

**Advanced Placement:**  
**Do minorities have equal opportunity?\***

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Abstract

Black and Hispanic high school students enroll in Advanced Placement (AP) courses at approximately half the rate of white students. This paper develops a microeconomic model of the AP participation decision and finds that low income is the single most important factor behind the minority AP participation gap. In addition, minority students enroll in AP math, science, and English at lower rates than comparable white students. Magnet schools promote AP participation among white students but reduce participation among college-bound black students. Race-matched role models promote AP-taking among high-achieving black males, and AP incentive programs have the potential to dramatically increase minority student participation. Policy implications include reducing the impersonal nature of large high schools by creating smaller “schools-within-a-school” while maintaining flexibility across academic tracks, eliminating magnet programs, hiring qualified AP teachers to actively mentor minority students, and implementing incentive programs that promote teacher training and provide incentives for student achievement.

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## **1. Introduction**

This paper examines racial differences in high school Advanced Placement course participation rates. Advanced Placement (AP) participation is an increasingly important determinant of students' opportunities and performance in higher education. AP courses follow a standardized curriculum, so AP experience conveys more information about a student's abilities than does experience in non-standardized (although perhaps equally advanced) classes. The University of California ranks the number of AP courses completed and the grades obtained in them as the fourth criterion for admission of new undergraduate students (Tomas Rivera Policy Institute, undated). This reflects a nationwide trend. According to the College Board, "college admissions personnel view AP experience as one indicator of future success at the college level. As college admissions become more selective, participation in an AP course is a great advantage" (2001).

AP experience is useful not just as a screening device for college admission; it also improves retention by serving as strong college preparation. When children whose parents did not attend college pursue a rigorous high school curriculum, their chances of attending college dramatically improve as do their chances of continuing past their first year (NCES, 2001). Students with AP experience are also more likely to graduate from college (Burdman, 2000). The academic culture provided by the AP Program can be particularly beneficial to minority students who may not be exposed to a culture of learning in other places.

While AP courses are offered in similar numbers at predominantly minority and white Texas high schools, black and Hispanic students enroll in AP courses at about half

the rate of white students.<sup>1</sup> To my knowledge, no previous research has provided a concrete measure of the minority AP participation gap or developed a microeconomic explanation of this gap. The College Board administers the AP Program and conducts the majority of AP-related research, most of which pertains to issues relating to student AP exam performance. None of the existing College Board research considers the determinants of the initial AP enrollment decision. In 2000, the College Board's National Task Force on Minority High Achievement produced a general report on the underachievement of minorities (College Board, 2000). The Task Force made vague recommendations for action and emphasized that a great deal more research is needed to understand the determinants of minority underachievement.

Between 1994 and 1999, AP participation rates more than quadrupled for white, black and Hispanic Texas public high school students. However, black and Hispanic students enrolled in AP courses at half the rate of white students in both years. Explanations for the continued lag of black and Hispanic students during a period of overall growth in participation remain largely speculative and focus on inferior resources at predominantly minority schools or low expectations and early tracking for minority students (Burdman, 2000; Chenoweth, 1998; Texas Education Agency, 1995). The latter hypothesis is supported by the fact that some schools use PSAT or SAT scores to limit enrollment in AP courses (Chenoweth, 1998).

This paper, by developing an empirical model of the individual student's initial AP enrollment decision, sheds new light on the underachievement of minority students with respect to the Advanced Placement Program using data from the Texas Schools Microdata Panel. The results show that family income is the single most important factor

behind the minority AP participation gap. Large schools offer the most diverse AP curriculum but reduce the participation rates of all students. Minority students enroll in AP math, science, and English at lower rates than comparable white students. Recent Hispanic migrants participate in AP at dramatically lower rates than other Hispanics, even when they are actively considering applying to a four-year college. Magnet schools promote AP participation among white students but reduce participation among black students. Role models are particularly important for promoting AP-taking among high-achieving black males, and AP incentive programs have tremendous potential for increasing the participation of minority students. Clear policy implications emerge from this research, including reducing the impersonal nature of large high schools by creating smaller “schools-within-a-school” while maintaining flexibility across academic tracks, eliminating magnet programs, hiring qualified AP teachers who are willing to mentor minority students, and developing incentive programs that promote teacher training and student achievement.

## **2. The Advanced Placement Program in Texas**

The Advanced Placement Program allows students to complete college-level course work while enrolled in high school and are taught by resident high school teachers. There are approximately 35 AP courses in 19 different subject areas ranging from Economics and Chemistry to Music Theory and Studio Art. Each May, students may take the AP examination in the subject area studied in class. AP exams are administered by the College Board and are graded by a panel of university professors and high school AP teachers on a scale of one to five.

There is no cost to students taking an AP course, although there is a fee of 78 dollars if students wish to take the AP exam. Most states subsidize exam fees for low income students, and in Texas, low income students can take each AP exam for as little as five dollars. Many universities grant incoming freshmen college credit for their AP work in subject areas where they earned a score of three or better on the AP exam. First-year college students with high AP exam scores in enough subject areas may even be granted sophomore standing at some schools.

For students, taking an Advanced Placement course has a dual advantage. First, while taking an AP course is not a prerequisite for attempting the relevant AP exam, course completion and exam performance are positively correlated (Texas Education Agency, 1995). Second, taking an AP course signals to college and university admissions officers that a student is prepared for college level work, whether or not she takes the AP exam. The University of Michigan considers the rigor of an applicant's high school curriculum in the admissions process and awards extra points in this category for taking AP courses (Long, 2001). University of California schools grant applicants five points for an A in an AP or honors course rather than the usual four (Burdman, 2000). These universities clearly recognize that the benefits of the AP Program are not derived solely from the AP examination.

The Texas Education Administration promotes the AP Program in Texas public high schools through the Advanced Placement Incentive Program (APIP). Under the APIP, the state pays for AP teachers to attend College Board approved summer training, pays teachers a one-time materials grant per course of up to \$3000 (for which teachers must apply), and pays schools \$100 for every student achieving a score of three or better

on an AP exam. In 2002 the Academic Excellence Indicator System, by which schools are publicly rated each year, started considering the number of advanced courses offered (including AP courses) and AP test results in its school evaluations. As a result, the number of AP courses offered at Texas public high schools has dramatically increased in the last ten years.

As the number of AP courses offered at Texas public high schools continues to increase, there is concern that the average quality of AP courses may be diminishing due to a shortage of qualified teachers. This concern is valid but not easily tested since AP exam scores are not necessarily a reliable measure of AP course quality. Some districts, schools, or teachers require all students enrolled in an AP course to take the AP exam while others do not, and this leads to difficult selection issues. Judging the performance of AP teachers based on their students' AP exam results also discourages teachers from maintaining open enrollment policies in AP classes. The potential quantity versus quality trade-off imposed by the dramatic growth in the AP Program in the past ten years is worthy of study but is beyond the scope of this paper.

### **3. Data and conceptual framework**

The analyses are conducted using the Texas Schools Microdata Panel (TSMP) for the 1998-1999 academic year.<sup>2</sup> Logit regressions are estimated separately for white, Hispanic, and black students as a function of student and school characteristics. The student is the unit of observation. The data include all white, Hispanic and black students attending Texas public high schools in which at least one Advanced Placement course was offered.<sup>3</sup> These selection criteria result in 383,043 students representing 723 Texas public high schools in the white sample, 255,139 students representing 719 high schools

in the Hispanic sample and 100,109 students representing 639 high schools in the black sample. A second set of regressions includes information on parental education, data that is only available for students who took the SAT. The sample of SAT-taking students includes high school juniors and seniors who are interested, presumably, in applying to a four-year college or university. This is a particularly relevant subsample for analyzing AP course-taking behavior and includes 19,963 white students (421 high schools), 7,009 Hispanic students (334 high schools), and 4,325 black students (247 high schools). The dependent variable is dichotomous and equal to one if the student enrolled in at least one Advanced Placement course in 1999. By defining the dependent variable in this way, I attempt to determine factors that promote initial student participation in the AP Program rather than the extent of a student's involvement in terms of the number of courses taken.

As discussed in detail below, Table 1 presents the expected theoretical impact of various student and school characteristics on AP enrollment. Student characteristics that potentially influence the AP participation decision include year in school, sex, family income, academic track, migrant status, and parent education. Potentially important school characteristics include the likelihood of individual mentoring, the diversity of AP offerings, magnet programs, urbanicity, and AP incentive programs. In addition to these factors, same-race teachers and predominantly same-race peer groups may influence minority students' decisions to participate in the AP Program. Table 2 provides descriptive statistics for all variables as they are included in the empirical model.

