class-Based Affirmative Action

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Submitted for the 2011 Association for Institutional Research Annual Forum

This material is based upon work supported by the Association for Institutional Research, the National Center for Education Statistics, the National Science Foundation, and the National Postsecondary Education Cooperative, under Association for Institutional Research Grant Number DG10-206. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author and do not necessarily reflect the views of the Association for Institutional Research, the National Center for Education Statistics, the National Science Foundation, or the National Postsecondary Education Cooperative.

Abstract

In November, 2008, Colorado and Nebraska voted on amendments that sought to end race-based affirmative action at public universities. In anticipation of the vote, Colorado‟s flagship public institution – The University of Colorado at Boulder (CU) – explored statistical approaches to support class-based affirmative action. This paper details CU‟s method of identifying disadvantaged and overachieving applicants in undergraduate admissions. Particular attention is devoted to the impact of putting this system into practice. Two experiments were conducted to evaluate the effects of implementing class-conscious admissions on the racial and socioeconomic diversity of accepted classes. In addition, historical data were examined to gauge the likelihood of college success for the beneficiaries of class-based affirmative action. Experimental results suggest low-income and minority students are more likely to be admitted to CU when class-conscious admissions criteria are used. Analyses of historical data suggest collegiate success for those admitted under class-based affirmative action is possible, although certainly not guaranteed. Such findings argue for the provision of robust academic support to these low-income, marginally qualified students once they arrive on campus.

Introduction

In November, 2008, Colorado and Nebraska voted on amendments seeking to eliminate consideration of race, ethnicity, gender, and national origin in the operation of public education. Passage of these amendments would have ended race-based affirmative action at public universities in those states. In anticipation of the vote, Colorado‟s flagship public institution – The University of Colorado at Boulder (CU) – explored new statistical approaches to support class-based affirmative action. This study details the development, implementation, and evaluation of this method of identifying disadvantaged and overachieving applicants in undergraduate admissions.

Few debates in higher education are as charged and divisive as affirmative action. The collection of factors we consider in admitting students to college ought to be a reflection of our values (Moses, 2002; Bowen & Bok, 1998). Prominent among these values are two goals that some believe operate at cross-purposes: rewarding academic excellence and removing barriers to equal opportunity. The harshest critics of affirmative action charge that considering race in college admissions actually perpetuates inequity by undermining meritocratic ideals (Connerly, 2000). These criticisms seem to have gained impetus, and as a result, the landscape of race-conscious admissions has changed. In the last decade, court cases and ballot initiatives have reshaped and profoundly limited the practice of race-based affirmative action in college admissions. At the same time, arguments favoring class-based approaches have gained substantial momentum (Long, 2007). The increased popularity of class-based affirmative action is at least partially attributable to the apparent vulnerability of race-based policies to court rulings and ballot initiatives. That vulnerability shows little sign of waning; the Supreme Court has suggested that in 17 years, race-based admissions policies will no longer be necessary (*Grutter*,

2003) and ballot initiatives intended to ban race-based affirmative action will likely continue to surface (Moses, Yun, & Marin, 2009). It is critical, then, that we carefully examine class-based policies that arise as the political viability of race-based affirmative action continues to erode.

Class-based affirmative action comes under a variety of names. It is alternately referred to as “economic” or “socioeconomic” affirmative action, and in some cases loosely characterized as admissions preferences for the poor (Espenshade & Radford, 2009; Long, 2004; Bowen & Bok, 1998). These differences reflect a fundamental difficulty defining the traits universities should examine to grant applicants additional consideration in class-based systems. Most of this trouble owes to disagreement over what class-based policies should actually accomplish. Deborah Malamud (1997) rightly observes that supporters of class-based affirmative action are divided into two camps: “race-neutral” supporters, who favor class-based considerations solely as a remedy for economic hardship, and “race-conscious” supporters, who believe class-based considerations can augment or maintain racial diversity. Ostensibly, class-based policies are designed to place a “thumb on the scale” in college admissions for applicants who have faced obstacles to upward mobility (Kahlenberg, 1997). We further expect class-based approaches to admit a group of students more socioeconomically diverse than groups admitted in the absence of such a policy. Ideally, class-based approaches would be evaluated according to their success achieving these goals. However, because race and class are correlated, class-based approaches often take hold in the wake of a ban on race-based affirmative action. For example, public universities in Texas, Michigan, and Florida immediately implemented race-neutral initiatives to maintain campus diversity following legal rulings or successful ballot initiatives that outlawed race-conscious programs (Chapa & Horn, 2007; Orfield, Marin, Flores, & Garces, 2007; Ancheta, 2005). Furthermore, UCLA‟s School of Law developed its own class-based admissions considerations in response to a ballot initiative that eliminated race-based affirmative action in California (Sander, 1997). Because such class-based programs immediately follow – and implicitly replace – race-based programs (Laird, 2005), class-based affirmative action is usually evaluated in terms of its success maintaining levels of racial diversity (e.g., Hinrichs, 2009; Long & Tienda, 2008).

Even given this narrow definition of outcomes, most of the debate surrounding class-based affirmative action has taken place in an empirical vacuum (Sander, 1997). Moreover, research on this topic is spread thinly across a variety of academic disciplines, including education, sociology, economics, and law. Published analyses tend to focus on one type of class-based affirmative action in particular – "Top X%" plans, where a sufficiently high class rank in high school would guarantee admission to a state university. The failure of Top X% plans to maintain rates of minority representation has been widely documented (e.g., Long, 2004; Long, 2007; Long & Tienda, 2008).

Supporters of the class-based philosophy argue that the failures of Top X% plans specifically should not reflect poorly on the prospects of class-based affirmative action in general (Kahlenberg, 1997). These advocates stress the need to account for the varying obstacles *individual* applicants have faced – a consideration explicitly absent from Top X% plans. Further, they have identified some measurable factors related to socioeconomic hardship (e.g., parents‟ education, family income) that are critical for both flagging disadvantaged applicants and assessing these policies‟ effects. The same advocates have not, however, sufficiently explained how admissions officers should account for these factors in concert to arrive at a systematic judgment of disadvantage. For the most part, more sophisticated class-based programs using applicant-level information have been evaluated only hypothetically, via simulation studies (e.g., Carnevale & Rose, 2004). Furthermore, research on class-based policies (both simulations and empirical work) often examines trends in the racial compositions of freshman classes. Campus diversity is an important outcome, but this focus tends to conflate college *enrollment* (i.e., a student‟s decision to matriculate) with college *acceptance* (i.e., an admissions officer‟s decision to admit or refuse). To date, no studies have empirically investigated the effects of class-based policies on undergraduate admissions decisions.

Expected Contribution to the Class-Based Affirmative Action Literature

The approach toward class-based affirmative action developed at CU aims to address some of the shortcomings outlined above. Using a nationally representative dataset (ELS; U.S. Department of Education, 2006), CU developed operational definitions of disadvantage that can be applied in admissions decisions. Randomized experiments were conducted to estimate the effects of implementing this class-based approach on both the racial and socioeconomic diversity of accepted classes. Finally, historical data were examined to estimate the likelihood of college success for beneficiaries of class-based affirmative action. Ultimately, I argue that CU represents a certain class of institution – large, moderately selective public universities – that has up to this point been underrepresented in affirmative action scholarship. This knowledge gap is significant, because large public schools account for more than half of the total undergraduate enrollment in the United States (Snyder & Dillow, 2010). Moreover, research suggests that unlike highly selective schools, these moderately selective institutions field applications from disadvantaged students for whom the stakes are quite high: Many low-income and minority applicants may not have the opportunity to attend a four-year college if they are refused admission to a school like CU (Hurtado, Inkelas, Briggs, & Rhee, 1997). When race-based policies are overturned, these institutions may struggle to develop new race-blind metrics to identify applicants who have overcome adversity. Through this research, I intend to introduce a methodology for developing and assessing admissions tools that account for the socioeconomic barriers applicants face.

Background

A Brief History of Affirmative Action

Before turning to the class-based affirmative action literature, it is useful to briefly attend to the turbulent history of race-based affirmative action in the United States. Following the Second World War, a few key legal decisions dramatically changed the prospects for equal educational opportunity for minorities in this country. In *Sweatt v. Painter* (1950) the Supreme Court ruled that Texas‟s maintenance of separate law schools for Blacks and Whites violated the Fourteenth Amendment (*Sweatt*, 1950). In 1954, the decision in *Brown v. Board of Education*, ended *de jure* segregation in public schools (*Brown*, 1954). The roots of race-based affirmative action are generally traced to Executive Order 10925, issued by President John F. Kennedy in 1961. This order established the Committee on Equal Employment Opportunity, and for the first time required that projects using Federal funds take "affirmative action" to ensure hiring and employment practices were free of racial bias (Kennedy, 1961).

