Is University of Wisconsin Education Becoming More Elite? A Partial Answer

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Introduction and Overview

There is considerable concern across the United States that accessibility to colleges and universities is becoming more economically elite; that due to increasing income inequality, rising costs of education and rising standards for admission, universities are increasingly serving only those from higher income families. An article in the *Christian Science Monitor* stated "about 50 percent of low-income students enroll in college right after high school, compared with 80 percent of high income students." The article goes on to note that the rate of college attendance for high-achieving, low-income students is approximately the same as the rate for low-achieving, high-income students (Khadaroo 2008). Bowen et al. (2005) point out that students in the bottom quartile of family income make up only 11 percent of enrollments at elite colleges and receive no preference during in college admission programs, many of which do have affirmative action policies for underrepresented minorities.

In this paper, therefore, we focus on whether or not income inequality has increased among those who apply and those who are admitted to a highly ranked, large, public university. We use data on University of Wisconsin-Madison (UW-Madison) applicants over a period of more than three decades, to shed light on accessibility in higher education more broadly. Specifically, we investigate how access to the UW-Madison has changed in terms of family income. Are there income differences between those who are admitted and rejected? Do family income and patterns of admission differ for Wisconsin residents compared to those applying from outside the state? In addition, are there changes in the importance of test scores such as the ACT (American

College Testing) and SAT (Scholastic Aptitude Test)? How might income and achievement measures relate to one another in the admissions process?

Our detailed applicant data allow us to track changes in the composition of the applicant pool, and to answer each of these questions in turn. As one of the largest premier public universities in the United States, a profile of access at UW-Madison can serve more generally to provide insight into access at other high quality, four-year, public universities.

In the following section, we provide some background on the issue of college accessibility for low-income students, focusing first on direct income effects and then discussing the possibility of indirect effects, moderated by measures of academic merit. We then present our unique statistical approach to measuring applicant family income of UW-Madison applicants, a crucial variable missing from the original data and most data on college admissions at an institutional level. Subsequently, we describe demographic trends in the applicant pool, followed by a series of yearly models of the probability of admission. Our analysis is focused primarily on family income and achievement – as measured by test scores.

Access to Post-Secondary Education

At the same time that rising disparities in family income have led to increasing concerns about access to higher education, the post-secondary landscape has shifted dramatically. Some trends suggest an expansion of access while others caution scholars and policymakers that students from the lowest income families continue to confront substantial barriers to entering high-quality institutions of learning – even public colleges and universities. In particular, we acknowledge the ways that heavy reliance on standardized tests for admissions decisions could complicate any study of access for low-income students.

Expanding Opportunities

College enrollment rates have risen. An increasing proportion of high school graduates have attended college since the end of World War II. Currently, 19.7 million students are attending colleges and universities across the Country (U.S. Department of Education 2011), and approximately 68 percent of high school graduates go on to attend some form of higher education (U.S. Bureau of the Labor Statistics, 2011). Students graduating from public high school are better prepared for college than they were in the past. They complete high school with more math, language arts, and science credits than was the norm 20 years ago. More students do their homework and take AP classes (Kane 2003, 2-3).

Many colleges and universities have explicitly sought to increase enrollments among minority students (Alon 2007, 487-488; Astin 2004). As a component of these efforts to diversify student bodies and expand access, the Federal government funds the TRIO programs, and many colleges and universities have created complementary supports to encourage completion among first generation, low-income, and minority students (e.g. Chaney et al. 1998). The amount of financial aid provided for higher education has also increased substantially in recent decades (College Board 2010A).

Persistent Challenges

Each of these trends is, however, more complicated than it might first appear. Large achievement gaps persist between low-income students and their more advantaged peers as well as between black, Hispanic, and white students (Terenzini et al. 2001; Timpane and Hauptman 2004, Reardon and Galindo, 2009). These achievement gaps are particularly in evidence on

standardized achievement tests, which have increasingly influenced admissions decisions (Carnevale and Rose 2004). The number of capable applicants has skyrocketed, while the institutional capacity of most colleges and universities has not grown apace (Karabel 2005; Lemann 1999; NACAC Board 2006; cf in Alon 2007 489).

Similarly, while college-going has increased among all groups since the 1980s, the gap in four-year college enrollment between the highest and lowest income groups actually seems to have widened (Ellwood and Kane 2000; Kane 2004). Approximately two-thirds of students in the top income quartile enroll in a four-year college within two years of high school graduation, as compared to a little over one quarter of students from the lowest income quartile (Ellwood and Kane 2000, 286). As of 2008 only 41.6% of 25-34 year olds have an Associate degree or higher, and the U.S. is ranked 12th among OECD countries on this metric. This low comparative ranking creates additional pressure to increase college attendance and completion (OECD 2009).

Potential college students also confront tuition costs that have risen consistently above the rate of inflation (College Board 2010), and though these increases are in part offset by financial aid, low-income students are more responsive (have a more elastic demand) to these increasing 'sticker prices' than are students from high-income families (Heller 1997; Kane 1999). Assistance to students has increasingly been offered in the form of loans as opposed to grants (College Board 2001). The purchasing power of Pell grants, targeted at the lowest income students has decreased over the last several decades (Gladieux 2004). Further, completion rates for low-income students lag as they may find themselves both less prepared for college than their peers and more time constrained as they work more hours to finance their education (Heller 2002; Walpole 2003).

In sum, despite significant efforts to expand access to higher education – and many successes – not all who are interested and capable manage to attend high quality institutions. This is particularly notable when we consider that these institutions, on average, provide better opportunities and higher rates of return to their students (Zhang 2005).

Limited Research Base on Trends in Access Related to Income

All of these broad trends leave unclear how access to elite, four-year institutions, particularly public universities, has changed in a context of substantially increased income inequality, and surprisingly few studies have attempted to identify trends in access with an explicit focus on income. Most trend studies begin with students that have already matriculated, and consequently learn little about the applicant pool, the admissions process, or where in the college-going process income effects are preventing students from attending quality institutions.

For example, Astin and Oseguera (2004) study access to the top 10 percent of institutions of higher learning from 1985 to 2000. They use data from the Cooperative Institutional Research Program's (CIRP) entering Freshman Survey, an annual instrument that has been administered for four decades.[1] The authors find that over this interval, the income level of entering freshman in these top tier colleges has increased but are unable to identify whether this can be tied to applicants' self-selection or shifting admissions preferences. Belley and Lochner (2007) conduct a similar study using the National Longitudinal Study of Youth (NLSY) cohorts drawn in 1979 and 1997, and find that income effects on college attendance increased substantially between the two cohorts.

[1] According to the authors, "Each fall approximately 400,000 freshmen from more than 700 institutions complete a comprehensive questionnaire that asks about basic demographic and biographical information, values, self-concept, attitudes, and educational plans." These data are survey data.