[Tables 1 and 2 here]

AP courses are challenging and college preparatory in nature, so upperclassmen are more likely to enroll than freshmen and sophomores. The relatively high ratio of

freshmen to seniors for Hispanic and black students in Table 2 reflects the higher drop-out rates for these two groups. Previous studies have found that more girls participate in the AP Program than boys (Texas Education Agency, 1995). The gender gap in AP participation is consistent with a gender gap in high school and college graduation rates, but the reasons behind these trends are unclear. One likely culprit is the pressure for black and Hispanic boys to work while in school (Fletcher, 2002). Given the potentially important differences in the determinants of curriculum choice on girls and boys, I estimate each model separately for males and females.

Low income students may also be pressured to work and/or carry a large burden of family responsibilities while attending school. Additionally, low income students typically have diminished access to a culture of learning that establishes expectations for attending college and leads students to pursue a high school curriculum rigorous enough to achieve this goal. As a result, students from low income families enroll in AP courses at lower rates, and I expect this effect to persist regardless of minority status once other factors are controlled. Low income is represented by a variable equal to one if the student qualified for free or reduced lunch at any time between 1989 and 1999.<sup>4</sup> The descriptive statistics are striking with respect to differences in family income. Just 27 percent of white students were ever low income compared to 84 percent of Hispanic and 76 percent of black students. Among students in the SAT subsample, fewer minority students were low income, but the gap between white and minority students remains.

Students in a low ability academic track are less likely to participate in the AP Program because they do not have the preparation necessary to perform college level work while in high school. Tracking is measured in part by the “ever special education”

variable which is equal to one if a student was involved in a special education program at any time between 1989 and 1999. Special education experience correctly reflects intellectual ability for some students. However, intellectually capable students may be placed in special education programs for behavioral or other reasons. Special education students are often placed in a low ability academic track for multiple subjects, and once placed in the low ability track, students find it difficult to jump to a higher level track due to curricular differences across tracks (Oakes, 1985). I expect the negative effect of special education on AP participation to be larger for black and Hispanic students if there is less flexibility between academic tracks for minority students. The overrepresentation of black students and the under representation of Hispanic students in special education relative to white students, as seen in Table 2, are consistent with national trends (Losen & Orfield, 2002).

Another important determinant of minority AP participation is recent migrant status. Recent migrants are less likely to participate in the AP Program as these students are less likely to be college bound. As a border state, Texas is responsible for educating a large number of Hispanic students, some of whom were born in the United States and others who are first generation immigrants. To measure the effect of being a recent migrant, the Hispanic model includes a variable equal to one if the student was designated Limited English Proficient (LEP) at any time between 1989 and 1999. Nearly 50 percent of students in the Hispanic sample were recent migrants by this measure.

Parent education is expected to have a positive effect on AP participation. Well-educated parents are more likely to instill college expectations in their children and to have the human capital to provide their children with the academic support necessary to

complete college level work while in high school. In addition, well-educated parents tend to be more pushy about getting their children enrolled in advanced classes.<sup>5</sup> Mother's education is chosen because mothers typically have more direct contact with children during their formative years than do fathers and because many heads of households are single mothers. This approach is appropriate in view of prior research which finds a large and significant effect of a mother's education on her child's acquisition of cognitive skills (Murnane, Maynard & Ohls, 1981) and eventual level of educational attainment (Krein & Beller, 1988). Mother's education is only available for students in the SAT subsample.

School characteristics also influence a student's AP enrollment decision. For example, students who receive individual mentoring and have positive role models are expected to enroll in AP courses at higher rates. Mentoring and role model effects are measured using school enrollment and the number of racially similar AP teachers (for minority students only). Students at large schools are more likely to feel isolated from those in authority and to receive less individual mentoring.<sup>6</sup> School counselors increasingly describe their jobs as "little more than scheduling, monitoring, and paper pushing" and leave career and guidance counseling to parents (Rosenbaum, 2001: 91). Therefore, higher enrollment is expected to reduce the probability of AP participation for all students but disproportionately more for minority students whose parents may have less of an understanding of the potential benefits of the AP Program. In addition, large schools may find it easier to track students. As discussed above, insofar as minority students are disproportionately tracked into lower-level courses or there is less flexibility between academic tracks for minority students, enrollment will have a larger negative

effect on minority AP participation. Enrollment is included in quadratic form to allow for non-linear effects.

Minority AP teachers may serve as active mentors or as positive role models to minority students who are considering enrollment in an AP class. Mentors are particularly important for black and Hispanic students who are less likely than white students to have an educationally involved adult at home. Many scholars hypothesize that students learn better when their school environment is similar to their home environment, an idea Ferguson (1998) describes as “cultural congruence.” Under this hypothesis, minority teachers may be particularly effective mentors and role models to minority students because their classrooms better replicate students’ home environment. Black teachers may also have higher expectations for black students and offer them more praise than white teachers (Beady & Hansell, 1981; Irvine, 1988). For these reasons, black and Hispanic students may be more likely to enroll in an AP class with a same-race teacher.<sup>7</sup> The presence of black or Hispanic role models is measured by the number of same-race AP teachers at a minority student’s school and is squared to allow for non-linear effects. This variable is omitted for white students.

The percentage of schools employing black or Hispanic AP teachers is small. Table 3 shows that 25 percent (183 of 719) of schools that enroll Hispanic students employ at least one Hispanic AP teacher while only nine percent (58 of 639) of schools that enroll black students employ at least one black AP teacher. The low number of minority AP teachers is partly attributable to supply and demand factors which limit the overall number of minority teachers hired. Once hired, minority teachers may also be less likely to be offered the opportunity to teach highly desirable AP courses.

[Table 3 here]

In addition to the racial composition of teachers, the racial composition of the student population is potentially an important determinant of students' willingness to engage in challenging coursework. There is considerable debate as to whether minority students actively discourage peers from engaging in behaviors conducive to academic success (Fordham & Ogbu, 1986; Ferguson 2002; Farkas, Lleras & Maczuga, 2002). Farkas, Lleras and Maczuga (2002) find evidence of an oppositional culture among black students at predominantly minority schools. However, recent survey results indicate that a greater proportion of black and Hispanic students report that their friends strongly agree with the statement "it is important to study hard to get good grades" than white students (Ferguson, 2002). To test for the possible presence of peer-driven academic disengagement such as that found by Farkas, Lleras and Maczuga (2002), I include a dummy variable for black and Hispanic students who attend schools in which more than 75 percent of students are of the same minority group as the student. The effect of this variable is predicted to be negative for black students if a predominantly black environment fosters resistance to academic achievement among black students. The expected effect is ambiguous for Hispanic students.

As part of the desegregation effort, Texas attempted to draw exemplary white students to predominantly black schools by developing magnet programs offering specialized coursework within a particular field such as math, technology, foreign languages, health, or the arts. Since the number and type of AP courses offered are controlled in these analyses, the expected effect of a magnet program in this model is ambiguous. Ideally, a magnet program would have a positive impact on AP course

taking for all students because it would serve to import a culture of academic excellence that would spill over from the magnet students to the “home school” students. However, if there is internal segregation between magnet students and home school students, there will be no cultural spillover effect. In this case, the magnet program may promote AP participation among magnet students but drain scarce resources from the home school students, potentially harming their academic opportunities and performance.

The greater the variety of AP courses offered at a school, the greater the choice of subject matter and the higher the probability that a student from any racial group will take their first AP course. For example, if AP Calculus is the only AP course offered, AP participation is likely to be lower than if AP English, AP History and AP Music Theory are also offered. For the purposes of this study, AP courses are grouped into five categories: “Science and Math” includes biology, environmental science, chemistry, physics, calculus, statistics, and computer science; “English” includes English language and composition and English literature and composition; “Arts” includes music theory, art history, general portfolio, and drawing; “Foreign Languages” includes Latin, French, German, and Spanish; and “Social Sciences” includes economics, government, U.S. history, European history, and psychology. The Foreign Language category is divided into two categories for Hispanic students: Spanish and non-Spanish. Since many Hispanic students already speak Spanish, enrolling only in AP Spanish would be of marginal value. As can be seen in Table 2, there is not a great deal of difference between the average numbers of AP courses available to students of different races.<sup>8</sup>

Urbanicity is expected to impact student AP course taking behavior through regional attitudes towards the value of a college education. On average, large suburban

areas are expected to sustain a culture that values college more than other areas. Empirically, urbanicity is determined at the district level based on 1990 Census data, so there is a notable lack of precision in these variables.<sup>9</sup> As shown in Table 2, most white students attend school in large suburban areas while black students are heavily represented in large urban areas. Hispanic students are fairly evenly distributed between large urban and large suburban areas.