The emergent push for equal educational opportunity was strengthened following the passage of the Civil Rights Act in 1964. One year later, affirmative action was the centerpiece of a speech offered by President Lyndon Johnson. In June of 1965, addressing graduates of Howard University, Johnson argued, "You do not take a person who, for years, has been hobbled by chains and liberate him, bring him up to the starting line of a race and then say, „you are free to compete with all the others,‟ and justly believe that you have been completely fair." Johnson claimed the next stage in the battle for civil rights would be the pursuit of "not just equality as a right and a theory but equality as a fact and equality as a result" (Johnson, 1966). Forty-five years later, these words continue to define the terms of the debate over race-based affirmative action and its plausible alternatives.

Johnson‟s position was essentially an extension of Title VI of the Civil Rights Act, which held that "No person in the United States shall, on the grounds of race, color, or national origin, be subjected to discrimination under any program or activity receiving Federal financial assistance" (*Civil Rights Act*, 1964). Universities and colleges in the United States took this as a call to recruit and admit minority students, but it was not long before opponents of race-conscious admissions policies used Title VI to challenge the legality of affirmative action. *Regents of the University of California v. Bakke* (1978) remains prominent in affirmative action case law. The deciding opinion, authored by Justice Lewis Powell, strictly forbade the use of numerical quotas or the setting aside of admissions spots for minorities. The decision did not, however, deal a fatal blow to race-based affirmative action. Powell also ruled that universities could take race into account in admissions decisions, as long as minority status was weighed among a host of other factors. The compelling interest in this regard, Powell argued, was the educational benefit realized by a diverse student body (*Bakke*, 1978).

Three court cases since have figured prominently in the evolution of affirmative action – *Hopwood v. Texas* (1996) and the 2003 *Gratz* and *Grutter* decisions in Michigan. In stark contrast to *Bakke*, the *Hopwood* decision held that while race-based affirmative action is not permissible to achieve campus diversity, it should be allowed to remedy the present effects of institutional discrimination (*Hopwood*, 1996). Soon after, the *Gratz* and *Grutter* rulings essentially invalidated *Hopwood*. Firstly, the *Gratz* decision held that the University of Michigan‟s approach to racial diversification via undergraduate admissions violated the mandates of equal protection, because racial minorities were specifically awarded points to bolster their likelihood of acceptance. This ruling confirmed that any quota system or allocation of points for minority status is strictly forbidden. The *Grutter* ruling, which focused on the University of Michigan‟s law school, held that race-conscious admissions policies were permissible, insofar as they aimed to enroll a "critical mass" of minority students. The notion of a critical mass is essential to this case, because such conditions ensure minority students will not feel particularly isolated on campus. Thus, *Grutter* affirmed *Bakke*, holding that the compelling interest served by race-based affirmative action was the educational benefit realized by a diverse campus – not the need for remediation of discrimination (*Gratz v. Bollinger,* 2003; *Grutter v. Bollinger*, 2003). The emphasis on campus diversity echoed Justice Powell‟s opinion in the *Bakke* case, and the *Grutter* decision is generally viewed as a substantial victory for proponents of race-based affirmative action (Karst, 2004). Thirty-eight years after President Johnson argued for the use of affirmative action to remediate institutionalized injustices, these legal decisions established the "diversity rationale" as the most viable justification for race-conscious admissions policies. These developments – especially the rise of the diversity rationale – are important to keep in mind as I examine the researched effects of policies intended to replace race-conscious admissions.

The Rise of Class-Based Affirmative Action

Beginning in the mid-1990s, race-based affirmative action was challenged at the ballot box. Voters in California, Washington, Michigan, Colorado, and Nebraska voted on variants of the "Civil Rights Initiative", intended to ban race-based affirmative action. The measure passed in every state except Colorado (Moses, Yun, & Marin, 2009). In addition, Florida Governor Jeb Bush eliminated affirmative action in college admissions via Executive Order 99-821 (the One

Florida Initiative), preempting a vote in the 2000 election. Nearly 40 years removed from the passage of the Civil Rights Amendment, the Civil Rights Initiatives use language remarkably similar to Title VI. These initiatives, however, charge that race-based affirmative action undermines equal opportunity by granting race-based preferences.

Several public universities implemented class-based affirmative action in response to these bans (Long, 2007). Class-sensitive admissions policies seemed well suited to replace race-based affirmative action; the strong relationship between race, social class, and "life chances" (see Weber, 1946) has been widely documented (Rothenberg, 2006; Sleeter, 2003; Brooks-Gunn & Duncan, 1997; Kahlenberg, 1997, Anderson, 1990). Still, class-based affirmative action had received little attention before race-based programs were legally challenged. Bob Laird, Dean of Admissions at the University of California – Berkeley when race-conscious policies were outlawed in that state, reminds us that long before the introduction of bans on race-based affirmative action, admissions officers recognized and tried to account for the damaging effects of low socioeconomic status (SES). He acknowledges, though, that such considerations varied from institution to institution and were not often implemented systematically (Laird, 2005). That uneven implementation seems to have resulted in a small net effect for class-based considerations. Recent analyses suggest that on average, universities still grant little to no preference to low-income college applicants (Espenshade & Radford, 2009; Bowen, Kurzweil, & Tobin, 2005; Carnevale & Rose, 2004)

Research on the effects of class-based affirmative action did not initiate in force until various race-based programs were outlawed. Because class-based programs arose as replacements for race-based programs, this research focuses primarily on the extent to which a class-based admissions system maintains levels of racial diversity on campus. Many class-based programs installed in the absence of race-based preferences took the general form of Top X% plans (Long, 2004; Long, 2007). Although relatively simple to implement, these plans were met with some skepticism. Because Top X% plans guarantee admission to state universities based on high school class rank, the success of this approach with respect to maintaining levels of racial diversity on college campuses depends implicitly upon racial segregation in high schools (Tienda & Niu, 2006). Further, concerns have been raised regarding a potential “creaming” effect: Even at extremely poor high schools, the most affluent students will likely rise to the top of the class (Carnevale & Rose, 2004). Numerous studies have shown that banning race-based affirmative action profoundly reduces minority representation on college campuses (Contreras, 2005). This is especially true for selective institutions. Although Top X% plans enable colleges to regain some ground with respect to minority representation, diversity levels continue to lag behind pre-ban levels (Saenz, 2010; Contreras, 2005, Horn & Flores, 2003).

In his 1997 book, *The Remedy*, Richard Kahlenberg stressed the inadequacy of class-based approaches – such as Top X% plans – where applicant-level considerations are implicitly absent (Kahlenberg, 1997). Rather, he argued that successful class-based policies would rely on applicant-level characteristics (e.g., family income and parents‟ education) as well as neighborhood- or high-school-level data (e.g., concentration of poverty). In addition, Kahlenberg emphasized the need for class-based policies to be evaluated according to their usefulness in increasing socioeconomic diversity. Sociological and educational literature would seem to support Kahlenber‟s stance. Demographic factors often present substantial obstacles to upward mobility. Situating this research in the context of college admissions, SES has been shown to exert a powerful influence on one‟s likelihood of attending a four-year college (Kinzie et al., 2004; Perna, 2000; Berkner & Chavez, 1997; Baker & Velez, 1996; Orfield, 1990; Hearn, 1984;

McDill & Coleman, 1965). This is especially true when students live in neighborhoods and attend schools where disadvantage is concentrated (Yun & Moreno, 2005). Moreover – irrespective to one"s decision to attend college – SES has been shown to significantly impact the academic measures (e.g., high school grade point averages and standardized test scores) admissions officers use to gauge applicants" college readiness (Cameron & Heckman, 2001; Hu & St. John, 2001; U.S. Department of Education, 1999; Astin, 1997; Hurtado et. al., 1997; Manski & Wise, 1983). It would seem, then, that Kahlenberg was on fairly stable ground proposing certain factors admissions officers must consider when conceiving of disadvantage. Still, his prescription for the mechanics of class-based affirmative action fail to explain specifically how these factors might be aggregated to make systematic determinations of disadvantage. Rather, Kahlenberg broadly recommends that as many such factors as possible be considered in class-based policies.

Beyond the socioeconomic factors admissions officers should account for in making determinations of disadvantage, critical questions arise regarding the weight (i.e., the size of the "boost" conferred in admissions decisions) that should be given to a determination of disadvantage. Kahlenberg"s suggestion is strictly outcome-oriented: A university should enact a boost large enough to ensure the racial and socioeconomic diversity it desires. Admissions officers might agree on a policy via the simulated enrollment outcomes associated with various boost sizes (Kahlenberg, 1997). In one such simulation study, researchers proposed a class-based policy that accounted for some of the applicant-level factors Kahlenberg advocates (Carnevale & Strohl, 2010). Of course, research of this sort only hypothesizes levels of socioeconomic and racial diversity that would result from strict implementation of class-based measures. Carnevale and Strohl found that class-based considerations would increase socioeconomic diversity, but racial diversity would be negatively impacted unless some form of race-based consideration was retained.