Looking Beyond Direct Effects of Income: Measures of Academic Merit

As Rae emphasized decades ago, economic – income-based – elitism is but one form of inequality (1981). We must consider the issue of low-income access to higher education within a broad perspective, addressing the question of whether or not universities are becoming more elite in terms of family income and measures of academic merit. Zwick (2007) reports that the SAT "has variously been labeled a wealth test, a crooked yardstick, and an 'effective' means of 'eliminating academically promising minority (and low-income) students' from the college admissions pool" (419).[2] She goes on to emphasize that increased reliance on standardized tests for admissions decisions is "incompatible with the goal of increasing the representation of people of color or poor people" (422).

Measures of academic merit are likely to reflect investments by the family including special SAT and ACT prep courses, the ability to choose better schools, hired tutors, a richer home environment in terms of reading materials and attendance at special summer programs. And while these measures predict potential college success (e.g. Bridgeman et al. 2004; Burton and Ramist 2001, cf. Zwick 2007, 421), they may also mask true potential. Thus while empirically it may be shown that income has little direct effect on admissions, income could be working indirectly through the higher level of merit achievement of individuals from well off families. Our data allow us to test the correlation between income and merit as measured by standardized tests. In the conclusion, we reflect on the interaction between income and merit as it affects applicants to high quality colleges.

[2] See also Rooney's 1998 report on the use of standardized tests in admissions.

Measuring Applicant Family Income

Studies of college-going and income effects have therefore uncovered a great deal, but have been characterized by a number of notable limitations. The first is a lack of sufficient, high-quality data. Federal statistics on institutions have not regularly monitored college enrollments from one year to the next. Instead, the National Center for Education Statistics (NCES) has periodically conducted longitudinal surveys, which have proven useful but do not substitute for trend data (Kane 2003, 89; Alon 2007, 488).

Surveys are themselves problematic instruments, as they do not generally provide reliable indicators of family income. The most common sources are student responses to survey questions administered during ACT and SAT examinations. For a number of reasons, these responses are probably woefully inaccurate; students simply do not have accurate information on family income (Gonyea 2005). Yet, CIRP, NLSY, and other datasets utilized in the study of higher education including the Integrated Postsecondary Education Data System (IPEDS) and National Educational Longitudinal Study (NELS), all rely on survey data to measure income

Free Application for Federal Student Aid or FAFSA applications require extensive data on family's resources and assets including family income but are only available for those who are requesting such aid. This limits the population that can be studied to enrolled students who request financial aid. In addition, these applications have only been used since 1992, limiting the period that could be covered for historical analysis.[3]

Our data, though limited to one institution, thus offer three improvements on prior research. First, they are longitudinal data. They cover a long period of time and therefore facilitate not just measuring change between two points in time, but dynamics. Second, data are available for both

[3] See http://www.finaid.org/educators/history.phtml accessed on October 17, 2008.

applicants and admitted students. And third, we employ a unique approach to obtain more accurate (less biased) measures of family income.

We use Census block data to obtain a measure of family income of all applicants. We do so for a relatively long period of time, from 1972 until 2007. Those data are based upon reported income (and other) data for approximately 1200 individuals (600 households) at the Census block level. With our large sample of applicants, this method promises to estimate family income imperfectly but with less bias than other available indicators. Coefficients on these proxies will reflect a combination of contextual and individual effects (Geronimus et al. 1996)

Matching Procedures

For each applicant with a home residence in the 50 States[4], we enlist the Applied Population Lab at UW-Madison to match prospective students' home address as reported on their initial application to a Census block.[5] Census blocks are the smallest geographic and population groups available from the Census. According to the Bureau of the Census:

> Census blocks are areas bounded on all sides by visible features, such as streets, roads, streams, and railroad tracks, and by invisible boundaries, such as city, town, township, and county limits, property lines, and short, imaginary extensions of streets and roads. Generally, census blocks are small in area; for example, a block bounded by city streets. [6]

[4] We are unable to include non U.S. residents in our analysis as we do not have a basis for assigning an income value.

[5] The address information for all of these applicants was provided to the applied population lab with a specially created ID. We were provided the Census data for each applicant tied only to the specially created ID. We inflated the income values to 2009 dollars, to weight the various Census years as described in the text, and to merge these income data with other data on the applicants such as race and scores using only the specially created IDs.

[6] See http://www.census.gov/prod/cen2000/phc-2-a.pdf accessed on October 17, 2008.

They are thus very small geographic units, themselves within Census tracts, which are designed to be homogeneous.[7] Once a student had been matched to a particular Census block, we merged into our original data the median family income for that block.[8] We use the 1980, 1990 and 2000 Censuses in this work as follows. Applicants between 1972 and 1980 were matched to the 1980 Census data. Applicants between 1981 and 1989 were matched to their Census block for both the 1980 and 1990 Census data. We match 1990 applicants only to the 1990 Census. Similarly, applicants between 1991 and 1999, are matched to both 1990 and 2000 Census data, while applicants from 2000 on are matched only to the 2000 data. We convert all Census block median incomes to 2009 dollars. We then interpolate median block incomes for all those with two Census block matches to weight the median income to best represent their block income in the year of application. For example, for an applicant in 1981 we weight the 1980 Census block median income by .9 and the 1990 Census block median income by .1 and average these two values to obtain a weighted block median family income.

Matching Results

[7] Census tracts are defined as follows: "A small, relatively permanent statistical subdivision of a county or statistically equivalent entity, delineated for data presentation purposes by a local group of census data users or the geographic staff of a regional census center in accordance with Census Bureau guidelines. Designed to be relatively homogeneous units with respect to population characteristics, economic status, and living conditions at the time they are established, census tracts generally contain between 1,000 and 8,000 people, with an optimum size of 4,000 people." http://www.census.gov/prod/cen2000/phc-2-a.pdf accessed on October 17, 2008.

[8] Data on income in 1999 are derived from answers to long-form questionnaire Items 31 and 32, which were asked of a sample of the population 15 years old and over. ''Total income'' is the sum of the amounts reported separately for wage or salary income; net self-employment income; interest, dividends, or net rental or royalty income or income from estates and trusts; social security or railroad retirement income; Supplemental Security Income (SSI); public assistance or welfare payments; retirement, survivor, or disability pensions; and all other income. See: http://www.census.gov/prod/cen2000/phc-2-a.pdf accessed on October 17, 2008

We are able to match more than 90 percent of all U.S. resident applicants by our procedure. That is, we obtain an imputed measure of family income for more than 90 percent of all U.S. applicants to the University of Wisconsin from 1972 to 2007 based on Census block data.[9] We think of these values as measuring some combination of permanent family income and community income of each applicant.[10]

Once applicants are matched to Census block income, geographic information are stripped from the dataset to protect the privacy of the applicants. We preserve three indicators identifying Wisconsin residents, Minnesota residents and resident of all other states. As a partially state-funded, public university, within-state (Wisconsin residents) applicants are given priority on admissions and face a far lower ticket price (tuition) than other students. A special agreement with Minnesota, allows those students to also face a reduced price. All other students pay a higher out of state tuition. For this reason we analyze applicants as a total population but control for state of residence.