During the 1990s, the O'Donnell Foundation developed an incentive program in the Dallas Independent School District to promote AP participation. While all students enrolled at participating high schools are eligible for the program, Dallas ISD is predominantly black and Hispanic so minority students primarily benefit. The Foundation provides performance-based financial incentives to schools, teachers, and students. Students who take an AP course can take the AP exam for half-price, and when students taking AP exams in math, science, English, or the arts earn a passing score of three or better, they are reimbursed for all exam fees and given \$100. The initial five-year program (which was subsequently renewed for nine schools in Dallas ISD) was highly successful at increasing AP exam-taking among female and minority students in the eligible schools (U.S. Department of Education, 1997). I include a variable equal to one for students in Dallas ISD to measure the magnitude of the effect of the O'Donnell Foundation Program on AP course-taking behavior.

#### **4. Results**

Empirical results from a logit regression of the student choice to enroll in at least one Advanced Placement course on student and school characteristics are provided in Tables 4 and 5. In the full sample (Table 4), chi-squared statistics testing the null

[Tables 4 and 5 here]

hypothesis that the slope coefficients are equal for male and female students vary from 55 to 486 across the races and are rejected at better than one percent significance in all cases. In the SAT-taking subsample (Table 5), the chi-squared statistic of the same hypothesis is rejected at better than one percent for white students, eleven percent for black students, and cannot be rejected at conventional levels for Hispanic students. With the exception of the urbanicity variables, the estimated coefficient signs are generally consistent with theory. Please see footnote nine for sources of potential bias in the urbanicity variables.

#### *4.1 Marginal effects*

In a logit model, the marginal effects are not constant and depend on the values chosen for the independent variables. Therefore, the logit coefficients reported in Tables 4 and 5 must be transformed around a chosen set of observed characteristics in order to obtain the marginal effects of each independent variable. Marginal effects and predicted probabilities of participation are presented for the average high school senior attending school in a large urban area by race, sex, and income level in Tables 6 and 7 for the complete sample and Tables 8 and 9 for the SAT-taking subsample.<sup>10</sup> The average

[Tables 6-9 here]

student, whether male or female, is assumed to have the mean values of their racial group for school size, the number of AP courses available, and mother's education. Other than "senior" and "large urban area," all dummy variables and minority role models are initially set to zero. Reported marginal effects reflect the impact of turning a dummy variable on or a one unit increase in a continuous variable. Baseline probabilities are reported in bold in the first row of each table. The marginal effect of each variable is

reported both in terms of point and percentage changes. For example, in Table 6, a white male high school senior who is not low income and attends school in a large urban area has a 47.2 percent baseline probability of enrolling in at least one AP course. If this student were low income, his predicted probability of participation would drop by 16.9 points, or 35.8 percent, to a 30.2 percent probability of participation (numbers fail to add due to rounding error).

As can be seen by the baseline probabilities presented in the first row for each group in Tables 6 and 7, black males are predicted to participate in AP at approximately half the rate of white males, and black females fare slightly better but still participate at between 60 and 70 percent of the white female rate regardless of income. On average, Hispanic females are even less likely to take an AP course than black females while Hispanic males are slightly more likely than black males to enroll. The minority gap in baseline participation rates among SAT-takers narrows dramatically for Hispanic students but remains approximately the same for black males (Table 8) and closes only slightly among black females (Table 9).

Low income reduces AP participation rates by approximately 40 percent. In the full sample, the adverse impact of low income is not statistically different for white and black students and is only slightly smaller (in absolute value) for Hispanic students. In the SAT-taking subsample, however, income has a significantly larger adverse effect on the AP participation of black students than on that of white students. Even when the low income coefficients are identical, as in the full sample, low income disproportionately affects the AP participation of minority students: greater than three-quarters of black and Hispanic students are low income compared to just one quarter of white students. The

power of income in explaining the overall minority participation gap will be discussed at length in the subsection below.

Academic tracking, as represented by special education experience, is also a strong negative predictor of AP participation. However, based on the results in Table 4, there is no indication that Hispanic and black males or Hispanic females face a special education liability any greater than their white counterparts. Black females, however, do have a significantly larger negative coefficient on special education experience than white females which may suggest a lack of flexibility across academic tracks for this group as discussed above. This negative effect does not persist in the SAT-taking subsample. As with income, however, the disproportionately high rate of special education participation among black students makes the adverse impact of special education greater for this group as a whole than for white or Hispanic students.

The negative effect of recent immigrant status is substantial for Hispanic students. Recent immigrant status, as proxied by having been Limited English Proficient at any point in the previous ten years, reduces the predicted probability of AP participation by approximately 30 percent in the full sample. Recent immigrant status was originally expected to reflect the effect of limited college expectations on student AP participation. However, the negative impact of recent immigrant status remains the same for females and falls only slightly for males in the subsample of SAT-takers, a sample which presumably contains those students who are actively considering college. This result suggests that, in addition to limited college expectations, recent immigrant status captures the lack of institutional knowledge about the AP Program and college admissions and underscores the need for active mentoring among this population.

Mother's education, a variable that is only available for the SAT-taking subsample, behaves as expected and is positive and significant for all students. There is some evidence that mother's education is more important for black males than for black females (difference significant at 11 percent). Across the races, increasing mother's education by one year increases the predicted AP participation rate for males by two to ten percent and for females by two to five percent. The impact of mother's education is significantly smaller for male and female Hispanic students than for the white control group.

While individual student/family characteristics have the largest impact on a student's AP participation, school characteristics are also significant predictors. The set of variables describing the diversity of a school's AP curriculum reveals that black and Hispanic students of both sexes actively avoid AP math and science classes. This result is particularly disturbing given the power of a strong high school math curriculum for predicting future academic and labor market success (Rose & Betts, 2001). Black and Hispanic females are also significantly less likely to take AP English than comparable white females, another discouraging result given the importance of analytical reading and writing as preparation for college and the labor market. Interestingly, neither result persists in the SAT-taking subsample where black and Hispanic students are just as likely to take AP math, science and English as comparable white students.

The only other pattern that appears in the curriculum variables is the tendency of Hispanic students to favor AP Spanish course offerings. As predicted, this result emerges strongly in the full sample. Hispanic AP Spanish students are generally highly motivated, however, as indicated by the fact that only 14 percent of those Hispanic

students who participated in the AP Program took AP Spanish and no other AP courses. In addition, Hispanic SAT-takers are no more likely to take AP Spanish than their white counterparts.

Magnet schools have a positive impact on the AP course-taking behavior of white and Hispanic students and a negative effect on black students. While these results are insignificantly different from zero in the full sample, they are significant in the SAT-taking subsample. Most white students self-select into magnet programs, so the positive effect of magnet programs on white AP course participation is not surprising. However, the negative effect of magnet programs on black students is discouraging. This result supports anecdotal evidence of internal segregation between students in the magnet program and those in the “home school” and that magnet programs drain resources from the home school. The impact of magnet programs on Hispanic students is somewhat difficult to interpret given that magnet programs were designed to facilitate black/white integration.

Figure 1 demonstrates the effect of school size over the range of the sample on predicted AP participation rates for the baseline group of low income males from Table 6. Large schools reduce the predicted participation rates for all students, and the adverse marginal effects are greatest with initial enrollment increases. The negative marginal effect of increasing enrollment beyond the average continues for white and Hispanic students but levels off for black students. The figures are similar for female students and for students who are not low income with the curves shifted up to reflect the higher average propensities. In the SAT-taking subsample, the curves are nearly linear over the sample range with the Hispanic curve shifted upwards (Figure 2). Among Hispanic

[Figures 1 and 2 here]

female SAT-takers (not shown), the adverse marginal effect of enrollment increases levels off at approximately 2500 students. As shown in Table 4, the raw logit coefficient on enrollment is significantly greater (in absolute value) for minority students than for white students. This result might indicate that at large schools, where academic tracking tends to be more prevalent, there is less flexibility across tracks for black and Hispanic students than for white students. Hispanic females are the only group in the SAT-taking subsample who have a significantly greater negative logit coefficient than the white control group (see Table 5).

The results from this model are consistent with the presence of an oppositional culture among black and Hispanic males. Although the coefficients reported in Table 4 indicate that a minority school has an insignificant or positive influence on black and Hispanic AP participation rates, this variable is capturing another unobserved school characteristic that influences AP course-taking behavior in addition to academic disengagement. The influence of this other characteristic is apparent in a pooled model that interacts the race of the student with the minority school variable; when the interaction term is included, the positive coefficient on minority schools remains significant for white males but a significant negative effect emerges for black and Hispanic males. For black students, the negative coefficient on the interaction term is larger in absolute value than the positive coefficient observed on the minority school variable alone. In this case, the oppositional culture (or some other negative influence unique to black students at black schools) completely offsets the positive influence of the unobserved variable that is being picked up by the minority school dummy. Clearly,

more research is needed to identify the sources of both the positive and negative AP-taking influences in predominantly minority schools.