In 1997, the UCLA School of Law more fully operationalized class-based affirmative action as conceptualized by Kahlenberg (Sander, 1997). This effort coincided with the passage of Proposition 209 – California‟s Civil Rights Initiative. Under this program, the school collected six socioeconomic variables similar to those Kahlenberg had suggested. Applicants who were located one or more standard deviations below the mean on any socioeconomic variable received "disadvantage points," to be added to the points they had already accrued via LSAT scores and college course grades. While this approach did fit multiple socioeconomic measures to a single quantitative scale, the points received from an identification of disadvantage varied depending upon the socioeconomic factor under examination. The differential weighting of these factors was somewhat arbitrary. Weights – and the attendant admissions boost – were formulated via simulation to achieve desired levels of racial and socioeconomic diversity among accepted students. Sander‟s approach increased socioeconomic diversity at UCLA Law School, but minority representation declined (Sander, 1997).

The failures of the class-based approaches described above to achieve desired levels of racial diversity seem to vindicate the nearly unanimous conclusions of prominent affirmative action researchers. In *The Shape of the River*, William Bowen and Derek Bok addressed the question of whether or not class-based policies could adequately replace race-conscious admissions (Bowen & Bok, 1998). Their conclusions are clear and intuitive. Race-based considerations at most selective universities are quite large. Even if universities were to grant low-income students "minority-size" boosts, racial diversity should plummet because minority status and poverty are not perfectly correlated. These simulations have been reproduced in subsequent research, and their results are consistently confirmed (Espenshade & Radford, 2009; Espenshade & Chung, 2005; Sander, 2004; Bowen, Kurzweil, & Tobin, 2005). As education policy analysts Robert Linn and Kevin Welner note, "The correlation between income and race is not nearly high enough that one can simply serve as a proxy for the other" (Linn & Welner, 2007, p. 42). Economist Thomas Kane echoes this sentiment: "No race-blind substitute can substantially cushion the effect of ending racial preferences. The problem is one of demographics" (Kane, 1998, p.448).

With the challenges inherent in class-based affirmative action vividly apparent, a Civil Rights Initiative – Amendment 46 – reached Colorado ballots in 2008. This was the catalyst for CU‟s implementation of class-based affirmative action. The introduction of Amendment 46 posed serious challenges to The University of Colorado‟s mission. It is the policy of the university to recruit and admit students possessing perspectives and life experiences that will provide a unique contribution to the campus environment. Moreover, CU seeks applicants who have overcome significant adversity, and is devoted to building racial and socioeconomic diversity among its students. Because Civil Rights Initiatives had been successful in other states, and Amendment 46 was polling favorably in early 2008, the Office of Admissions feared it would lose a critical tool with the passage of this initiative. The University of Colorado was aware of the arguments for class-based affirmative action as a substitute for race-based policies, and had observed the mixed success achieved by other states that implemented class-based considerations once race-based policies were outlawed. I was hired in June, 2008 to help CU evaluate and improve upon class-based approaches developed in other states and in the scholarly literature.

The first task in this endeavor required a review of the class-based policies both proposed and in use (e.g., Kahlenberg, 1997; Carnevale & Rose, 2004; Sander, 1997, Studley, 2003). The University of Colorado identified both areas of promise and room for improvement. The applicant-level factors proposed by Kahlenberg and used by the UCLA Law School provide individualized indicators of disadvantage. However, the methodology underpinning the weights assigned to each factor, and the means by which these factors were aggregated to form a single quantitative scale representing disadvantage, were inappropriate for use at CU. Specifically, the architects of the UCLA system relied on various simulated outcomes to decide how each factor should be weighted (Sander, 1997). Because the undergraduate admissions process – at least at CU – is a rather subjective endeavor, conducting simulations to project acceptance rates for disadvantaged applicants would have been imprecise. Likewise, Top X% plans offered both possibility and peril. While these plans clearly employ a blunt instrument to identify disadvantage, they do provide a tremendous benefit to applicants who are identified: guaranteed admission.

Developing Measures to Support Class-Based Affirmative Action

The architecture of class-based affirmative action at CU owes to Richard Kahlenberg‟s description of the goals embodied in class-conscious admissions (Kahlenberg, 1997). Specifically, the university sought to quantify (1) the obstacles to life chances each applicant faced, and (2) the extent to which that applicant had overcome those obstacles. With these goals in mind, CU chose to model certain outcomes relevant to college admissions and shown in the literature to be influenced by socioeconomic factors. Specifically, CU investigated four outcomes – enrollment in a four-year college, cumulative weighted high school GPA, ACT scores, and SAT scores – and devised four indices to measure disadvantage and overachievement. "Obstacles to life chances" are construed as disadvantage, and disadvantage is quantified as *the reduction, owing to socioeconomic circumstance, in an applicant's likelihood of attending a four-year college*. This is the "Disadvantage Index." The university construes "overcoming obstacles" as overachievement, and overachievement is quantified as *the extent to which an applicant's academic credentials exceed what is expected, conditional on socioeconomic factors*. These are the "Overachievement Indices." The sections that follow elaborate on the statistical methods that underlie each Index.

The Disadvantage Index

The Disadvantage Index is derived from two prediction equations. Specifically, one number is calculated for each applicant: the marginal increase or decrease in the probability of four-year college enrollment, owing to socioeconomic circumstance. The Disadvantage Index is based upon an underlying logistic regression model, where the dependent variable is a binary indicator of enrollment in a four-year college in October following a student"s graduation from high school. The binary logistic regression model is presented in Equation 1 below:

$$P(E_i = 1) = \frac{\exp(\boldsymbol{\beta}\mathbf{X}_i + \boldsymbol{\xi}\mathbf{Z}_i)}{1 + \exp(\boldsymbol{\beta}\mathbf{X}_i + \boldsymbol{\xi}\mathbf{Z}_i)} \tag{1}$$

In the model above, individuals are indexed by i (i = 1, . . . , N). The variable E_i takes a value of "1" if applicant i enrolls in a four-year college, and 0 otherwise. Let $\mathbf{X}_i$ be a vector of academic credentials and $\mathbf{Z}_i$ be a vector of socioeconomic measures for applicant i. Let $\boldsymbol{\beta}$ and ξ represent the two vectors of parameters associated with $\mathbf{X}_i$ and $\mathbf{Z}_i$, respectively. Independent variables used in this logistic model fall into three separate categories. Student-level socioeconomic variables (included in the vector $\mathbf{Z}_i$) are (1) whether the applicant"s native language is English, (2) parents" highest education level, (3) family income level, and (4) the number of dependents in the family. High-school-level socioeconomic variables (also included in the vector $\mathbf{Z}_i$) are (5) whether the applicant attended a rural high school, (6) the school-wide percentage of students eligible for free or reduced-price lunch (%FRL), (7) the school-wide student-to-teacher ratio, and (8) the size of the 12^{th}-grade class. Student-level academic credentials (included in the vector $\mathbf{X}_i$) are (9) high school cumulative weighted GPA, and (10) the higher of two standardized admissions test scores (ACT composite or SAT combined).

A further step is necessary for calculating the Disadvantage Index: Two different probabilities are computed for any given applicant. The first is $\hat{P}(E_i = 1|\ \hat{\boldsymbol{\beta}}\mathbf{X}_i, \hat{\boldsymbol{\xi}}\mathbf{Z}_i)$, which represents the probability that applicant *i* will enroll in college given his or her specific academic credentials ($\mathbf{X}_i$) and socioeconomic measures ($\mathbf{Z}_i$). The second is $\hat{P}(E_i = 1|\hat{\boldsymbol{\beta}}\mathbf{X}_i, \hat{\boldsymbol{\xi}}\mathbf{Z}^*)$, which is identical to the first probability with one important change: The values for the circumstance variables are fixed at those of a "typical" applicant. This distinction is represented by the substitution of $\mathbf{Z^*}$ for $\mathbf{Z}_i$. For continuous socioeconomic measures, the values for a "typical" applicant are defined as the mean from the full distribution of CU applicants. For categorical or ordinal predictors, values for the typical applicant are defined as the mode.

The Disadvantage Index (DI) represents the difference between the two probabilities defined above. Larger negative values are interpreted as more disadvantage.

$$DI_i = \hat{P}(E_i = 1|\ \hat{\boldsymbol{\beta}}\mathbf{X}_i, \hat{\boldsymbol{\xi}}\mathbf{Z}_i) - \hat{P}(E_i = 1|\ \hat{\boldsymbol{\beta}}\mathbf{X}_i, \hat{\boldsymbol{\xi}}\mathbf{Z}^*) \tag{2}$$

For further clarification, a visual representation of this Index is provided in Appendix A.