Findings

We present our findings in two parts below. First, we present a set of descriptive indicators and discuss the changing composition of the applicant pool over three decades. Second we estimate a series of logistic regressions to estimate the effects of applicant characteristics on the probability of admission over time.

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[9] See Appendix Table 1.

[10] The lowest percentage of matches was in the first year, 1972-73 and 1987 for which we matched 87% of the applicants. The smallest applicant pool was the second year (1973-74) for which we had 16, 730 applicant files. The average number of applicants over all these years was 21,754. Note that these numbers include applicants to graduates schools at the UW, which are not included in the analyses below.

Applicants to the University of Wisconsin: 1972 to 2007

Residency. The University of Wisconsin-Madison draws students from throughout the United States and numerous countries. Figure 1 illustrates the changing residency patterns of applicants from 1972 to 2007. Three trends are worth noting. First, the proportion of applicants from Wisconsin has declined – from approximately 70 percent in 1972 to just over 40 percent in 2007. Second, there has been a considerable increase in the total number of applicants, from just over 9,000 applicants in 1972 to just over 20,000 in 2007. Third, the rising number of applicants results primarily from an influx of out-of-state students. However, a UW Board of Regents policy limits enrollments of non-Wisconsin residents to 25 percent of undergraduates (Minnesotans count as residents under a reciprocity agreement between the states).[11]

[Figure 1 About Here]

Median family income. Applicant median family income has increased in real terms over the 35 years of our study, across all residency groups. However, there are substantial differences by residency. Applicants from Wisconsin have higher incomes by 22.5 percent over 35 years. In contrast Minnesota applicants have 40 percent higher incomes in 2007 than in 1972; and out-of-state resident families have close to 50 percent higher incomes in 2007 than at the beginning of the series. See Figure 2 below.[12]

[Figure 2 About Here]

Absolute real income however, obscures relative income – i.e. the ratio of family income to median family income. We compare resident applicants of each state to the median family income in their state of residence and plot those ratios over time, below in Figure 3. The results

[11] See http://www.news.wisc.edu/admissions/myth12.html for a description of the Board of Regents' policy and see Appendix Table 2 for residency statistics by year, corresponding to Figure 1.
[12] See Appendix Table 3 for real median family income statistics corresponding to Figure 2.

of this exercise are telling. Wisconsin and Minnesota applicants have remained at the same relative income levels over the period of the study. This suggests that applicants from these two states are not substantially wealthier in 2007 than they were in 1972, using median family income in the state as the comparison. On the other hand, the out-of-state applicants have increasingly higher relative income incomes. Applicants from other states came from families earning 1.3 times the median family income in the U.S. in 1972 and by 2007 are applying from families earning nearly 2 times the median. As a result of the out of state group, the overall median family income of applicants has increased for all applicants from 1972 to 2007.

[Figure 3 About Here]

In sum, the overall income of applicants to the University of Wisconsin-Madison has increased as much as 50 percent over 35 years, according to measures of median family income, but that increase has been driven almost exclusively by increasing numbers of out of state students applying to the university who generally come from families with very high incomes.

Distribution of applicant income. Trends in real and relative median family incomes of applicants can still mask the distribution of absolute incomes of applicants. Or more specifically, we ask relative to the overall income distribution where are UW applicants? Figure 4 displays the UW-Madison applicants by relative income quintiles over time.[13]

Applicants to UW have rarely come from the lowest 40 percent of the income distribution since the very beginning of our study period. And the representation of applicants from these

[13]Quintile determinations are made by comparing the student's family income to the median family income distribution in the state, or across the states (for non-WI, non-MN applicants). The comparison distributions are constrained to include only families in which there is at least one child between the ages of 15 and 24 and in which the head of the household is less than 65. Given that we were unable to condition on these factors when imputing income to our applicants, both of these constraints produce a comparison distribution that is more likely to identify students as coming from the lower income quintiles and therefore likely to overestimate representation of these applicants.

lowest two income quintiles has somewhat declined overtime. The majority of applicants come from families towards the top of the income distribution. Both the Minnesota and out-of-state applicant pools are weighted more heavily towards the top two income quintiles than the applicant pool for Wisconsin residents, but the bottom two quintiles remain substantially underrepresented even for this group.[14]

[Figure 4 About Here]

Racial Composition of Applicants. To the extent that membership in a historically underrepresented minority group correlates with low levels of family income, the racial composition of UW students over time reinforces findings from the income data. Figure 5, below illustrates a considerable increase in the diversity of applicants to the university over the 35 years of this study. However, that increase is almost entirely due to a sharp rise in the proportion of applicants who identify as Asian.

Representation of African Americans, Hispanics, and Native Americans has either decreased as a proportion of applicants (African Americans), increased early and then declined (Hispanics), or remained very small (Native Americans). For example, in 1972, there are 356 black applicants to UW-Madison. In 2007, despite the applicant pool having more than doubled, there are 508. Unlike median family income, there are no notable differences in minority representation among applicants according to state of residence. [15]

[Figure 5 About Here]

Increasing Academic Achievement. In addition to the changes noted above, we also find that the applicant pool has become increasingly academically competitive. The average SAT and

[14] See Appendix Table 4 for yearly income distribution among applicants corresponding to Figure 4.
[15] See Appendix Table 5 for yearly demographic statistics for applicants corresponding to Figure 5.

ACT scores of applicants have steadily risen, as has the average high school rank among those students reporting one. Like other universities, UW-Madison now regularly confronts a glut of highly qualified applicants for whom it has insufficient space.[16]

Admissions to the University of Wisconsin: 1972 to 2007

We demonstrated above that admissions officials at the UW-Madison are likely to be limited in terms of their effect on elitism and inequality at the university. They must deal with the applications they receive, and they do not receive many from low-income students. However, previous work has found that income and related factors like legacy preferences can affect admissions processes and may serve to further limit access for low-income and underrepresented groups (Kahlenberg, 2010). Thus we now examine the admission process to answer our core question. We do not find strong evidence that student family income negatively affects applicants' likelihood of admission, though we do identify an increasing effect of admissions tests like the ACT and the SAT, a trend which may ultimately limit access to the university. These results and other trends affecting the admissions process are discussed below.