There is no evidence of an oppositional culture in the SAT-taking subsample. As Fordham and Ogbu (1986) suggest, successful students find ways to cope with an oppositional culture by gaining acceptance in other ways, such as participating in sports or being the class clown. It is possible that students who have self-selected into the SAT-subsample are those few who have developed ways of coping with an oppositional culture. While these results are certainly not conclusive about the presence of an oppositional culture among minority students, they indicate the need for further research on the subject.

Perhaps in part due to an oppositional culture among black students in the full sample, introducing a black AP teacher role model has no effect on the AP participation of black students overall. In the presence of an oppositional culture, black teachers may be seen as “‘functionaries’ of the dominant [white] society” (Fordham & Ogbu, 1986: 185). However, a large positive role model effect emerges among black males considering college. Introducing a black AP teacher increases the AP participation rate of black students in the SAT-taking subsample by more than 30 percent. Given the lack of significance in the course availability variables, this result suggests that high achieving black males choose teachers rather than courses when deciding to enroll in AP. Better role model measures are needed to determine whether minority AP teachers promote AP participation by setting an example or by actively mentoring students that they know from previous classes or extra-curricular activities. Such information would be valuable for determining how to strategically recruit and place minority teachers.

The only factor that had a greater estimated impact on any group's AP participation rate than role models on college-bound black males is the incentive program instituted by O'Donnell Foundation. The incentive program increased AP participation by 90 percent among low income black female SAT-takers and 112 percent among low income black males in the full sample. Percentage increases in Hispanic participation rates in response to the incentive program were markedly less than those of comparable black students but remain large. These data indicate that students increased their enrollment in AP courses as a result of the O'Donnell program but do not reveal how well students performed in these classes or whether they earned a passing score on the relevant AP exams.<sup>11</sup> However, even if the students in the O'Donnell program are not yet performing at the college level in AP classes, they are becoming exposed to a culture of intellectualism and raising their academic expectations.

#### *4.2 The total participation gap*

The total participation gap between white and minority students is due to some combination of the following three effects: white and minority students have different observable traits that make them more or less likely to enroll in an AP class (different mean traits); white and minority students have similar observable traits but due to cultural or other differences, those traits have differing influences on a student's attitudes and behavior, and therefore on their propensity to enroll in an AP class (different coefficients); and unobservable or immeasurable differences between white and minority students make them more or less likely to enroll in an AP class.

In an effort to determine the extent to which each of the above contributes to the AP participation gap, Table 10 presents the predicted probabilities of participation for

average students by race when: (i) they have their own average traits and face their own coefficients; (ii) they have white average traits but face their own coefficients; (iii) they have their own average traits but face white coefficients. Since the typical minority

[Table 10 here]

student is low income, the total participation gap is considered to be the gap between white students with high income and black and Hispanic students with low income. Row (iv) partially combines rows (ii) and (iii) by giving minority students the high income of white students (but otherwise their own average characteristics) and white coefficients. Note that the probabilities reported in the first row of each group are those that were reported in row (i) of Tables 6 and 7. I consider only the full sample for this exercise. The original predicted participation gaps are: 30.3 points for Hispanic males; 36.2 points for Hispanic females; 32.4 points for black males; and 33.8 points for black females.

Row (ii) reports the results from substituting white average traits for each minority group's own traits and recalculating the probabilities of participation. If male Hispanic students had white average characteristics and were not low income, the predicted probability of participation in AP would increase from 16.9 to 26.3 which would close the Hispanic/white participation gap by 31 percent. Similarly, the participation gap for Hispanic females would close by a total of 22 percent if they were given white average characteristics. The entire source of the reduction in the participation gap for both males and females is the income variable; the other variables jointly widen the participation gap, albeit by a very small amount. The reduction in the participation gap between black and white students in row (ii) also comes entirely from the income variable. Giving black students white characteristics allows black males to

enjoy a 32 percent reduction in their participation gap and reduces the participation gap for black females by 49 percent. While white traits other than income do not widen the gap for black students as they do for Hispanic students, they close the participation gap for black students by less than one percent.

Even if minority students were observationally equivalent to white students, a substantial AP participation gap would persist. Approximately 70 percent of the gap remains unexplained for Hispanic males and females as well as for black males. Half the gap remains unexplained for black females. Therefore, other factors besides differences in observed characteristics must be responsible for remaining differences in the predicted participation rates between white and minority students. Much of the remaining participation gap can be explained by giving minority students white attitudes and behavior, as represented by the white coefficients, while maintaining their own observable traits. Row (iii) reports predicted AP participation rates calculated using the minority groups' own average traits coupled with white estimated coefficients. White coefficients close the participation gap by approximately 36 to 40 percent for Hispanic students and by 40 to 46 percent for black students. If Hispanic students were given white coefficients AND higher income, as reflected in row (iv), the participation gap closes by approximately 90 percent or more for Hispanic students and by up to 98 percent for black students. Thus, it appears that differences in *responsiveness* to observable characteristics and income alone explain the vast majority of the participation gap for both Hispanic and black students.

This exercise demonstrates that the model presented here succeeds in explaining greater than 90 percent of the white-Hispanic and white-black AP participation gaps in

Texas public schools. Unobservable characteristics that differ between minority and white students are responsible for the remaining portions of each gap. Examples of some unobservable characteristics that are undoubtedly important but are not adequately controlled in this model include motivation, information and expectations about college, and academic tracking.

## **5. Conclusions**

In many ways, black and Hispanic students do not have equal access to AP Programs even when AP courses are offered in their schools. Low income diminishes the AP participation of students from all races, but black and Hispanic students are three times more likely to be low income as white students. In fact, three-quarters of all black and Hispanic students come from low income families. Although the data used in this paper do not provide information about parent education for the full sample, it is likely that many parents of minority students had unpleasant high school experiences themselves and have no experience with higher education. Therefore, minority students have few resources upon which to draw in terms of parental support and institutional knowledge as they attempt to navigate the educational system: they are unlikely to have academic role models at home and often have poor academic histories and limited (or unrealistic) expectations about future college attendance. Each of these factors reduces the likelihood that a minority student will pursue an advanced curriculum such as that provided by the AP Program.

Given the extensive rates of poverty and academic underachievement among minority students, it is disturbing to watch high schools grow increasingly large and impersonal. In the absence of academic role models in their homes and communities,

black and Hispanic students need mentoring at school in order to understand the potential benefits of a rigorous high school curriculum for college and labor market preparation. Their failure to perceive these benefits is evidenced by the fact that they shy away from the AP math, science and English classes that would serve them best in the future. The low AP participation rates among recent Hispanic migrants who are presumably serious about applying to a four-year college or university provide additional evidence of the limited institutional knowledge in this group.

There are several ways for high schools to promote a rigorous curriculum among minority students. Large high schools can be subdivided into smaller “schools-within-a-school” to foster a more intimate educational environment while providing a diverse advanced curriculum. However, it is critical that academic tracking in these schools remain flexible enough that students are able (and encouraged) to enter a more challenging academic track if their skills and interest warrant it. In addition, schools can eliminate magnet programs and hire AP teachers, minority or not, who are invested in the success of minority students and able to serve as role models and mentors. Administrators can also provide teachers with the support and incentives to help minority students set realistic academic goals, prepare for college level work, and navigate the college admissions process. Finally, business and community leaders can come together with schools, as they have in Dallas, to provide funding for programs that promote teacher training and provide incentives for student achievement. Such efforts constitute a critical component of any strategy to break the cycle of minority poverty and academic underachievement.

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## Notes

<sup>1</sup> Texas Schools Microdata Panel 1994 and 1999.

<sup>2</sup> These proprietary data are compiled and maintained by the UTD Texas Schools Project. School years are referenced by the year of their spring term. Therefore, the 1998-99 school year will be hereafter referred to as “1999.”

<sup>3</sup> Charter and alternative schools are excluded.

<sup>4</sup> This definition is chosen for two reasons. Stigma regarding free or reduced lunch tends to be significant in high school, leading many students who qualify to refuse the benefit. Looking to earlier years when the stigma was presumably smaller provides a more accurate measure of low-income status. Additionally, since income is highly correlated across time and the income cut-off for free or reduced lunch is arbitrary, students who fail to qualify in a particular year are likely still to be low income.

<sup>5</sup> Chmelynski (1998) claims that many black parents avoid interfering in their children’s placement; or, when they do intervene, they may actively discourage their children from taking courses that place them in a predominantly white environment.

<sup>6</sup> The Carnegie Council on Adolescent Development (1989) recommends that school reform include the creation of “small communities for learning where stable, close, mutually respectful relationships with adults and peers are considered fundamental for intellectual development and personal growth” because it is too easy for students in large schools to fall through the cracks (p. 9).