The Overachievement Indices

Development of the Overachievement Indices followed the work of Studley (2003). The three Indices are derived from three prediction equations. Two to three values are calculated for each applicant, as a function of that applicant‟s (1) cumulative weighted high school GPA, (2) ACT composite score, and (3) SAT combined score[1]. The Overachievement Indices‟ prediction equations are based on parameter estimates from three separate multiple regression models, where the dependent variables in each case are (1) HSGPA, (2) ACT composite score, and (3) SAT combined score[2]. The general form of the regression model is given below:

$$Y_i = \boldsymbol{\theta}\mathbf{K}_i + \varepsilon_i \tag{3}$$

In the model above, individuals are indexed by i ($i = 1, \ldots, N$). Y_i is the value for the academic credential under examination (HSGPA, ACT, or SAT). Let $\mathbf{K}_i$ be a vector of socioeconomic measures. Let $\boldsymbol{\theta}$ be a vector of parameters associated with $\mathbf{K}$. The unobserved error term is represented by ε_i. Independent variables (i.e., the vector $\mathbf{K}_i$) used in the Overachievement Index are nearly identical to the socioeconomic variables employed in the Disadvantage Index. Student-level variables include (1) the applicant‟s native language, (2) single parent status, (3) parents‟ education level, (4) family income level, and (5) the number of dependents in the family. High-school-level socioeconomic variables include (6) whether the applicant attended a rural high school, (7) %FRL, (8) student-to-teacher ratio, and (9) the size of

[1] Because applicants to CU are required to take either the ACT or the SAT, most applicants (roughly 73%) have an Overachievement Index for only one of those two admissions tests.
[2] For the Overachievement Index, SAT scores represent the sum of scores on the math and verbal sections of the SAT.

the 12th-grade class. For any given academic credential Y, the Overachievement Index (OI) value for applicant i is based on e_i, the residual from the multiple regression specified in Equation 4:

$$OI_i = e_i = Y_i - \hat{\boldsymbol{\theta}}\mathbf{K}_i \tag{4}$$

For further clarification, a visual representation of the Overachievement Index is provided in Appendix B.

Data Sources

If the parameters in the Indices‟ regression models (i.e., $\boldsymbol{\beta}$, $\boldsymbol{\xi}$, and $\boldsymbol{\theta}$) were known, prediction equations could be formed and Disadvantage and Overachievement Index values could be calculated for each applicant to CU. Those parameters are not known, however, so they were estimated using extant data. As such, the University of Colorado‟s class-based system relies on the Education Longitudinal Study (ELS) database (U.S. Department of Education, 2006). The ELS-based parameter estimates for the Disadvantage Index‟s model of college enrollment and the Overachievement Indices‟ models of HSGPA, ACT scores, and SAT scores are provided in Appendix C. The ELS data contain information on a nationally representative cohort of students followed through high school and postsecondary education from 2002 to 2006. ELS was the most complete resource available for quantifying the relationships between SES, high school academic credentials, and four-year college enrollment. Historically, CU has not collected detailed socioeconomic data from its applicants, nor has it investigated whether applicants who did not come to CU eventually enrolled in another four-year institution. Because ELS collected socioeconomic and academic data from respondents in high school, and tracked students‟ progress beyond high school, it seems suitable for the estimation of the Disadvantage and

Overachievement Indices. Moreover, ELS allowed CU to avoid a weakness of other class-based approaches – the reliance on simulated enrollment outcomes (e.g., Sander, 1997) rather than empirical enrollment data.

Implementation of Indices in Admissions Decisions

The Office of Admissions set numerical thresholds along the Indices‟ scales to establish successive categories of disadvantage and overachievement. Thresholds were necessary because for admissions personnel, the Indices represent somewhat unfamiliar scales. Defining thresholds along each Index scale, CU theorized, would help admissions staff determine the values that represent substantial disadvantage or overachievement. Under the Disadvantage Index, those categories are “no disadvantage,” “moderate disadvantage,” and “severe disadvantage.” Overachievement categories are “no overachievement,” “high overachievement,” and “extraordinary overachievement.” Utilization of the Indices by admissions personnel relies on these thresholds. Applicants experiencing moderate or severe disadvantage, or exhibiting high or extraordinary overachievement, are granted additional consideration (i.e., given a boost) during applications review. No applicant identified under either Index may be refused admission outright; any application exhibiting disadvantage or overachievement must, at the very least, be referred to a committee of admissions officers for holistic review (i.e., a comprehensive second look). Further, identification under either Index can serve as a *primary* or *secondary* factor for admission without further review. Primary and secondary factors comprise all measures and indicators admissions officers use to evaluate undergraduate applications. Secondary factors in the admissions process are generally less influential. Status as an underrepresented minority

(URM)[3] is one example of a secondary factor. Primary factors, however, are quite influential. They include, for example, standardized test scores and high school course-taking patterns. As such, identification under the Disadvantage and Overachievement Indices can wield powerful influence over an applicant‟s prospects for admission. Table 1 below details the implementation of the Indices in admissions decisions. In Table 1, "high overachievement" and "extraordinary overachievement" refer to any of the Overachievement Index values (i.e., GPA or test scores). One need only overachieve on one of these measures to be granted a boost.

Table 1. *Additional Consideration Granted to Disadvantaged and Overachieving Applicants*

	No Overachievement	High Overachievement	Extraordinary Overachievement
No Disadvantage	No additional consideration	*Secondary* factor boost	*Primary* factor boost
Moderate Disadvantage	*Secondary* factor boost	*Primary* factor boost	*Primary* factor boost
Severe Disadvantage	*Primary* factor boost	*Primary* factor boost	*Primary* factor boost

Research Questions

The Index definitions presented above, coupled with the implementation procedures detailed in Table 1, form the conceptual grounding for CU‟s system of class-based affirmative action. In the sections that follows, I introduce two experiments and an analysis of historical

[3] URM refers to Blacks, Latinos, and Native Americans

data. These tasks are designed to investigate the effects of putting this system to use. The analyses are driven by two primary research questions:

1. To what extent does the implementation of CU‟s class-based affirmative action policy change the likelihood of acceptance for low-SES and minority students?
2. What is the likelihood of college success for students admitted under CU‟s class-based policy?

The analyses are varied, both in terms of the outcomes they examine and the methods they employ. As such, for each motivating question, the research methods and findings are presented together.

The Impact of Class-Conscious Admissions on Acceptance Rates

Methods: Race-Based versus Class-Based Affirmative Action

In November, 2008 – after the initial development this class-based system – the Colorado Civil Rights Initiative was defeated. The voters‟ rejection of Amendment 46 presented CU with an opportunity to further "beta test" the Disadvantage and Overachievement Indices, comparing admissions decisions made under a class-based approach to those made under the official race-based policy. To gauge the effect of implementing a class-based approach to replace race-based admissions, I used a small-scale repeated measures experimental design. Four hundred eighty applications from the full applicant pool (i.e., all students applying for admission for Fall 2009). Of the 480 applications sampled, 478 had sufficient information to be included in this experiment. Each of the selected applications had already been reviewed under the race-based policy. An additional review of each sampled application was conducted using CU‟s class-based approach, with all race identifiers removed. Application review using the Disadvantage and

Overachievement Indices is considered the treatment condition. The official review – using the race-based policy rather than the Indices – is considered the control condition. Ten admissions officers participated in this experiment. Each reviewed roughly 50 applications, and no reviewer evaluated the same application twice. In this experimental framework, each application functions as its own counterfactual; we observe both the outcome of the treatment (i.e., class-based affirmative action) and what would otherwise have occurred had the treatment not been administered (i.e., race-based affirmative action).

One outcome of interest in this experiment is the percentages of both URM and low-income students admitted under each condition. Another focus is the academic credentials of students admitted under each condition. Admissions officers are attentive to overall acceptance rates and the mean academic credentials of freshman matriculants, because these statistics affect the university"s reputation. While CU aims to enroll a socioeconomically and racially diverse incoming class, it is unwilling to sacrifice selectivity standards to do so. As such, it is important to investigate whether or not these changes to admissions policies beget aggregate changes in the academic qualifications of admitted classes. Perhaps more importantly, CU would like to avoid admitting low-SES students who have little chance at success in college.

Findings: Race-Based versus Class-Based Admissions

In the first experiment, overall acceptance rates were only slightly higher under the class-based approach than under race-based affirmative action (76% versus 74%). Acceptance rates for low-SES, severely low-SES, and URM applicants are summarized in Table 2. Within the experimental sample, 25% of applicants are low-SES, 7% are severely low-SES[4], and ten percent are URMs. Hypothesis testing was carried out using McNemar"s test of correlated proportions (1947).