Increasing selectivity. The first important trend in admissions data is portrayed in Figure 6. The change is striking. Admission to UW-Madison has become notably more competitive, as defined by the proportion of applicants being admitted. Except for a few years in 1975 and 1976, through the mid-1980s, a very large percentage (close to 90 percent) of those who applied were admitted. However, since that time (mid 1980s), there has been a steady decline in the proportion admitted, dropping to approximately 60 percent for the final year in our data. As

[16] See Appendix Table 6 containing year-by-year information on achievement statistics.

indicated in Figure 1, part of this is undoubtedly explained by the dramatic increase in applicants, which have far outstripped space available for first-year students.[17]

[Figure 6 About Here]

Modeling the Admissions Process. In order to understand how income, achievement, race, and other individual level applicant variables affect the admissions process, we estimate a series of logistic regressions, one for each year, with admission as the dependent variable. That is we model the following equation:

$$A_{it} = \boldsymbol{\beta_t Y_{it} + \gamma_t L_i + {}_{\delta t} P_i + \lambda_t X_i + \alpha_t + \varepsilon_t}$$

where A= the admission status of individual i who applied in year t; Y= individual I's family income, L=individuals applicant's geographic location (Wisconsin, Minnesota or other), P=applicant's performance as captured by ACT or SAT score, and high school rank; X=the individual applicant's other characteristics including background such as age, gender, race/ethnicity, α= the constant and the β, γ, δ and λ are estimated for each year, t.

Pseudo R squareds suggest that models explain roughly 30 percent of the variance in acceptance in most years. For ease of interpretation and to facilitate cross-year comparisons, we present effects in terms of changes in predicted probability of admission.[18]

Effects of Family Income on Admissions Probability. Given the increasing competitiveness of the applicant pool, has elitism accompanied the rise in selectivity? Is it more difficult now for

[17] See Appendix Table 5 for yearly acceptance rates.

[18] Income coefficients and predicted probabilities of admission by year and income quintile, corresponding to Figures 7 and 8, can be found in Appendix Tables 7 and 8. Significance and directionality of income quintile coefficients generally remains the same across years, even in otherwise naïve models. Applicants from the bottom income quintile are significantly less likely than those in the middle to earn admission in the early years of the data set and significantly more likely to be admitted in the later years of the data. Applicants from the top income quintile are significantly more likely to be admitted in the early years of the data, and neither more or less likely to be admitted than those in the middle income quintile in the later years of the data. The only substantial and significant income effect present by 2007 is a positive impact of membership in the lowest income quintile.

low-income applicants to gain admission to UW-Madison? Figure 7 shows the differences in the probability of admissions by the income quintile of the applicants, over a series of years from 1972 to 2007. In the earlier years, holding all other variables constant, applicants from the lower income quintiles are less likely to be admitted, while those from the upper quintiles are more likely to be admitted. These effects are statistically significant in some years but not others and are generally small, though the effect of moving from the poorest to the most elite income quintile is occasionally quite large, from an 83 percent probability of admission to a 93 percent probability of admission in 1977.

In later years, from 1995 until 2007, students in the lowest income quintile are statistically significantly more likely to obtain admission than are students from all other income quintiles. This effect is large and consistent, and represents an increase in the probability of admission of between 10 and 15 points, depending on the comparison group. From 2004-2007, students in the highest income group were also more likely to obtain admission. The effect was modest but significant.

[Figure 7 About Here]

We find therefore that students at the top of the income distribution may have had modest advantages historically, but that students in the lowest income quintile are substantially advantaged in the admissions process more recently – holding all other variables constant. Further supporting the notion that access for low-income students is not limited at UW, as a result of the admissions process, the median family income of rejected and admitted groups of students are also essentially the same.[19]

[19] Along similar lines, we note that the students of traditionally under-represented minorities also appear to be advantaged in the admissions process. As was the case for low-income students, African Americans and Hispanic students do not apply in large numbers, but do appear to receive an admissions preference

Figure 8 reinforces this finding by illustrating the differences in the probabilities of admission for students from the first to the fifth income quintiles. It is apparent that in the earliest years, that difference favored those in the highest quintile of the U.S. population for admission. And these differences were statistically significant at a 95 percent level of confidence. From 1984 to 1997 there are no significant differences in the probability of admission between the lowest and highest income quintiles. However, since 1999, the advantages of the poorest student in gaining admission are considerable compared to those from the richest households.

[Figure 8 About Here]

Effect of Academic Merit on Admissions Probability. Though we can dismiss the hypothesis that inequality and elitism are increasing as a result of direct income effects on admission, we cannot state with any certainty that the admissions process does not privilege higher income students and so the issue of whether or not merit-based admissions policies reinforce or exacerbate elitism remains unanswered. While the negative impacts of membership in the lowest income quintile disappeared and then reversed, the impact of achievement measures on the admissions process has increased. Our clearest evidence of that trend is portrayed in Figure 9, which compares the probability of admission for the years 1972 and 2007. The probabilities are broken down by income quintile (as above), but also by the student's score on the ACT admissions test. As is very clear, neither income nor ACT score had a substantial effect on

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when they apply. Holding all other factors constant, including income, the change in predicted probability of admission for applicants belonging to these groups is significant and substantial from 1986 onward. It is notable that this shift is apparent much earlier than the shift in preference for low-income students, and that the magnitude of the effect is generally larger. The change in predicted probability of admission ranges between .15 and .30 in most years.

admission in 1972. Going from an ACT score of 20 to 30 improves the chances of admission by a little less than 10 percent.[20]

[Figure 9 About Here]

However, by 2007, the admissions world had changed considerably. There is also a very pronounced, statistically significant and important effect of applicant test score in our models, with students across all income groups having a greater chance of admission with higher test scores. The differences in the probability of admissions, holding all other variables at their means, are more than 70 points for students scoring 30 on the ACT compared to those students scoring 20. A comparison of the effect of a ten point increase in ACT score (from 20 to 30) while holding all other variables constant, is plotted in Figure 10 below. The shift in the weight of academic merit is dramatic and may be the most obvious means by which access to higher education is constrained for low-income youth. [21]

[Figure 10 About Here]

To investigate the potential that income effects might be manifest in test scores, we estimate a series of bivariate linear models, regressing ACT score on income. A high correlation between merit and family income would suggest that income is in fact operating through measures of academic achievement during the admissions process. We do not find a strong relationship historically, though we do find that the relationship between ACT and our measure of income has tightened progressively since 1986. In 1972, median family income and ACT score are

[20] Predicted probabiliites corresponding to Figure 9 can be found in Appendix Table 9. Predicted probabilities by ACT and income quintile are also presented in Table 9 for additional years.
[21] See Appendix Table 10 for a predicted probabilities and effect sizes corresponding to Figure 10.

statistically significantly related to one another, but the correlation is small, .087. By 2007, this relationship has strengthened, and the correlation coefficient is .220.[22]

Income may be operating through test scores in the admissions process, but that is not entirely clear from these data. Indeed, this lack of a strong relationship could arise from several dynamics. The applicant pool as whole is academically elite – if low-income students with low test scores opt out of the application process, then we are unlikely to see a strong relationship between income and achievement within this group. An increasing correlation could signal an intensifying relationship between income and pre-college achievement, or simply be a by-product of greater participation in ACT testing among applicants.