<sup>7</sup> Several studies have considered the influence of primary and secondary school teacher role models (Ehrenberg, Goldhaber and Brewer 1995, Evans 1992, Nixon and Robinson 1999). However, none of these papers consider curriculum choice as an outcome measure.

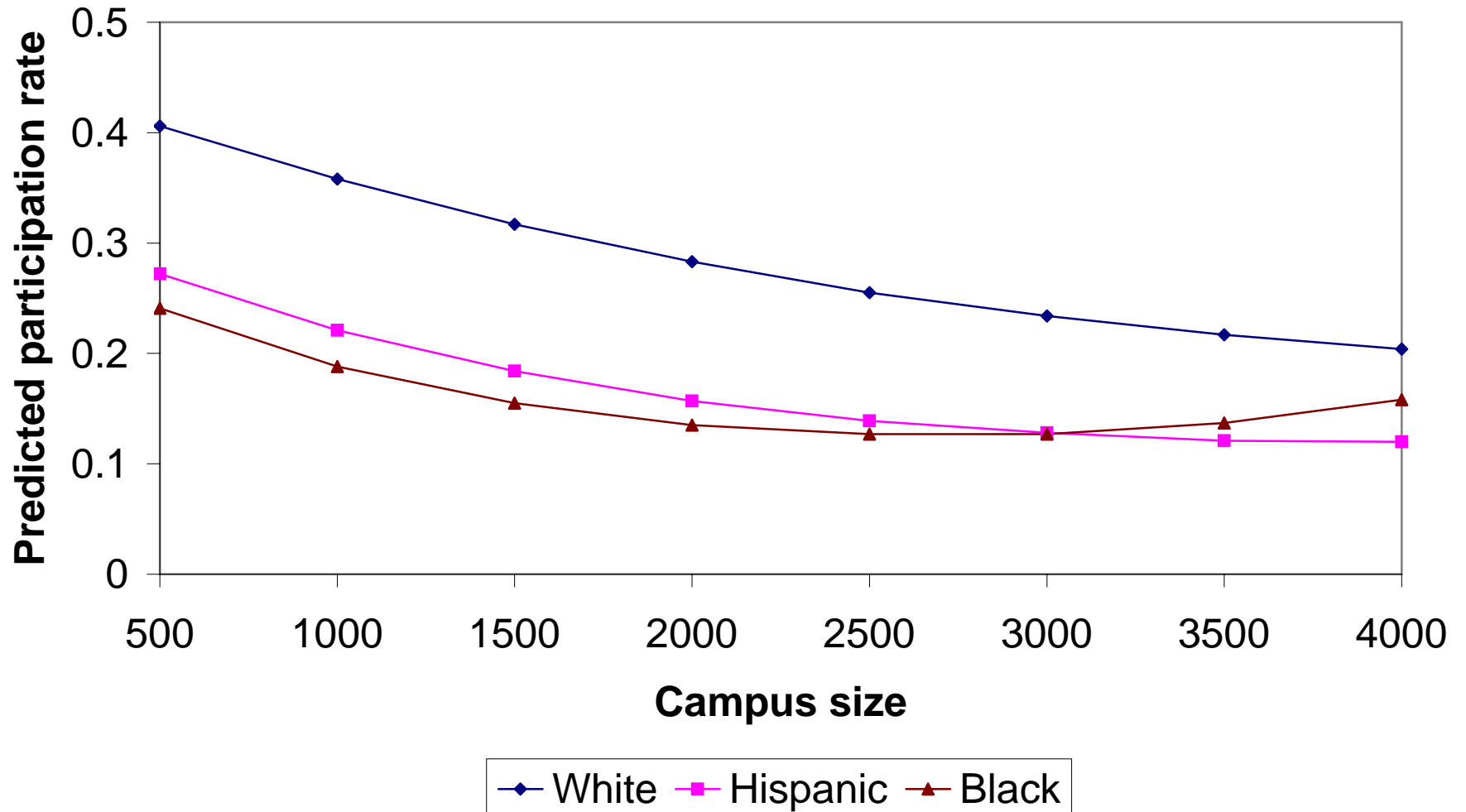
<sup>8</sup> The TSMP indicates whether or not a particular AP course was taught but does not indicate how many sections of the course were offered. Therefore, it is not possible to discern how many students were in one section of an AP class or to differentiate between a school that offered one section of a particular AP class and a school that offered more than one section of the same class.

<sup>9</sup> Schools designated “large urban” are located in school districts serving the central city of MSAs with populations greater than 250,000 (according to 1990 Census figures). “Large suburban” schools are located in the same county as the large urban schools but outside the central city, or in the adjacent counties. “Small urban” schools are located in counties serving MSAs with populations less than 250,000, and “rural” schools include all other schools. Therefore, there is considerable measurement error in the urbanicity variables, particularly for “large urban” and “large suburban,” due to the broad level of aggregation as well as rapid suburbanization during the 1990s.

<sup>10</sup> The predicted probability of enrolling in an AP course for observation  $i$  is  $\exp(\hat{\beta}' X_i) / (1 + \exp(\hat{\beta}' X_i))$ . The results of the marginal percentage changes are approximately the same when looking at seniors attending school in a large suburban area. I focus on large urban areas since the O’Donnell Foundation incentive program is in Dallas ISD, a large urban school district.

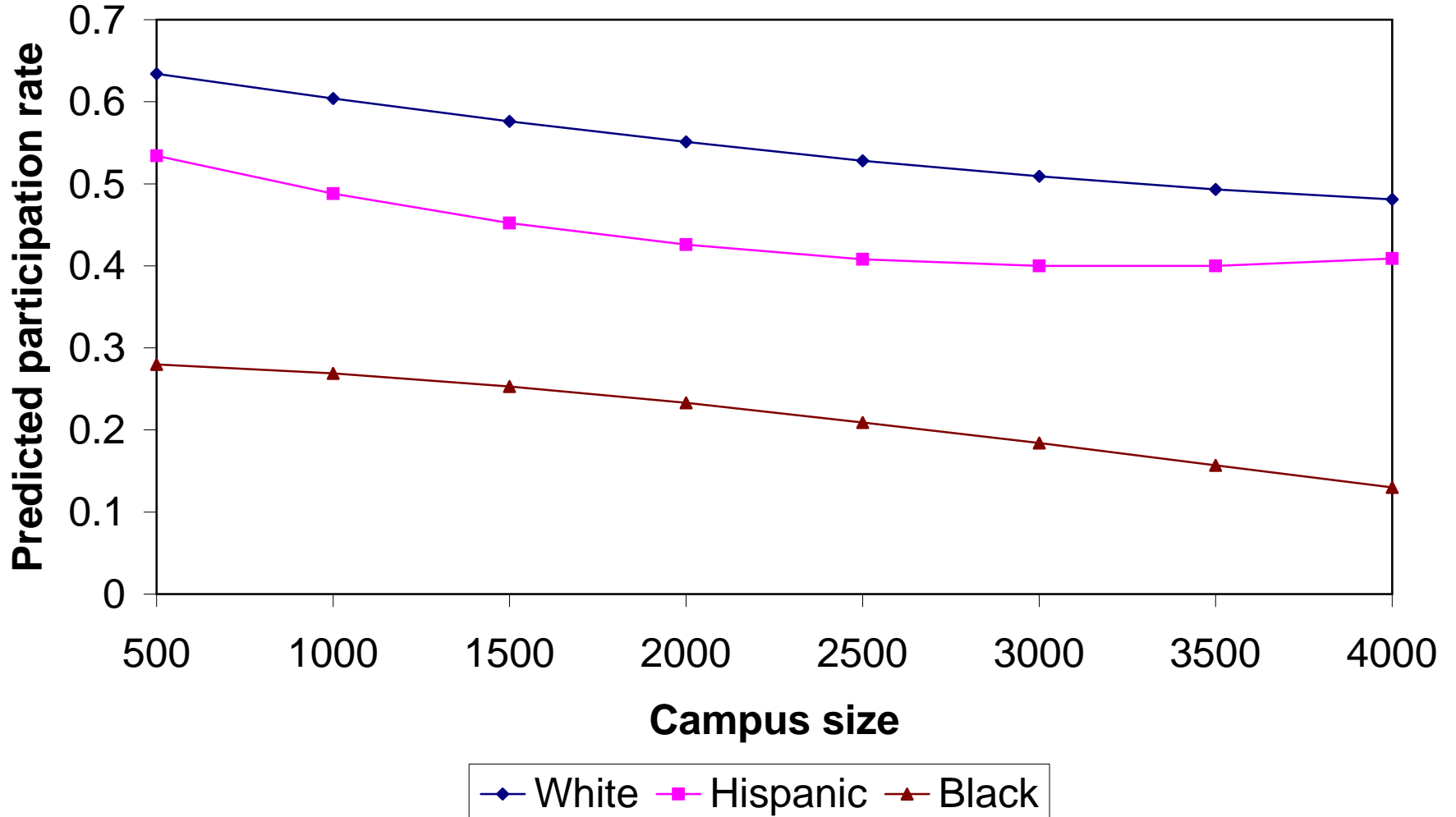
<sup>11</sup> While the AP curriculum is designed to be standardized, there is considerable anecdotal evidence that AP course quality varies widely across schools and subject areas. AP course quality may be particularly variable across Texas high schools in the late 1990s given the rapid expansion of course offerings and the limited supply of qualified teachers.