Table 2. *Acceptance Rates by Admissions Condition and Subgroup, 2009 Experiment*

Applicant Type	N	Acceptance Rate		
		Class-based	Race-based	Difference
Low SES	121	81%	72%	9%**
Severely Low SES	35	83%	63%	20%*
URM	48	65%	56%	9%

**p* < 0.05; ***p* < 0.01

It is not surprising that acceptance rates improve for low-SES students under CU"s class-based system. This approach was designed specifically to identify those applicants for additional consideration. Further, this result aligns with findings from simulation and empirical studies that informed this work (Espenshade & Radford, 2009; Sander, 1997; Carnevale & Rose, 2004). The result for URMs, on the other hand, should be somewhat surprising; it would seem to contradict simulations and empirical work completed to date, which generally suggest that class-based affirmative action will increase socioeconomic diversity and decrease racial diversity, when compared to a race-based policy (Espenshade & Radford, 2009; Espenshade & Chung, 2005; Sander, 1997; Bowen & Bok, 1998; Bowen, Kurzweil, & Tobin, 2005; Carnevale & Rose, 2004). Moreover, like any class-based approach, the Indices are not perfect identifiers of URM

[4] I define a low-SES applicant as having *either* low parental income (i.e., less than $60,000) or low parental education (i.e., neither parent received a college degree). Severely low-SES applicants exhibit *both* low parental income and low parental education.

applicants. In the case of this experiment, 65% of URM applicants were identified in some way by the Indices, although 79% of those identified were conferred a primary factor boost.

This seemingly contradictory finding highlights the importance of the amount of additional consideration offered by identification in class-based affirmative action. The class-based approach at CU is comparatively privileged in this context: Under the Disadvantage and Overachievement Indices, identification can grant *primary* factor consideration. Under race-based affirmative action at CU, URM status is a *secondary* factor. These qualitative distinctions are further illustrated by way of a few binary logistic regression analyses. Holding constant high school GPA and standardized test scores, applicants identified in any way by the Indices are 2.2 times more likely to be admitted as those not identified. Applicants identified for primary factor consideration are 5.7 times more likely to be admitted. Under CU‟s race-based policy (again controlling for grades and test scores), URMs are 1.4 times more likely than non-URMs to be admitted. Because just over half of URMs receive primary factor consideration, URM applicants are 2.4 times more likely than non-URMs to be admitted under CU‟s class-based system. Thus, the interpretation seems relatively straightforward: Although the Disadvantage and Overachievement Indices are somewhat inefficient identifiers of URM applicants, URMs that this approach does identify are usually granted more consideration than they would receive under race-based affirmative action.

With respect to academic credentials, there was little difference in aggregate qualifications across experimental groups. A summary is provided below in Table 3.

Table 3. *Academic Credentials by Admissions Condition*

Measure	Accepted Applicants		Refused Applicants	
	Class-based	Race-based	Class-based	Race-based
N	365	352	113	126
Mean High School GPA	3.56 (*0.39*)	3.58 (*0.38*)	2.73 (*0.31*)	2.8 (*0.34*)
Mean ACT Composite	26 (*3.7*)	27 (*3.6*)	23 (*4*)	23 (*4.2*)
Mean SAT Combined	1197 (*147*)	1207 (*136*)	1048 (*134*)	1028 (*142*)

High school GPAs and ACT scores are nearly identical among accepted students across conditions, while SAT scores were slightly higher among students accepted under the race-based policy. Of course, gross aggregate summaries of academic credentials are but one set of data admissions departments may use to evaluate the feasibility of class-based policies. In fact, these policies give rise to a more important concern – namely, that the beneficiaries of class-based admissions may not have a high likelihood of success in college. In this experiment, there were 19 applicants accepted under the Disadvantage and Overachievement Indices who were *not* accepted under race-based affirmative action. I will term these students "class-based admits." Not surprisingly, these applicants exhibit both low SES and marginal high school academic credentials. To wit – these applicants had a mean HSGPA of 3.09 and a mean ACT composite of 23, compared to 3.6 and 27 for the applicants accepted under both conditions. Such a finding raises questions about class-based admits" chances of success in college. This issue is addressed in depth via Research Question 2.

Methods: Race-Based versus Class-Plus-Race Affirmative Action

Race-conscious admissions policies remain legal in Colorado, and the CU Office of Admissions continues to implement them. For the Fall 2011 admissions cycle, CU moved to a hybrid “class-plus-race” affirmative action framework. Race is used as it has been in the past (i.e., as a potential secondary factor boost), and the new class-based system is being implemented as detailed in Table 1. To forecast the impact of this change, a randomized controlled experiment was conducted in 2010. As a starting point, 2,000 “borderline” applications were randomly sampled from the Fall 2010 pool. This group was composed of applications the Office of Admissions determined were neither clear refusals nor clear admits. Prior research on college admissions suggests that identification by a class-based affirmative action system will likely carry the most weight for applicants of this sort (Willingham & Breland, 1982). Half the sample was randomly assigned to application review using both race and the Indices (i.e., a class-plus-race approach), and the other half to review using race-based affirmative action only. Those who undergo class-plus-race review are considered the treatment group. Those reviewed under the race-based approach comprise the control group. As with the first randomized experiment, outcomes of interest include acceptance rates for low-SES and URM students. The few available simulation studies that compare race-based affirmative action to a class-plus-race approach indicate that a class-plus-race approach should substantially improve campus socioeconomic diversity and slightly improve (by one or two percentage points) racial diversity (e.g., Espenshade & Radford, 2009; Bowen, Kurzweil, & Tobin 2005). To my knowledge, no studies have yet been conducted that empirically investigate the impact of implementing a class-plus-race system in undergraduate admissions.

Findings: Race-Based versus Class-Plus-Race Affirmative Action

The results of the second experiment are largely similar to the results of the first: Under class-plus-race admissions, low-SES and URM applicants have an increased likelihood of acceptance, compared to race-based admissions. These results are summarized in Table 4. Of the 2,000 applications sampled, 1,813 contained sufficient information to be included in the experiment. Sample attrition was equivalent across experimental conditions. Within the experimental sample, 32% of applicants are low-SES, 11% are severely low-SES, and 14% are URMs. Hypothesis testing was carried out using Fisher‟s exact test (1922).

Table 4. *Acceptance Rates by Admissions Condition and Subgroup, 2010 Experiment*

Applicant Type	Class-Plus-Race[a]		Race-Based[b]		Difference
	N	Acceptance Rate	N	Acceptance Rate	
Low SES	212	58%	195	49%	9%*
Severely Low SES	54	57%	55	44%	13%
URM	118	62%	118	45%	17%**
Low SES *and* URM	47	59%	43	27%	32%**

*$p < 0.05$; **$p < 0.01$

[a] $n = 901$

[b] $n = 912$

Overall acceptance rates were identical across experimental conditions, at 62%. This aggregate drop in acceptance rates compared to the 2009 experiment is to be expected, because the sample under consideration includes only borderline applicants. The increased acceptance rates for low-SES applicants under class-plus-race affirmative action align with prior research. In and of itself, an increase in acceptance rates for URMs under class-plus-race affirmative action is also not surprising. Still, the magnitude of the differences in acceptance rates for URMs between conditions (17 percentage points) is much larger than would be anticipated based on previous simulation studies. Espenshade and Radford (2009) predicted increases in acceptance rates around 1.2 percentage points for minorities under class-plus-race affirmative action. The large difference in URM acceptance rates observable here is at least partially attributable to a sizeable boost associated with a *dual identification* (i.e., being a low-SES and URM applicant) under the class-plus-race approach.

The dual identification effect substantially outstrips the boost granted to URMs under race-based affirmative action. This sizeable increase in the odds of admission for URMs under a class-plus-race approach may be due to uneven application of the Indices. Specifically, larger class-based boosts are being conferred upon URMs than non-URMs. I will elaborate with a few more logistic regression analyses. Under the class-plus-race approach, URMs identified in any way by the Indices are 4.9 times more likely to be admitted as URMs not identified. In contrast, non-URMs identified by the Indices are 1.9 times more likely to be admitted as non-URMs not identified by the Indices. A primary factor identification for URMs is particularly impactful: Underrepresented minorities who earn primary factor consideration are 9.2 times more likely to be admitted. In contrast, non-URMs who earn primary factor consideration are 3.5 times more likely to be admitted. The larger class-based effects for URMs beget substantially improved acceptance rates for this group under class-plus-race admissions. In this case, it seems as though the whole (class-based and race-based considerations for low-SES minorities) is greater than the sum of its parts.

This analysis suggests multiple identifications under an affirmative action framework are not merely additive. Prior research on this topic has not dealt specifically with class-based and race-based considerations, but rather with considerations for athletes, legacies, and minorities.