Conclusions

Has access to quality higher education declined for low-income students in the last thirty years? Is extreme income inequality mirrored in the admissions process at the University of Wisconsin? The answer is clearly no in terms of family income, but then again students from the bottom of the distribution were never adequately represented.

With the exception of out-of-state, non-Minnesota applicants, the median family income of student applicants has not increased between 1972 and 2007, in either real or relative terms. Out-of-state applicant income has increased almost 50 percent in real terms and considerably compared to median U.S. income. However, the representation of those students is constrained by law to 25 percent, thus limiting the degree to which they might displace students from less well-off families. The median family income does not differ significantly or substantially between admitted and rejected students.

[22] See Appendix Table 11 for yearly regression and correlation coefficients between ACT and income.

However, applicants to UW are far from representative of all income strata. Consistently over the 35 years of this study, few applicants come from the lowest income quintiles while the vast majority come from the richest 40 percent of U.S. income households. In recent years, the small percentage of applicants from the lowest income quintile has been partially offset by some measure of preference in the admissions process. Those students in the most recent years are approximately 15 percent more likely to be admitted, holding a number of relevant factors constant, than applicants from any other income quintile. This difference holds across varying levels of merit as measured by ACT scores.

Although we find no elitism based on income, indicators of academic merit suggest that the students attending UW-Madison are unequivocally a more elite group than in the past. Within the context of the admission process, this effect appears to operate somewhat independent of income, but we speculate that the increasing importance ascribed to standardized measures of academic achievement may have a chilling effect on low-income students looking to apply.

A limited body of work has investigated ways in which the admissions process might be altered to increase representation of disadvantaged and underrepresented groups, but for the most part, authors have come to the same conclusion – that access to the highest quality institutions is likely to remain limited for high school graduates from low income families absent some other policy innovation (e.g. Zwick 2007). Even public universities seeking to increase representation of low-income students must actively recruit low-income students or must find a way to signal to those students that they value skills and potential beyond those demonstrated on college entrance exams. If potential students do not apply, there are few possible policy alternatives in the admissions process that can improve access for low income for low-income students. Any sort

of income-based affirmative action policy would be likely to make little dent in access, given the underlying distribution of applicants.

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Figure 1. Total Number of Applicants and Proportion by State of Residence: 1972-2007

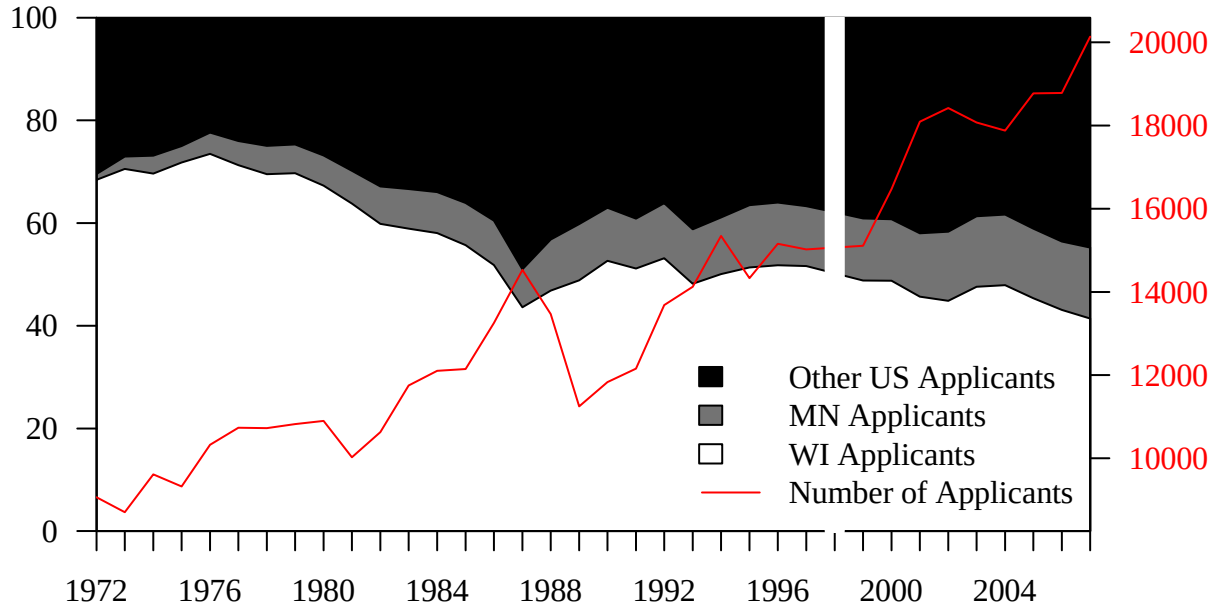


Figure 2. Real Median Family Income of Applicants: 1972-2007, (2009 dollars)

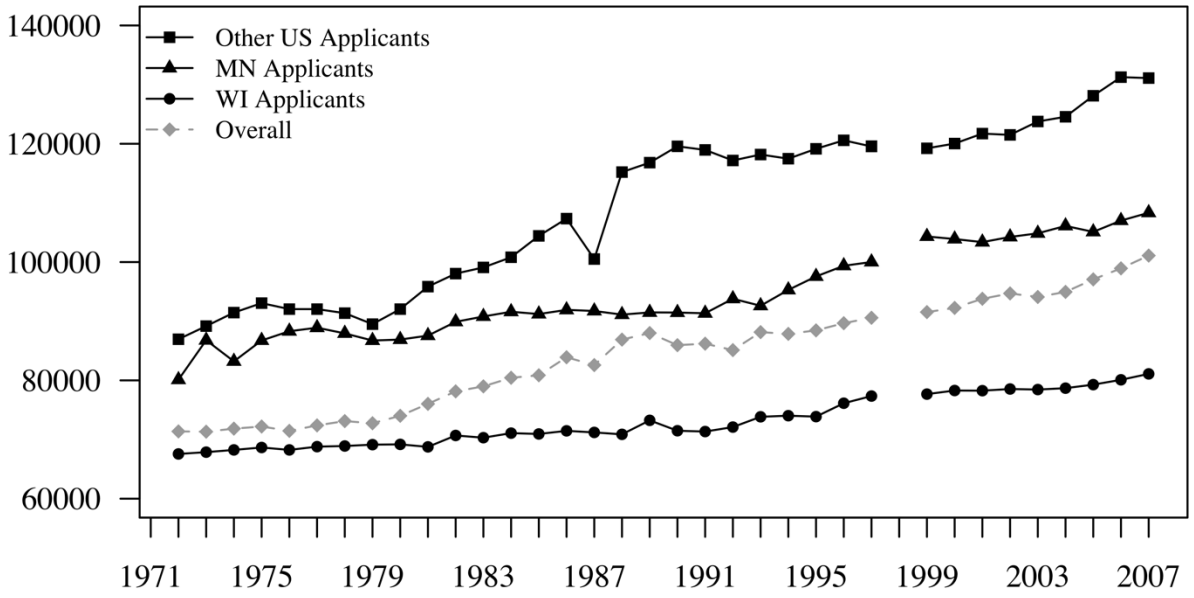


Figure 3. Relative Median Family Income of Applicants: 1972-2007, (2009 dollars)