**Figure 1**  
**Effect of school size on low income males**



**Figure 2**

**Effect of school size on low income males: SAT takers only**



**Table 1**  
**Theoretical influences behind the AP enrollment decision**

Student characteristics		School characteristics	
Grade	+	Role models/mentors	+
Female	+	Oppositional culture	-
Low income	-	Magnet program	?
Low ability academic track	-	Diversity of AP offerings	+
Recent migrant	-	Non-suburban	-
Parents' education	+	AP incentive program	+

**Table 2**  
**Descriptive statistics<sup>1</sup>**

	White		Hispanic		Black	
	All	SAT takers	All	SAT takers	All	SAT takers
AP taker (percent)	15.3	52.3	8.2	42.3	7.2	35.6
<b>Student characteristics</b>						
<i>Distribution of students by grade</i>						
freshman (percent)	27.1	-	34.2	-	32.4	-
sophomore (percent)	26.1	-	25.7	-	25.7	-
junior (percent)	24.8	1.6	22.0	3.2	22.7	4.0
senior (percent)	22.0	98.4	18.1	96.8	19.2	96.0
female (percent)	49.3	54.2	49.1	56.1	50.1	56.2
ever low income (percent)	26.8	12.0	83.7	69.8	75.7	59.3
ever LEP (percent)	-	-	46.2	29.0	-	-
ever special education (percent)	17.9	6.5	16.1	5.7	21.3	7.0
mother's years education	-	14.9 (2.6)	-	14.2 (3.0)	-	14.2 (2.5)
<b>School characteristics</b>						
<i>Distribution of students by urbanicity</i>						
large suburban area (percent)	62.5	66.1	43.6	42.6	37.9	37.9
large urban area (percent)	8.1	14.9	34.1	44.8	41.3	55.9
small urban area (percent)	6.3	3.6	6.2	1.6	8.0	1.8
rural area (percent)	23.1	15.4	16.1	11.0	12.8	4.4
enrollment	1699 (888)	1825 (768)	1779 (738)	1876 (693)	1683 (742)	1793 (699)
> 75 percent students own ethnic group (percent)	-	-	43.9	46.2	18.1	24.1
number own ethnic AP teachers	-	-	1.5 (1.9)	1.7 (1.9)	0.6 (1.0)	0.7 (1.0)
attend magnet school (percent)	0.6	1.0	1.3	2.2	6.0	12.1
Dallas ISD: AP incentives (percent)	0.9	1.4	5.4	5.6	13.7	22.7
AP science/math classes offered	4.7 (2.1)	5.3 (2.1)	4.2 (1.9)	4.4 (1.9)	4.6 (2.1)	4.9 (2.0)
AP English classes offered	1.6 (0.7)	1.6 (0.7)	1.6 (0.7)	1.5 (0.6)	1.5 (0.6)	1.4 (0.7)
AP arts classes offered	1.0 (1.1)	1.2 (1.2)	0.7 (0.9)	0.7 (0.9)	0.9 (1.0)	1.0 (1.0)
AP foreign language classes offered	1.8 (1.9)	2.0 (1.8)	-	-	1.6 (1.7)	1.6 (1.6)
AP Spanish language classes offered	-	-	0.9 (0.7)	1.0 (0.7)	-	-
AP non-Spanish foreign language classes offered	-	-	0.6 (1.0)	0.8 (1.0)	-	-
AP social science classes offered	2.5 (1.6)	2.9 (1.6)	2.4 (1.4)	2.5 (1.4)	2.6 (1.5)	2.7 (1.4)
N	383,043	19,963	255,139	7,009	100,109	4,325

<sup>1</sup>Source: Texas Schools Microdata Panel, 1999. For continuous variables, standard deviations are in parentheses. Values reported for dummy variables represent the percentage of the sample reporting a "1."

**Table 3**  
**Number of schools employing minority AP teachers<sup>1</sup>**

# Black AP teachers			
employed	Big urban	Not big urban	Total
1	20	18	38
2	13	2	15
3	4	0	4
4	0	0	0
5	0	1	1
Total	37	21	58

# Hisp. AP teachers			
employed	Big urban	Not big urban	Total
1	24	67	91
2	10	40	50
3	7	6	13
4	6	8	14
5	3	3	6
6	3	2	5
7	0	3	3
8	0	1	1
Total	53	130	183

<sup>1</sup>Source: Texas Schools Microdata Panel, 1999

**Table 4**  
**Logit estimates of student AP participation<sup>1</sup>**

	White		Hispanic		Black	
	Male	Female	Male	Female	Male	Female
sophomore	1.58 *** (0.06)	1.26 *** (0.06)	1.53 *** (0.08)	1.59 *** (0.07)	1.48 *** (0.21)	1.79 *** (0.18)
junior	3.96 *** (0.06)	4.19 *** (0.05)	3.53 *** (0.07)	3.74 *** (0.07)	4.05 *** (0.18)	4.52 *** (0.16)
senior	4.30 *** (0.06)	4.43 *** (0.05)	3.79 *** (0.07)	3.87 *** (0.07)	4.56 *** (0.18)	4.81 *** (0.16)
ever low income	-0.72 *** (0.02)	-0.80 *** (0.02)	-0.62 *** (0.03)	-0.57 *** (0.03)	-0.66 *** (0.05)	-0.79 *** (0.04)
ever special education	-1.40 *** (0.03)	-1.36 *** (0.03)	-1.31 *** (0.05)	-1.38 *** (0.05)	-1.39 *** (0.08)	-1.57 *** (0.09)
enrollment/1000	-0.48 *** (0.04)	-0.59 *** (0.04)	-0.68 *** (0.08)	-0.94 *** (0.07)	-0.87 *** (0.14)	-1.28 *** (0.11)
(enrollment/1000) <sup>2</sup>	0.04 *** (0.01)	0.06 *** (0.01)	0.09 *** (0.02)	0.16 *** (0.02)	0.16 *** (0.03)	0.25 *** (0.03)
ever Limited English Proficient	-	-	-0.45 *** (0.03)	-0.50 *** (0.02)	-	-
>75 percent students own ethnic group	-	-	0.29 *** (0.04)	0.45 *** (0.03)	-0.11 (0.08)	-0.05 (0.06)
number of AP teachers own ethnic group	-	-	-0.01 (0.02)	0.03 (0.02)	-0.03 (0.07)	-0.07 (0.05)
(AP teachers own ethnic group) <sup>2</sup>	-	-	0.01 *** (0.003)	0.01 *** (0.002)	0.003 (0.02)	0.01 (0.01)
magnet school	0.41 (0.09)	0.07 (0.09)	0.50 *** (0.10)	0.24 *** (0.09)	-0.08 (0.10)	-0.11 (0.08)
AP science/math classes	0.09 *** (0.01)	0.04 *** (0.01)	0.03 *** (0.01)	0.01 (0.01)	-0.01 (0.01)	-0.01 (0.01)
AP English classes	0.14 *** (0.01)	0.27 *** (0.01)	0.15 *** (0.02)	0.22 *** (0.02)	0.17 *** (0.04)	0.22 *** (0.03)
AP arts classes	0.04 *** (0.01)	0.02 *** (0.01)	0.04 ** (0.02)	0.03 ** (0.01)	0.04 (0.03)	-0.07 *** (0.02)
AP foreign language classes	0.05 *** (0.01)	0.08 *** (0.005)	-	-	0.04 ** (0.02)	0.10 *** (0.01)
AP Spanish language classes	-	-	0.23 *** (0.02)	0.29 *** (0.02)	-	-
AP non-Spanish foreign language classes	-	-	0.08 *** (0.01)	0.09 *** (0.01)	-	-
AP social science classes	0.10 *** (0.01)	0.08 *** (0.01)	0.06 *** (0.01)	0.07 *** (0.01)	0.14 *** (0.02)	0.09 *** (0.02)
school in large urban area	0.52 *** (0.03)	0.63 *** (0.03)	0.19 *** (0.03)	0.09 *** (0.03)	0.30 *** (0.07)	0.37 *** (0.05)
school in small urban area	0.23 *** (0.03)	0.27 *** (0.03)	0.16 *** (0.05)	0.16 *** (0.04)	-0.43 *** (0.11)	-0.29 *** (0.08)
school in rural area	0.02 (0.03)	0.07 *** (0.02)	-0.18 *** (0.04)	-0.20 *** (0.04)	-0.44 *** (0.10)	-0.61 *** (0.08)
Dallas: AP incentives	0.30 *** (0.08)	0.63 *** (0.08)	0.30 *** (0.07)	0.46 *** (0.06)	0.97 *** (0.08)	0.86 *** (0.06)
n	194,289	188,754	129,774	125,365	49,998	50,111