Shulman and Bowen (2001) conclude that the presence of multiple identifications in this context (e.g., a minority legacy applicant) are roughly additive in their effects on the likelihood of admission. Espenshade, Chung, and Walling (2004), on the other hand, conclude that multiple identifications for minorities (e.g., a minority athlete) translate to effects that are *less than* additive. My findings point to a slightly different conclusion, although it is critical to note that these previous studies did not consider class-based identifications. These results suggest dual identification under a class-plus-race system translates to an effect that is larger than the sum of separate identification effects.

For the 2010 experiment, a comparison of academic credentials for accepted students yields results nearly identical to those seen in the 2009 experiment. As such, those results are not discussed in great detail here. High school GPAs of students accepted under class-plus-race affirmative action are slightly lower (by two hundredths of a grade point) than the GPAs of students accepted under race-based affirmative action. Likewise, SAT scores are lower for the class-plus-race group (by five points), although ACT scores are virtually identical. None of these differences is statistically significant.

College Outcomes for Class-Based Admits

Methods

Recall that in the 2009 experiment, students (1) admitted under the class-based approach and (2) refused under the race-based approach exhibited low SES and marginal academic credentials. This finding suggests the need for an investigation of "academic mismatch" (Sander, 2004). Studies of mismatch have been carried out by many of the same researchers who have conducted the most thorough studies of race-based and class-based affirmative action (Sander, 2004; Espenshade & Radford, 2009; Bowen & Bok, 1998; Bowen, Chingos, & McPherson, 2009). The issue is fiercely debated. Those who claim mismatch is a significant problem (e.g., Sander, 2004) stress that under race-based affirmative action, minorities attend colleges for which they are academically underprepared, and compete with academically superior peers. This scenario begets lower grades, lower graduation rates, and lower distal outcomes. Sander, for example, points to reduced rates of bar passage for Black students admitted to selective law schools under race-conscious policies. Those who disagree point to significantly higher graduation rates at more selective universities (cf., Espenshade & Radford, 2009; Bowen & Bok, 1998; Bowen, Chingos, & McPherson, 2009). In short, these higher graduation rates cancel out the decrease in college outcomes associated with minority status, and in fact point to a net gain associated with minority students enrolling at the most selective schools to which they are admitted.

This analysis focuses on low-SES students admitted under CU"s class-based approach. The available research on the effects of SES on college achievement reveals some troubling patterns with respect to students of this sort. Essentially, low-SES students tend to perform worse in college than their upper-class peers, even after controlling for high school academic credentials – which are themselves powerful predictors of college outcomes (e.g., Bowen, Chingos, & McPherson, 2009). These studies underscore a legitimate concern: The University of Colorado would like to avoid admitting low-SES students who have little chance at success in college. Because class-based admits in the 2009 experiment were refused under the official race-based admissions policy at CU, it is not possible to follow their progress in college. To investigate the issue empirically, high school and college data were collected from the roughly 21,100 students who first enrolled at CU between 2000 and 2003. The set is limited to these four years because each student who enrolled during this time has had the opportunity to graduate from college in six years – a common measuring stick in research on college outcomes (Espenshade & Radford, 2009; Bowen, Chingos, & McPherson, 2009). I sought to identify a matched set of students from that set of 21,100 to act as "impostors" for the 19 class-based admits from the 2009 experiment. In fairness, it may seem as though CU – which operated under a race-based policy between 2000 and 2003 – should never have enrolled class-based admits. In fact, minor fluctuations in applicant pools from year to year and the uncertainty inherent in undergraduate admissions have produced numerous students whose profiles closely match those of the first experiment"s class-based admits.

Impostor students were selected from the historical dataset using coarsened exact matching (CEM; Iacus, King, & Porro, 2008). The tasks involved in CEM are implied by its name. First, a set of covariates is chosen as the basis for matching class-based admits to their historical impostors. In this case, covariates included all socioeconomic and high school achievement measures that (1) influence the likelihood of admission in CU"s class-based system and (2) were available in the historical dataset. Those variables are family income level, parents" highest education level, and "Predicted Freshman Year GPA." The academic measure, known as PGPA, is the predicted value of an applicant"s freshman year GPA at CU. The measure is derived from a regression equation, which is based solely on high school GPA and either SAT scores or ACT scores.

Because PGPA is a continuous variable, exact matches between class-based admits and historical students will be rare. As such, the PGPA scale must be coarsened, in other words, recoded into discrete ordinal categories. Decisions about the degree of coarsening in CEM are made somewhat subjectively, using substantive knowledge of the scales to be coarsened. There are no rules of thumb for this process, although it is generally considered unwise to coarsen continuous variables beyond the point at which crucial information is lost. Given a number of potential coarsening choices (i.e., 0.25, 0.5, and 0.75 standard deviations), admissions officers suggested that academic measures be coarsened to 0.25 standard deviations in the historical dataset. Finally, as noted above, family income level and parents‟ education level are already categorical variables, so they are not coarsened any further. Once all covariates have been recoded as categorical variables, strata are formed in the experimental and historical dataset. Each stratum is defined by a unique combination of values on the categorical covariates.

The next step in CEM is straightforward: Impostors comprise all the students in the historical dataset located in a stratum occupied by at least one class-based admit. Any class-based admits without at least one matched impostor are not represented in the impostor student set. It should also be noted that in CEM, the degree of coarsening controls the balance on covariate values between, in this case, the experimental class-based admits and their historical impostors. Before analysis of impostor students‟ college outcomes can commence, weights are applied to each stratum in the historical dataset. The weighting procedure is introduced by Iacus, King, and Porro (2008). Let N_t be the total number of class-based admits matched to at least one impostor student, and N_c be the total number of matched impostor students. Further, let N_t^s be the number of class-based admits in stratum *s*, and N_c^s be the number of matched impostor students in stratum *s* (*s* = 1, . . . , S). The weight for stratum *s*, W_s, is given by:

$$\mathrm{W}_s = \frac{\mathrm{N}_c}{\mathrm{N}_t} \times \frac{\mathrm{N}_t^s}{\mathrm{N}_c^s} \tag{5}$$

A set of 2,704 students from the historical dataset were selected to serve as impostors for the 19 class-based admits. Ultimately, measures of college success are examined for the selected groups of impostor students in the historical dataset to determine whether or not CU can expect the beneficiaries of class-based affirmative action to do well in college. Those measures of collegiate success include (1) cumulative GPA at CU (CUGPA), (2) total credit hours earned, (3) graduation in four years, and (4) graduation in six years. To form a baseline to which impostor students" outcomes can be compared, I also examine mean CUGPA and credit hours earned, and percent graduating in four and six years for all students in the historical dataset *not* included in the impostor group.

Findings

Analyses of grades, credit hours earned, and graduation rates for the historical impostors suggest college outcomes will be consistently lower for class-based admits than for typical undergraduates at CU. Table 5 presents aggregate measures of college success for those students. The reader may interpret statistics associated with impostors in Table 5 as the best available prediction of college outcomes for class-based admits. As a baseline for comparison, the table includes the same measures for all historical students not categorized as impostors.[5] Standard deviations are included parenthetically.

Table 5. *College Outcomes for Historical CU Students, by Group*

[5] The baseline group was more likely than historical impostors to enroll in more selective undergraduate programs (e.g., engineering) at CU. Still, the results in Table 5 do not change if the analysis is restricted to only those baseline and impostor students who enrolled in the less selective College of Arts & Sciences.

Group	N	CU GPA	Credit Hours Earned	% Graduating, 4 Years	% Graduating, 5 Years	% Graduating, 6 Years
Impostors	2,704	2.50 *(0.76)*	25.9 *(9.9)*	28.3%	44.3%	52.9%
Baseline	18,422	2.83 *(0.77)*	31.6 *(12)*	39.8%	61.4%	66.0%

Across measures, college outcomes were lower for impostors when compared with the baseline. With respect to both undergraduate GPA and credit hours earned, these differences were roughly equivalent to one half of a standard deviation – a substantial drop off in college performance. More than half of the historical impostors eventually graduated from college, but graduation rates at four, five, and six years for historical impostors lagged significantly behind the graduation rates of other CU students. Still, as a share of the baseline graduation rates, historical impostors‟ graduation rates increased following additional years of college. The impostors‟ graduation was 70% of the baseline graduation rate after four years, 72% after five years, and 80% after six years. As such, it would seem as though graduation rates for class-based admits may begin to approach baseline graduation rates given additional years in college.[6]

Finally, and not surprisingly, the college outcomes detailed above vary, depending upon how class-based admits were identified by the Indices. Impressive college outcomes are more often observed for the impostors of those class-based admits identified by the Overachievement Indices. For example, four class-based admits from the 2009 experiment were identified by the Overachievement Indices but *not* by the Disadvantage Index. Those class-based admits have 601 historical impostors, and those impostors performed well in college. In fact, their mean

[6] These results are robust to alternate matching strategies. For example, coarsening PGPA to either 0.5 or 0.125 standard deviations yields estimates similar to those above.

cumulative GPA (2.94) and six-year graduation rate (70%) surpassed the baseline. In contrast, 10 class-based admits from the 2009 experiment were identified by the Disadvantage Index but *not* by the Overachievement Indices. They were assigned 1,352 historical impostors. These impostors did not fare as well in college. Their mean undergraduate GPA was 2.25, and less than half (42%) graduated in six years.