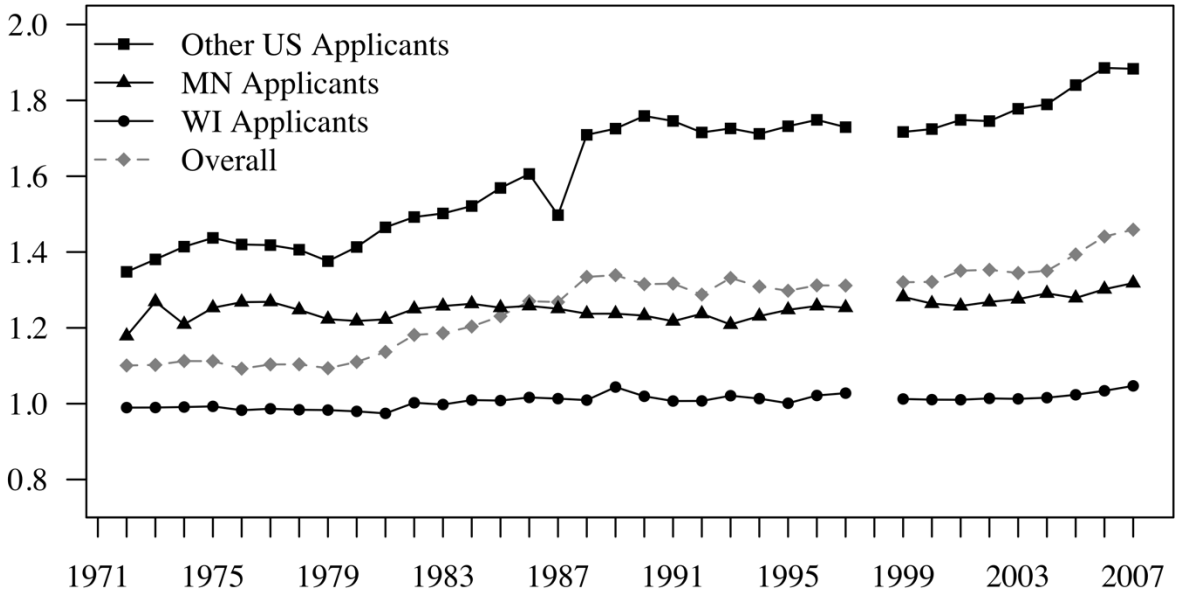


Figure 4. Applicants by Quintile of Median Family Income: 1972-2007

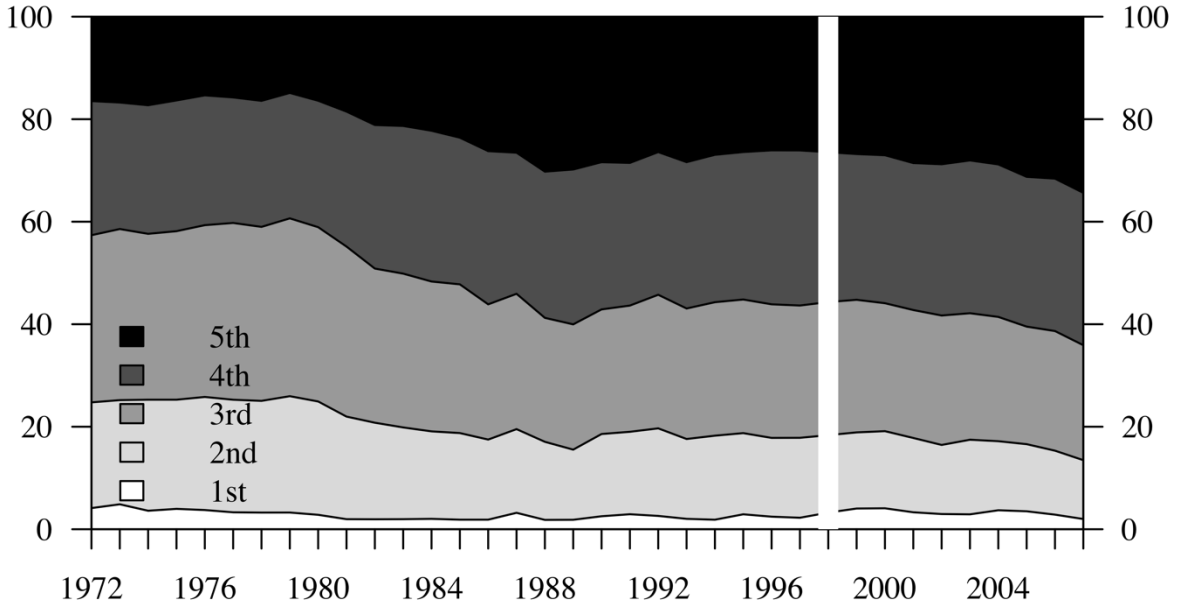


Figure 5. Proportion of Applicants by Race and Ethnicity: 1972-2007