<sup>1</sup>Standard errors are in parentheses. \*\*\*p<0.01; \*\*p<0.05; \*p<0.10

**Table 5**  
**Logit estimates of student AP participation: SAT takers only<sup>1</sup>**

	White		Hispanic		Black	
	Male	Female	Male	Female	Male	Female
senior	1.25 *** (0.21)	0.74 *** (0.16)	1.44 *** (0.31)	0.94 *** (0.21)	1.51 *** (0.39)	1.02 *** (0.30)
ever low income	-0.13 * (0.07)	-0.37 *** (0.06)	-0.27 *** (0.09)	-0.37 *** (0.08)	-0.42 *** (0.12)	-0.57 *** (0.10)
ever special education	-0.99 *** (0.08)	-0.97 *** (0.10)	-0.64 *** (0.16)	-0.34 ** (0.17)	-0.63 *** (0.21)	-0.95 *** (0.24)
mother's education	0.13 *** (0.01)	0.12 *** (0.01)	0.04 *** (0.01)	0.04 *** (0.01)	0.12 *** (0.02)	0.08 *** (0.02)
enrollment/1000	-0.29 * (0.16)	-0.46 *** (0.14)	-0.47 (0.29)	-1.05 *** (0.25)	-0.03 (0.48)	-0.65 * (0.38)
(enrollment/1000) <sup>2</sup>	0.03 (0.04)	0.03 (0.03)	0.07 (0.07)	0.22 *** (0.06)	-0.05 (0.11)	0.10 (0.09)
ever Limited English Proficient	-	-	-0.48 *** (0.09)	-0.60 *** (0.08)	-	-
>75 percent students own ethnic group	-	-	0.30 *** (0.12)	0.54 *** (0.10)	0.02 (0.18)	0.50 *** (0.15)
number of AP teachers own ethnic group	-	-	-0.01 (0.06)	-0.11 ** (0.05)	0.70 *** (0.22)	0.14 (0.18)
(AP teachers own ethnic group) <sup>2</sup>	-	-	0.01 (0.01)	0.02 ** (0.01)	-0.26 *** (0.08)	-0.14 ** (0.06)
magnet school	0.62 ** (0.26)	0.04 (0.25)	-0.17 (0.30)	-0.37 (0.30)	-0.43 * (0.23)	-0.58 *** (0.17)
AP science/math classes	0.06 *** (0.02)	-0.01 (0.01)	0.04 (0.03)	0.04 (0.03)	0.05 (0.04)	-0.02 (0.03)
AP English classes	0.12 *** (0.03)	0.16 *** (0.03)	0.08 (0.07)	0.22 *** (0.06)	-0.01 (0.10)	0.25 *** (0.08)
AP arts classes	0.02 (0.02)	0.02 (0.02)	0.04 (0.05)	0.05 (0.05)	0.04 (0.06)	-0.03 (0.05)
AP foreign language classes	0.03 * (0.02)	0.08 *** (0.01)	-	-	0.03 (0.05)	0.10 (0.04)
AP Spanish language classes	-	-	0.05 (0.07)	0.13 ** (0.06)	-	-
AP non-Spanish foreign language classes	-	-	0.08 (0.05)	0.13 *** (0.05)	-	-
AP social science classes	0.07 *** (0.02)	0.09 *** (0.02)	0.12 *** (0.04)	0.10 *** (0.03)	0.05 (0.06)	0.12 *** (0.04)
school in large urban area	0.35 *** (0.07)	0.59 *** (0.06)	0.42 *** (0.10)	0.38 *** (0.08)	0.34 ** (0.16)	0.38 *** (0.13)
school in small urban area	-0.13 (0.12)	0.19 * (0.11)	-0.02 (0.27)	0.02 (0.32)	-0.62 (0.50)	0.25 (0.36)
school in rural area	0.22 ** (0.09)	0.16 ** (0.08)	-0.05 (0.17)	0.05 (0.15)	-0.10 (0.40)	-0.004 (0.29)
Dallas: AP incentives	0.87 *** (0.25)	1.04 *** (0.25)	0.49 *** (0.21)	0.41 *** (0.17)	0.92 *** (0.20)	1.25 *** (0.18)
n	9,147	10,816	3,079	3,930	1,892	2,433

<sup>1</sup>Standard errors are in parentheses. \*\*\*p≤0.01; \*\*p≤0.05; \*p≤0.10

**Table 6**

**Marginal changes<sup>1</sup> in predicted probability of average senior in large urban area enrolling in at least one Advanced Placement course**

*SAMPLE: All males*

	Not low income			Low income		
	White	Hispanic	Black	White	Hispanic	Black
Baseline probability	<b>47.2</b>	<b>27.4</b>	<b>25.1</b>	<b>30.2</b>	<b>16.9</b>	<b>14.8</b>
ever low income	-16.9*** (-35.8)	-10.5*** (-38.3)	-10.4*** (-41.4)	-	-	-
ever special education	-29.1*** (-61.7)	-18.1*** (-66.1)	-17.4*** (-69.3)	-20.6*** (-68.2)	-11.7*** (-69.2)	-10.7*** (-72.3)
add 1 AP science or math	2.2*** (4.7)	0.6*** (2.2)	-0.3 (-1.2)	2.0*** (6.6)	0.5*** (3.0)	-0.2 (-1.4)
add 1 AP English	3.5*** (7.4)	3.0*** (10.9)	3.2*** (12.7)	3.1*** (10.3)	2.2*** (13.0)	2.2*** (14.9)
add 1 AP arts	0.8*** (1.7)	0.7** (2.6)	0.7 (2.8)	0.8*** (2.6)	0.5** (3.0)	0.5 (3.4)
add 1 AP foreign language	1.2*** (2.5)	-	0.7** (2.8)	1.1*** (3.6)	-	0.5** (3.4)
add 1 AP Spanish language	-	4.8*** (17.5)	-	-	3.5*** (20.7)	-
add 1 AP non-Spanish language	-	1.5*** (5.5)	-	-	1.1*** (6.5)	-
add 1 AP social science	2.4*** (5.1)	1.2*** (4.4)	2.7*** (10.8)	2.1*** (7.0)	0.9*** (5.3)	1.9*** (12.8)
ever Limited English Proficient	-	-8.0*** (-27.4)	-	-	-5.4*** (-31.9)	-
introduce ethnic role model	-	0.1 (0.4)	-0.5 (-2.0)	-	0.1 (0.6)	-0.3 (-2.0)
>75 percent students own ethnic	-	6.2*** (22.6)	-2.0 (-8.0)	-	4.5*** (26.6)	-1.3 (-8.8)
magnet school	10.2*** (21.6)	11.0*** (40.1)	-1.5 (-6.0)	9.3*** (30.8)	8.3*** (49.1)	-1.0 (-6.8)
Dallas ISD: AP incentive program	7.5*** (15.9)	6.3*** (23.0)	21.7*** (86.5)	6.6*** (21.9)	4.6*** (27.2)	16.5*** (111.5)

<sup>1</sup> Marginal changes are represented as point changes. Percentage changes are below in parentheses.

Significance is reported based on infinitesimal marginal changes for continuous variables.