In sum, this analysis of college outcomes suggests college success for class-based admits is possible, but far from guaranteed. Compared to their undergraduate peers, we can expect fewer class-based admits to graduate from college. We can also expect, on average, lower college grades from class-based admits. This will be especially true of class-based admits singled out solely by the Disadvantage Index. Still, more than half of the matched impostors did ultimately earn a college degree. Moreover, class-based admits who were identified due to overachievement in high school may perform quite well in college – better, in fact, than typical CU undergraduates.

Discussion

Implications for Class-Based Affirmative Action

The University of Colorado"s approach was designed with particular goals in mind: maintaining minority acceptance rates in the absence of race-based affirmative action, and increasing acceptance rates for socioeconomically disadvantaged but deserving applicants. In these respects, the results are promising. First, whether institutions replace race-conscious admissions with class-based systems, or simply phase in class alongside race, the addition of class-based considerations should substantially improve the likelihood of acceptance for low-SES students. For institutions seeking to increase socioeconomic diversity, class-based affirmative action seems to be a promising avenue. Second, these results suggest class-based affirmative action may be useful for institutions hoping to recover rates of minority representation under race-neutral admissions conditions. In this respect, the size of the boost attached to a class-based identification matters a great deal. Poverty and minority status are not perfectly correlated, so if class is intended to replace race in college admissions, the boost attached to an identification of disadvantage or overachievement must substantially outdo the additional consideration associated with minority status. In addition, results from the 2010 experiment suggest that when class-based and race-based affirmative action are combined, significant additional consideration may be conferred to applicants identified under both frameworks (i.e., low-SES minorities). As such, class-plus-race approaches have the potential to improve considerably minority acceptance rates.

When the beneficiaries of class-based affirmative action matriculate, we can expect substantially lower college outcomes. Analysis of historical CU data suggests class-based admits graduate at lower rates and earn lower grades than their peers. This finding is not damning for class-based affirmative action, but it does raise a legitimate concern: While the class-based system at CU holds promise for maintaining minority representation and increasing socioeconomic diversity, its implementation will result in the admission of some students whose academic credentials and SES suggest a reduced likelihood of college success. Students identified solely by the Disadvantage Index are those most likely to have trouble maintaining strong GPAs throughout their college careers and ultimately attaining a degree. Conversely, those identified by the Overachievement Index may perform better in college than the typical undergraduate. So, the stories and statistics presented in the analysis of matched historical impostors do not rule out the possibility of college success for the beneficiaries of class-based affirmative action. They do argue for the provision of robust academic support systems for low-income, marginally qualified students once they arrive on campus.[7]

Limitations and Areas for Further Research

First, it is important to acknowledge that the 2009 experiment utilized random sampling, but not random assignment. Random sampling provides generalizability, but random assignment would have addressed some threats to internal validity. Specifically, the conditions of this experiment may not realistically reflect the environment in which admissions officers make decisions. The treatment condition (review via the Disadvantage and Overachievement Indices, without consideration of race) constituted an unofficial admissions decision. The official decision had been rendered by way of the race-based policy. Under these circumstances, it is possible that admissions officers gave more weight to identification under the Indices than they would have had these class-based decisions been "for keeps." As such, acceptance rates for low-SES and URM applicants under the class-based condition may be biased upwards. It may be tempting to compare the results from the 2009 experiment to those of the 2010 experiment, which used random assignment. Such comparisons may not be valid. First, the 2010 experiment uses a modified treatment – class-plus-race affirmative action rather than class-based affirmative action – as a replacement for the race-based control condition. Second, the 2010 experiment examines a different population – borderline applicants – than the 2009 experiment, which drew from the full applicant pool. With so many adjustments from one experiment to the next, it is safest to view these experiments" results as complimentary, but not directly comparable.

[7] As of the 2011 admissions cycle, identification by the Disadvantage Index triggers referral to the McNeill Academic Program, a structured academic support system for underprivileged students.

In addition, much of the prior research on the prospects of class-based affirmative action – most notably William Bowen and Derek Bok‟s work in *The Shape of the River* – focuses on race-conscious and class-conscious strategies at elite, highly selective colleges (Bowen & Bok, 1998). The University of Colorado at Boulder is a different sort of institution. Two features in particular distinguish CU from the institutions most often included in prior research on affirmative action. First, while still the flagship public university in Colorado, CU‟s overall acceptance rate is much higher than those reported at highly selective colleges. Second, and perhaps more importantly, the admissions boost associated with minority status at CU is relatively small. Research by Espenshade and Radford (2009), Long (2007), and Sander (2004) suggests that at many selective private and public schools, the boost for minority status is quite large. My preliminary findings suggest the effectiveness of class-based affirmative action with respect to maintaining racial diversity hinges upon the size of the boosts class-based systems confer. Universities with admissions frameworks similar to CU‟s – those that place relatively little weight on minority status, and are willing to place substantial weight on class-based measures – should be able to replicate these findings. At highly selective schools, however, it may not always be feasible to enact class-based considerations that are appreciably larger than the sizeable race-based considerations already in place. It is possible, however, that CU represents a certain class of university – one to which the bulk of class-based simulations to date do not reasonably apply – where boosts for minority status were never particularly large to begin with, and class-based affirmative action can be counted upon to produce levels of racial diversity nearly equivalent to those realized under race-conscious admissions.

A Final Note on Class-Conscious Admissions

A lesson I carried throughout this process bears mentioning here: Class-based affirmative action is terribly complex. These systems tend to come into existence hurriedly, under the threat of an affirmative action ban (e.g., Sander, 1997). A class-based approach – by definition and often by law – must be designed to measure one thing (class) while its architects often hope to conveniently proxy another (race). Moreover, the system to which a class-based approach is compared is usually quite simple. Race-based affirmative action relies on an observable binary indicator – minority / non-minority – to confer additional consideration in admissions. Class-based approaches offer no such simplicity. Even if thresholds of disadvantage and overachievement are established to form successive categories of applicants – as is the case with this effort – considerable care must be taken in defining and justifying those thresholds. Finally, building this class-based system required access to multiple large-scale datasets, not only for the estimation of the statistical models that underpin the approach, but also for testing, refining, and assessing the method once it has been put to use. Still, this research suggests the development of a class-based approach is doable in relatively short order. Further, validity studies can be carried out and evaluation criteria established such that any class-conscious system will be flexible over time to the changing needs of the admissions officers who implement it.