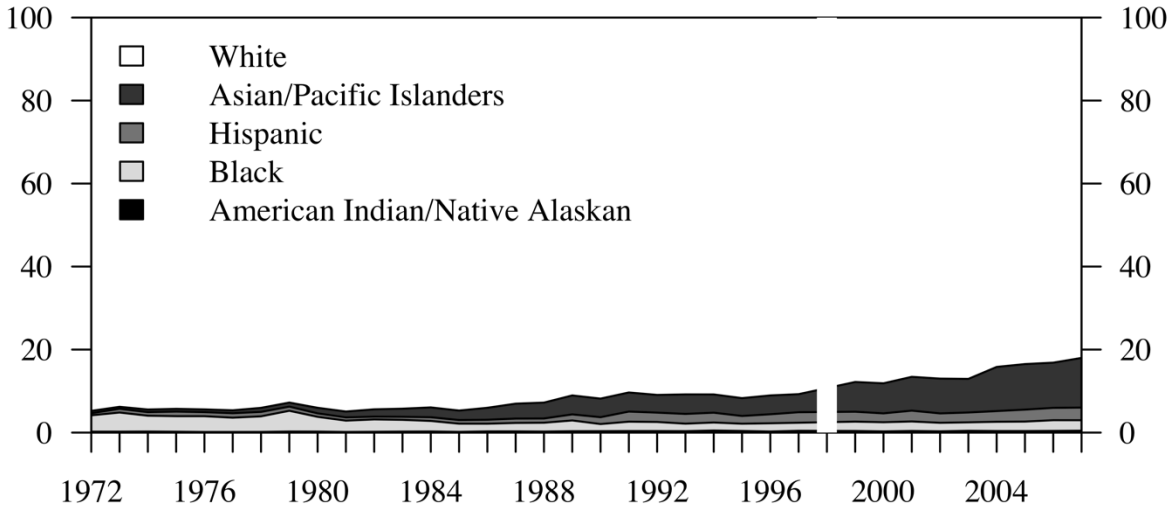


Figure 6. Rate of Admission to UW-Madison: 1972-2007

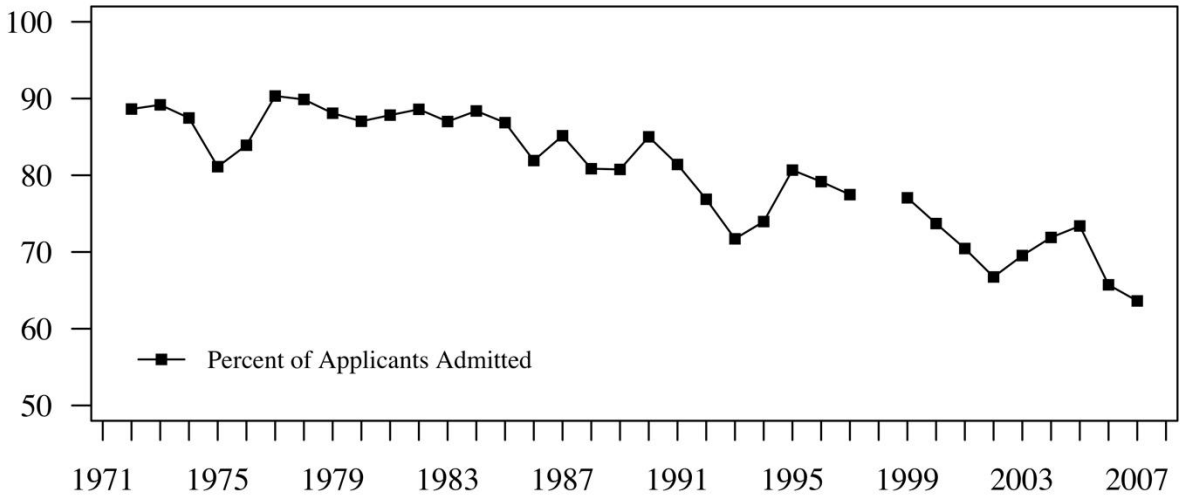
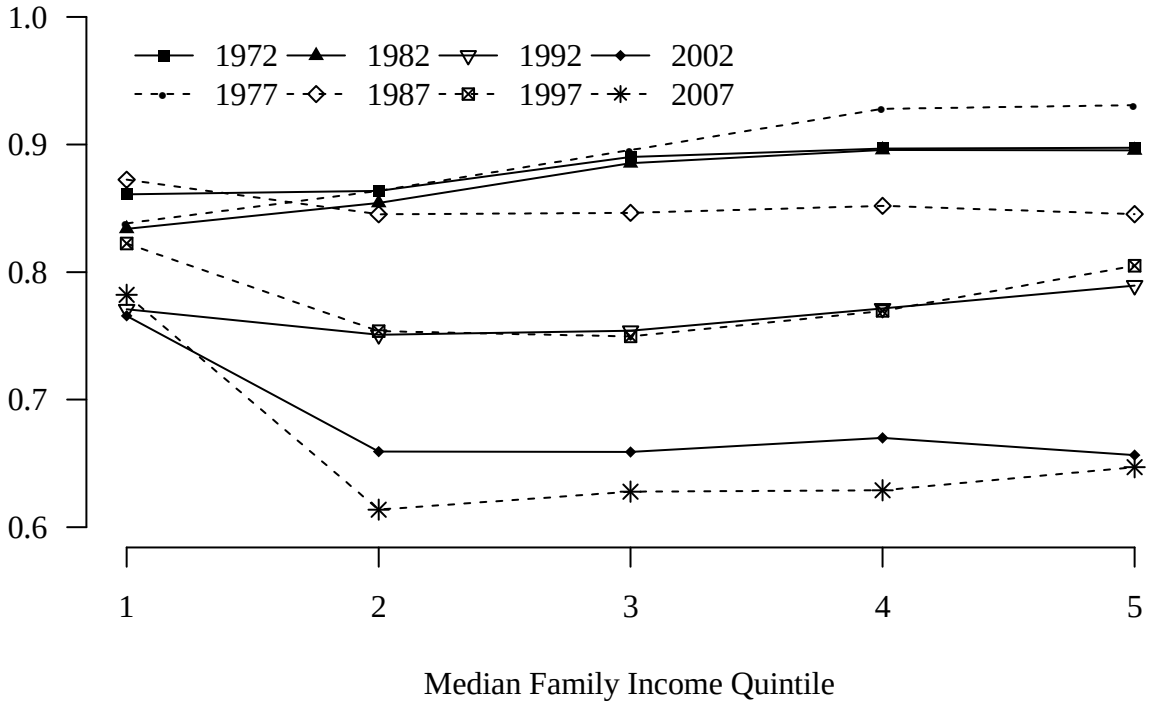
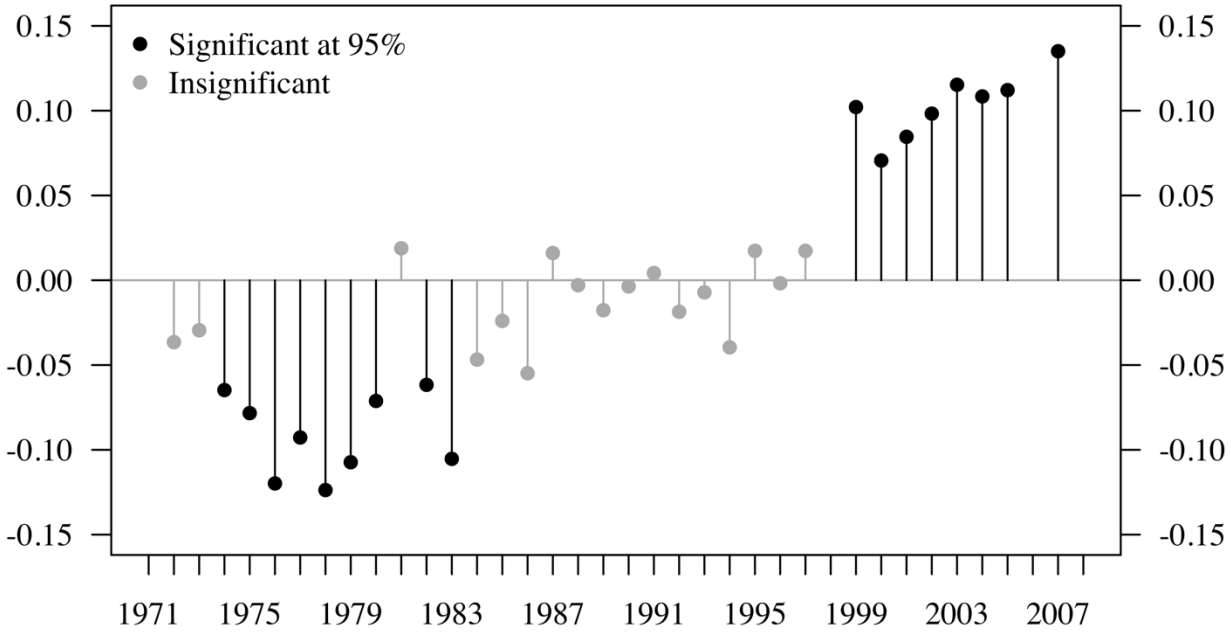