\*\*\*p≤0.01; \*\*p≤0.05; \*p≤0.10

**Table 7**

**Marginal changes<sup>1</sup> in predicted probability of average senior in large urban area enrolling in at least one Advanced Placement course**

*SAMPLE: All females*

	Not low income			Low income		
	White	Hispanic	Black	White	Hispanic	Black
Baseline probability	<b>55.1</b>	<b>29.1</b>	<b>37.2</b>	<b>35.7</b>	<b>18.9</b>	<b>21.3</b>
ever low income	-19.4*** (-35.2)	-10.2*** (-35.1)	-16.0*** (-43.0)	-	-	-
ever special education	-31.1*** (-56.4)	-19.7*** (-67.7)	-26.2*** (-70.4)	-23.2*** (-65.0)	-13.4*** (-70.9)	-15.9*** (-74.6)
add 1 AP science or math	1.0*** (1.8)	0.2 (0.7)	-0.3 (-0.8)	1.0*** (2.8)	0.1 (0.5)	-0.2 (-0.9)
add 1 AP English	6.6*** (12.0)	4.8*** (16.5)	5.2*** (14.0)	6.5*** (18.2)	3.6*** (19.0)	3.8*** (17.8)
add 1 AP arts	0.5*** (0.9)	0.6** (2.1)	-1.6*** (-4.3)	0.5*** (1.4)	0.4** (2.1)	-1.1*** (-5.2)
add 1 AP foreign language	1.9*** (3.4)	-	2.5*** (6.7)	1.8*** (5.0)	-	1.8*** (8.5)
add 1 AP Spanish language	-	6.2*** (21.3)	-	-	4.7*** (24.9)	-
add 1 AP non-Spanish language	-	1.8*** (6.2)	-	-	1.3*** (6.9)	-
add 1 AP social science	2.0*** (3.6)	1.4*** (4.8)	2.1*** (5.6)	1.9*** (5.3)	1.0*** (5.3)	1.5*** (7.0)
ever Limited English Proficient	-	-9.2*** (-31.6)	-	-	-6.5*** (-34.4)	-
introduce ethnic role model	-	0.7 (2.4)	-1.2 (-3.2)	-	0.5 (2.6)	-0.9 (-4.2)
>75 percent students own ethnic	-	10.1*** (34.7)	-1.1 (-3.0)	-	7.9*** (41.8)	-0.7 (-3.3)
magnet school	1.7 (3.1)	5.1** (17.5)	-2.5 (-6.7)	1.6 (4.5)	3.9** (20.6)	-1.8 (-8.5)
Dallas ISD: AP incentive program	14.7*** (26.7)	10.3*** (35.4)	21.2*** (57.0)	15.5*** (43.4)	8.0*** (42.3)	17.7*** (83.1)

<sup>1</sup> Marginal changes are represented as point changes. Percentage changes are below in parentheses.

Significance is reported based on infinitesimal marginal changes for continuous variables.

\*\*\*p≤0.01; \*\*p≤0.05; \*p≤0.10

**Table 8**

**Marginal changes<sup>1</sup> in predicted probability of average senior in large urban area enrolling in at least one Advanced Placement course**

*SAMPLE: Male SAT takers*

	Not low income			Low income		
	White	Hispanic	Black	White	Hispanic	Black
Baseline probability	<b>59.1</b>	<b>49.8</b>	<b>32.6</b>	<b>55.9</b>	<b>43.2</b>	<b>24.2</b>
ever low income	-3.2*	-6.6***	-8.4***	-	-	-
	(-5.4)	(-13.3)	(-25.8)			
ever special education	-24.2***	-15.4***	-12.1***	-23.9***	-14.5***	-9.7***
	(-40.9)	(-30.9)	(-37.1)	(-42.8)	(-33.6)	(-40.1)
increase mother's ed by 1 year	3.0***	0.9***	2.7***	3.1***	0.9***	2.3***
	(5.1)	(1.8)	(8.3)	(5.5)	(2.1)	(9.5)
add 1 AP science or math	1.5***	0.9	1.2	1.6***	1.0	1.0
	(2.5)	(1.8)	(3.7)	(2.9)	(2.3)	(4.1)
add 1 AP English	2.9***	2.0	-0.3	2.9***	2.1	-0.3
	(4.9)	(4.0)	(-0.9)	(5.2)	(4.9)	(-1.2)
add 1 AP arts	0.5	1.1	0.9	0.5	1.1	0.8
	(0.8)	(2.2)	(2.8)	(0.9)	(2.5)	(3.3)
add 1 AP foreign language	0.7*	-	0.7	0.7*	-	0.5
	(1.2)		(2.1)	(1.3)		(2.1)
add 1 AP Spanish language	-	1.1	-	-	1.2	-
		(2.2)			(2.8)	
add 1 AP non-Spanish language	-	1.9	-	-	2.0	-
		(3.8)			(4.6)	
add 1 AP social science	1.6***	2.9***	1.1	1.6***	2.9***	0.9
	(2.7)	(5.8)	(3.4)	(2.9)	(6.7)	(3.7)
ever Limited English Proficient	-	-11.9***	-	-	-11.3***	-
		(-23.9)			(-26.2)	
introduce ethnic role model	-	0	10.4***	-	0.1	9.0***
		(0)	(31.9)		(0.2)	(37.2)
>75 percent students own ethnic	-	7.4***	0.5	-	7.4***	0.5
		(14.9)	(1.5)		(17.1)	(2.1)
magnet school	13.7***	-4.4	-8.6**	14.3***	-4.2	-6.9**
	(23.2)	(-8.8)	(-26.4)	(25.6)	(-9.7)	(-28.5)
Dallas ISD: AP incentive program	18.5***	11.9**	22.3***	19.3***	12.1**	20.3***
	(31.3)	(23.9)	(68.4)	(34.5)	(28.0)	(83.9)

<sup>1</sup> Marginal changes are represented as point changes. Percentage changes are below in parentheses.

Significance is reported based on infinitesimal marginal changes for continuous variables.

\*\*\*p≤0.01; \*\*p≤0.05; \*p≤0.10

**Table 9**

**Marginal changes<sup>1</sup> in predicted probability of average senior in large urban area enrolling in at least one Advanced Placement course**

*SAMPLE: Female SAT takers*

	Not low income			Low income		
	White	Hispanic	Black	White	Hispanic	Black
Baseline probability	<b>67.0</b>	<b>53.0</b>	<b>47.3</b>	<b>58.5</b>	<b>43.9</b>	<b>33.7</b>
ever low income	-8.5*** (-12.7)	-9.2*** (-17.4)	-13.6*** (-28.8)	-	-	-
ever special education	-23.6 (-35.2)	-8.6*** (-16.2)	-21.4*** (-45.2)	-23.7*** (-40.5)	-8.2*** (-18.7)	-17.2*** (-51.0)
increase mother's ed by 1 year	2.7*** (4.0)	1.1*** (2.1)	1.9*** (4.0)	3.0*** (5.1)	1.1*** (2.5)	1.7*** (5.0)
add 1 AP science or math	-0.2 (-0.3)	1.0 (1.9)	-0.6 (-1.3)	-0.1 (-0.2)	0.9 (2.1)	-0.6 (-1.8)
add 1 AP English	3.4*** (5.1)	5.6*** (10.6)	6.2*** (13.1)	3.8*** (6.5)	5.6*** (12.8)	5.8*** (17.2)
add 1 AP arts	0.3 (0.4)	1.4 (2.6)	-0.9 (-1.9)	0.5 (0.9)	1.3 (3.0)	-0.8 (-2.4)
add 1 AP foreign language	1.8*** (2.7)	-	2.6** (5.5)	2.0*** (3.4)	-	2.3** (6.8)
add 1 AP Spanish language	-	3.3** (6.2)	-	-	3.2** (7.3)	-
add 1 AP non-Spanish language	-	3.3*** (6.2)	-	-	3.2*** (7.3)	-
add 1 AP social science	1.9*** (2.8)	2.4*** (4.5)	2.9*** (6.1)	2.2*** (3.8)	2.3*** (5.2)	2.7*** (8.0)
ever Limited English Proficient	-	-14.9*** (-28.1)	-	-	-13.9*** (-31.7)	-
introduce ethnic role model	-	-2.3** (-4.3)	0 (0)	-	-2.3** (-5.2)	0 (0)
>75 percent students own ethnic	-	12.9*** (24.3)	12.3*** (26.0)	-	13.4*** (30.5)	11.8*** (35.0)
magnet school	0.9 (1.3)	-9.3 (-17.5)	-14.0*** (-30.0)	1.0 (1.7)	-8.9 (-20.3)	-11.5*** (-34.1)
Dallas ISD: AP incentive program	18.1*** (27.0)	10.0** (18.9)	28.5*** (60.3)	21.4*** (36.6)	10.3** (23.5)	30.2*** (89.6)

<sup>1</sup> Marginal changes are represented as point changes. Percentage changes are below in parentheses.

Significance is reported based on infinitesimal marginal changes for continuous variables.

\*\*\*p≤0.01; \*\*p≤0.05; \*p≤0.10

**Table 10**  
**Predicted probabilities of minority AP participation**  
**given white traits or coefficients<sup>1</sup>**

Average traits/coefficients	Male		
	White	Hispanic	Black
(i) own/own	47.2	16.9	14.8
(ii) white/own	47.2	26.3	25.3
(iii) own/white	47.2	27.9	29.6
(iv) own, not low income/white	47.2	44.3	46.4

Average Traits/Coefficients	Female		
	White	Hispanic	Black
(i) own/own	55.1	18.9	21.3
(ii) white/own	55.1	27.0	37.7
(iii) own/white	55.1	33.5	34.7
(iv) own, not low income/white	55.1	52.7	54.0

<sup>1</sup>Hispanic and black students are assumed to be low income; white students are assumed not to be low income.