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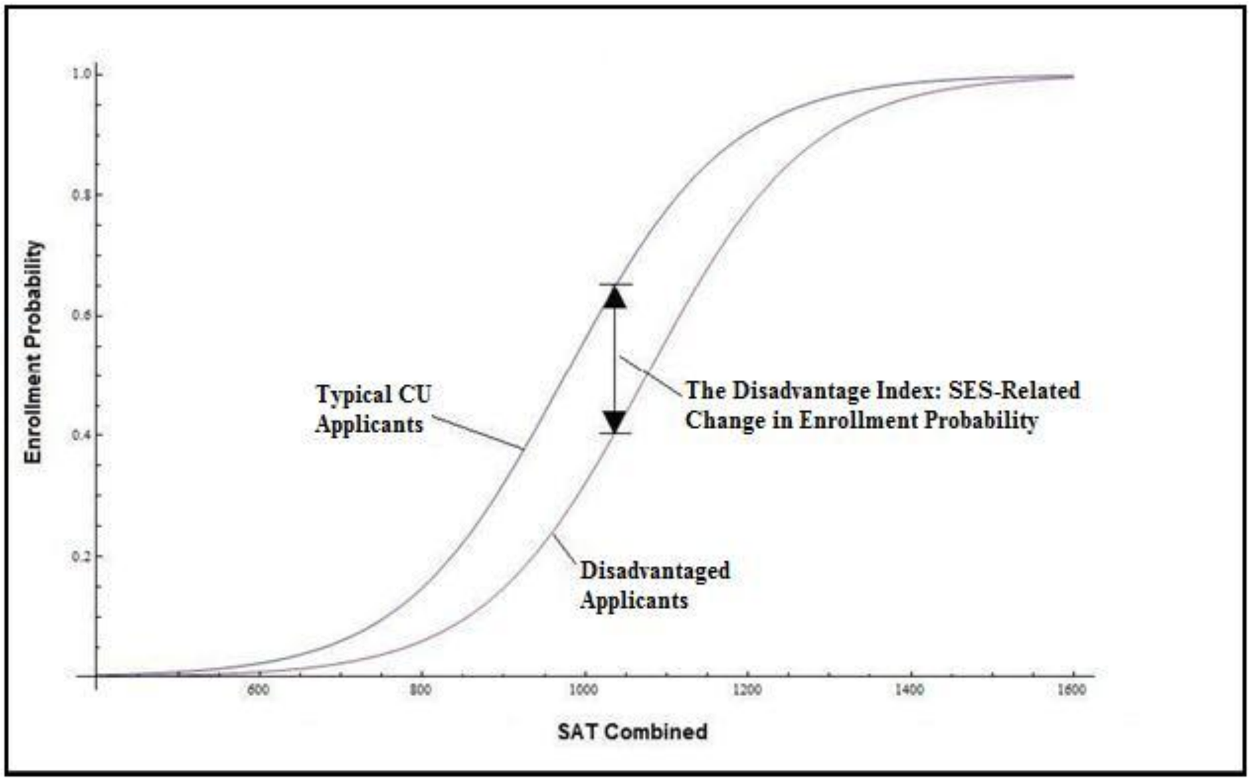
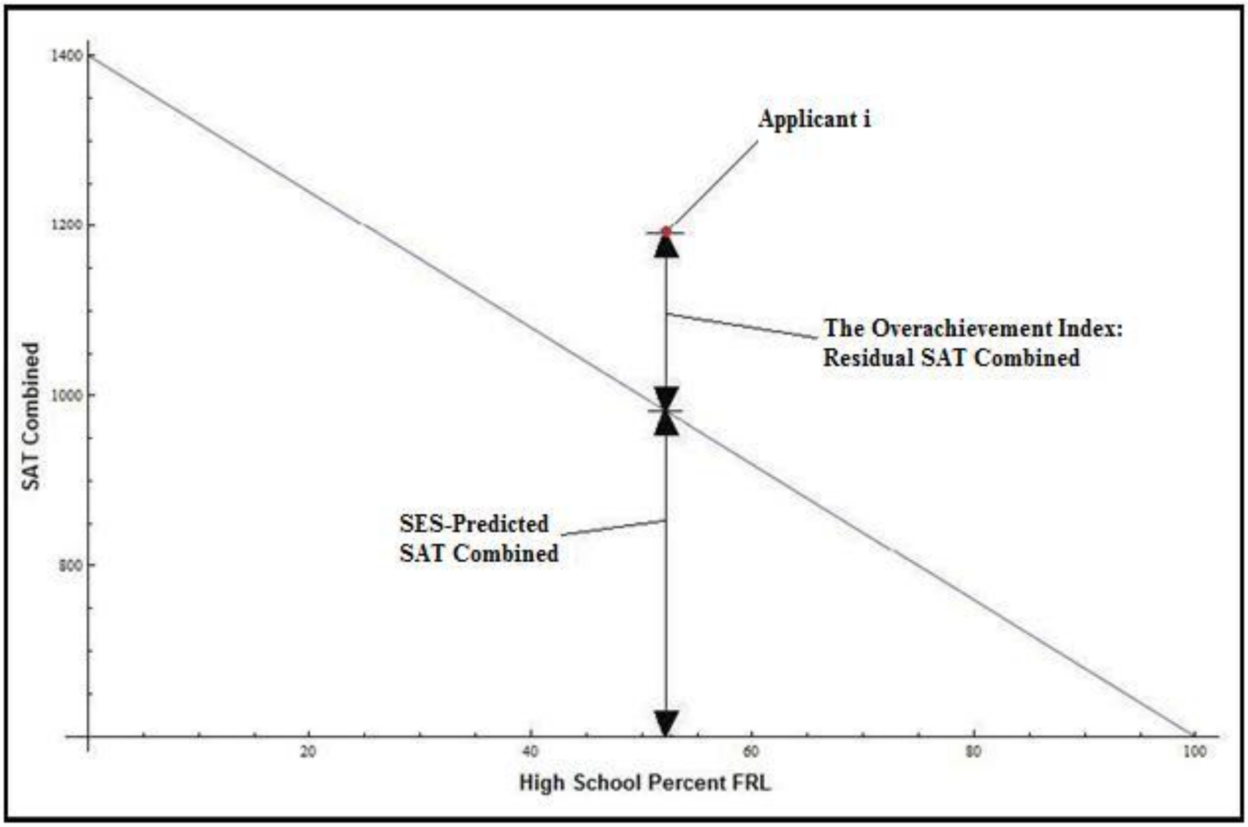
Appendix A. *Visual Representation of the Disadvantage Index*

For the purposes of illustration, the probability of enrollment in a four-year college is plotted as a function of SAT combined score for two groups of applicants – those with typical socioeconomic characteristics and those with socioeconomic characteristics indicating disadvantage. It is important to point out that the ogive representing typical CU applicants remains fixed, because the socioeconomic characteristics of the typical applicant are fixed. The ogive representing a disadvantaged applicant, however, may vary as a function of the socioeconomic measures specific to that applicant.



Appendix B. *Visual Representation of the Overachievement Index (SAT)*

For the purposes of illustration, SAT combined score is plotted as a function of one socioeconomic measure: the percentage of students school-wide receiving free or reduced-price lunch.



Appendix C. *Parameter Estimates and Model Fit Statistics for the Disadvantage and Overachievement Indices*

	Disadvantage Index		Overachievement Index (HSGPA)		Overachievement Index (ACT)		Overachievement Index (SAT)	
	Log Odds		*OLS*		*OLS*		*OLS*	
Predictor Variables [a]	*Estimate*	*S.E.*	*Estimate*	*S.E.*	*Estimate*	*S.E.*	*Estimate*	*S.E.*
Intercept	-2.07	0.020	2.60	0.005	16.81	0.044	923.25	1.680
Native Language English	-0.07	0.008	-0.05	0.002	0.94	0.021	-16.96	0.809
Single Parent			-0.19	0.002	-0.96	0.015	-38.53	0.643
Dependents			-0.03	0.001	-0.15	0.004	-6.54	0.200
Dependents * Income @ $0 - $14,999[b]	-0.12	0.001	0.00		0.00		0.00	
Dependents * Income @ $15,000 - $34,999	-0.06	0.001	0.03	0.002	0.28	0.010	16.02	0.320
Dependents * Income @ $35,000 - $49,999	-0.03	0.003	0.07	0.001	0.54	0.009	34.82	0.540
Dependents * Income @ $50,000 - $74,999	0.02	0.003	0.09	0.001	0.87	0.003	58.11	0.160
Dependents * Income @ $75,000 - $99,999	0.07	0.002	0.13	<0.001	1.19	0.001	72.40	0.620
Dependents * Income @ $100,000 - $199,999	0.11	0.002	0.17	<0.001	1.45	0.006	88.30	0.560
Dependents * Income @ $199,000+	0.18	0.001	0.19	0.002	1.74	0.007	105.61	1.400
Parents' Highest Level of Education								
No/Some High School	0.00		0.00		0.00		0.00	
High School Graduate	0.13	0.006	0.09	0.002	0.71	0.010	29.60	0.650
Some College	0.39	0.004	0.16	0.001	1.45	0.003	56.01	0.740
2-year College Graduate	0.52	0.005	0.26	0.003	2.01	0.012	88.14	1.610
4-year College Graduate	0.71	0.002	0.33	<0.001	2.93	0.001	117.43	0.800
Postgraduate Study	0.88	0.001	0.46	0.003	3.52	0.002	146.34	0.980
Rural High School	-0.15	0.006	0.13	0.002	0.61	0.014	-7.77	0.639
High School Percent F/R Lunch	-0.003	<0.001	-0.004	<0.001	-0.05	<0.001	-2.53	0.017
Size of 12th-Grade Class	0.0001	<0.001	-0.0002	<0.001	0.0001	<0.001	-0.04	0.001
Student-to-Teacher Ratio	-0.03	0.001	0.03	<0.001	0.12	0.002	3.80	0.065
High School Weighted GPA	0.86	0.004						
Highest Test Score, Standardized	0.60	0.003						
Model Summary Statistics								
Nagelkerke R^2	0.31							
-2 Log Likelihood	1130118.6							
R^2			0.09		0.19		0.19	
Standard Error of the Model			0.48		3.41		129	

[a]Unless otherwise noted, parameter estimates are significant at $\alpha = 0.001$

[b]The interaction term Dependents*Income is included only for the Disadvantage Index. All other Indices use the main effects Dependents and Income

*$p < .05$