Figure 7. Predicted Probability of Admission by Income Quintile, Selected Years



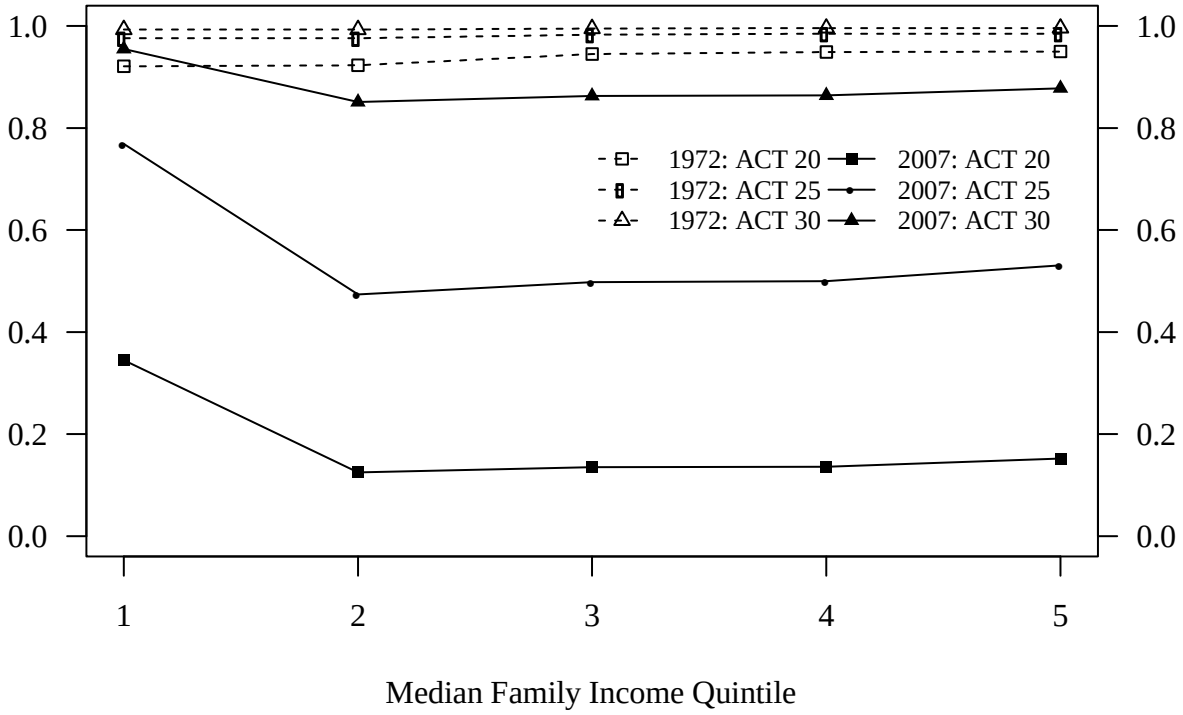
Predicted probability of admission is estimated by holding all other v ariables at their model means.

Figure 8. Effect of Membership in the 1st Income Quintile Compared to 5th, 1972-2007



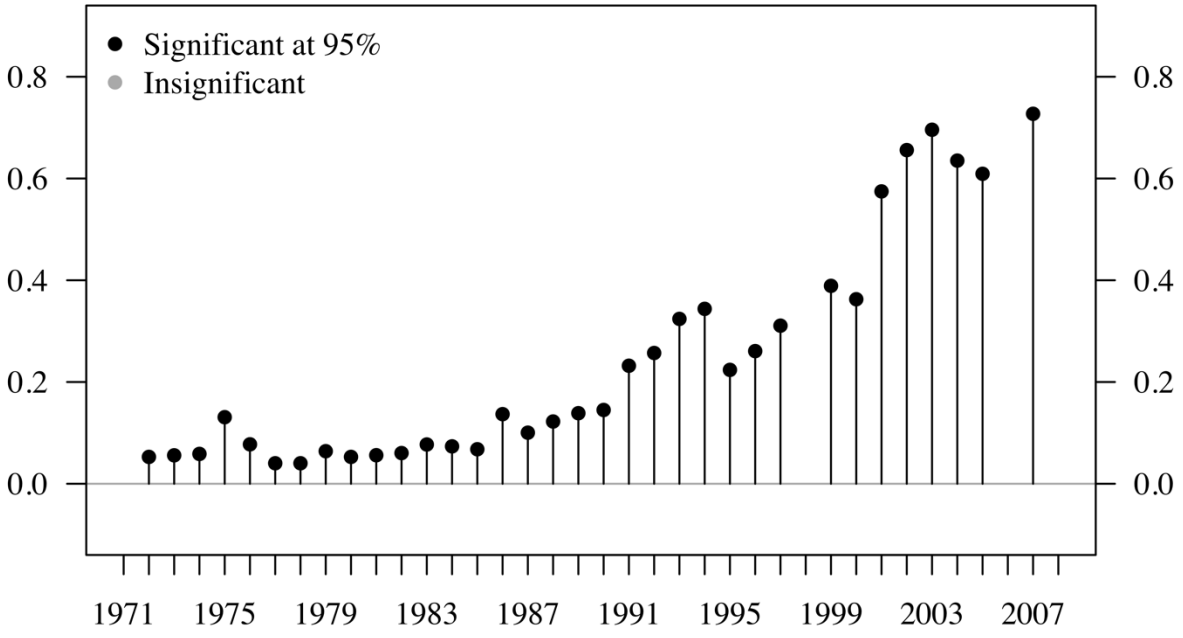
Predicted probability of admission is estimated by holding all other variables at their model means.

Figure 9. Predicted Probability of Admission by Income Quintile and ACT, 1972 & 2007



Predicted probability of admission is estimated by holding all other v ariables at their model means.

Figure 10. Effect of ACT Score Change from 20 to 30, 1972-2007



Predicted probability of admission is estimated by holding all other variables at their model means.