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# La Follette School of Public Affairs

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

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

## *Introduction*

There is considerable concern in Wisconsin and other states that accessibility to colleges and universities is becoming more elite; that due to rising costs of education and rising standards for admission universities are increasingly serving only those from higher income families. For example an article in the *Christian Science Monitor* in August of this year entitled “Too Few low income students?” stated that “about 50 percent of low-income students enroll in college right after high school, compared with 80 percent of high income students” and go on to state that the rate of high achieving low income students is about that of high income students that have far lower achievement scores<sup>1</sup>. William Bowen, Martin Kurzwell and Eugene Tobin note in their book that students in the bottom quartile of family income make up only 11 percent of elite college enrollment and receive no advantage from college admission programs; they call for an affirmative action program directed at low income applicants to promote equal opportunity and increase economic growth<sup>2</sup>. In this paper we use family income of University of Wisconsin-Madison applicants and those admitted over more than three decades to shed light on whether there has been a decline of opportunity to attend elite institutions among those with limited family incomes. As the premier public university in the state, this profile can serve more generally to provide insight on the issue of increasing elitism of premier public universities.

How accessible are the best public institutions to students from different socioeconomic groups? And, given the debates about financial aid that have been occurring at both the national and state, it is important to know: (a) How has access to the University of Wisconsin-Madison changed in terms of family income during the last three decades? (b) Are the patterns different for those within the state compared to those from outside the state? (c) Is there an income difference between those admitted and rejected for admission? And (d) What is the trend in the rate of applicants being admitted? This study addresses these questions.

Data on family income of applicants to specific colleges and universities are difficult to acquire. The most common sources are the income questions that students answer when completing ACT or SAT examinations. For a number of reasons these responses are probably woefully inaccurate. There is evidence from other studies that students simply do not have accurate information on family income. Universities could include income information on application forms, but most do not (including UW-Madison). Detailed income and asset data are included on the federal financial aid application form (FAFSA), but only students applying for financial aid complete those forms.

How can we acquire such data? Universities could do surveys of samples of applicant families. That would be costly and it is not clear how accurately families would respond. They may also

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<sup>1</sup> “Too few low-income students? *Christian Science Monitor*, August 8, 2008.

<sup>2</sup> Bowen, Kurzwell and Tobin, 2005. *Equity and Excellence in American Higher Education*. Charlottesville, VA.: University of Virginia Press. 2005.

view it as intrusive. A second method, and the one employed in this study, is to use the applicant's address and zip code to match block-group level census data. Those data provide aggregated income (and other) data for approximately 1200 individuals (600 households). With our large sample of applicants, we believe we are able to accurately estimate family income.

As a state-based institution, students from the state are given priority and face a far lower "ticket price (tuition) than other students; there is also a special agreement with a neighboring state, Minnesota, in which those students 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, and then separately as Wisconsin, Minnesota, and other out-of-state applicants.

### *Background*

Clearly the increasing proportion of high school graduates who attend college since the end of World War II, suggests that there are opportunities for nearly all those interested in attending. Today approximately 64% of high school graduates go on to attend some form of higher education. (U.S. Bureau of the Census, 2006) But not all who are interested are able to attend high quality institutions. These are institutions that on average provide better opportunities and higher rates of return to its students.<sup>3</sup> Several studies using national data have found that inequality in access between socioeconomic groups to higher education has not diminished over this period. (see for example reviews in Baker & Velez, 1996; Gamoran, 2001; Karen, 2002).

There are a few other studies that have attempted to address the question of trends in access by family income for somewhat earlier periods of time and shorter periods of time. For example, Astin and Oseguera (2004) studied access to the top 10% of institutions of higher learning from 1985 to 2000 using data from the Cooperative Institutional Research Program's (CIRP) entering Freshman Survey, an annual assessment that has been conducted for four decades.<sup>4</sup> The authors found that over this interval that the income level of entering freshman in these top tier colleges was indeed increasing. Another recent study attempted to study whether the presence of two-year colleges reduced the number of those high school graduates attending more prestigious institutions. The study which used Student information obtained from the National Education Longitudinal Study (NELS 1988–2000) and a subset followed for the Postsecondary Education Transcript Study (PETS) data found that two year colleges increased access and did not lead to high achieving students from more disadvantaged backgrounds attending more prestigious four year institutions. (Josipa Roksa, 2008) Again income data are based on survey data but in this case combined with data on education and occupation to form a measure of SES.

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<sup>3</sup> See Zhang 2005.

<sup>4</sup> 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.

## *Our Approach*

The key constraint to addressing the question of whether prestige universities or a particular university has become more economically elite over time is the lack of accurate measures of family income. This is also a key constraint in attempting to understand whether the pattern of applications has become more elite over time; whether the pattern of acceptances has changed and also (on “only”) become more elite and finally whether it is at the level of those who chose to enroll whether there has been a change toward more students from higher income families enrolling. The problem has been that there are only limited sources of data and many of them do not include the full population of interest. Looking at a particular institution, accurate family income is available for those who apply for financial aid. Free Application for Federal Student Aid or FAFSA applications require extensive data on family’s resources 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 can be covered for historical analysis.<sup>5</sup>

Other sources of data traditionally used have been either from self reports of family income from students as they enroll or from reports on SAT and ACT tests. All of these are provided by 17-18 year olds primarily and are generally viewed as quite inaccurate. The data sets used by the studies cited above, CIRP, NELS and PETS are also limited to enrolled students and are based on survey data filled in by students who report their family income. And their use would also be limiting in terms of historical analysis.

Our approach is to use Census Block data, as a source for family income of all applicants. We do so for a relatively long period of time, 1972-2006 or three and a half decades. Thus we believe our study is unique in the long time period covered and our ability to address the question of whether the income of applicants has changed over this period and whether the income of those accepted has changed. In this process we also address the question of the role of income in the admission process and how it has changed over time.

### **Procedures**

We proceeded as follows: after learning of the availability of student applications back to 1972, we met with staff of the Applied Population Lab to learn of the possibility of matching these applicants to Census Block data. 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.<sup>6</sup>

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<sup>5</sup> <http://www.finaid.org/educators/history.phtml> accessed on October 17, 2008.

<sup>6</sup> <http://www.census.gov/prod/cen2000/phc-2-a.pdf> accessed on October 17, 2008.

They are thus very small geographic areas within Census Block Groups which are themselves within Census tracts which are themselves designed to be homogeneous.<sup>7</sup>

The income collected by the Census is defined as follows:

The data on income in 1999 were 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.(Ibid.)

The median income from the matched Census Block is then used to represent an applicant's family income. We use the 1980, 1990 and 2000 Censuses in this work as follows. For each applicant with a home residence in the 50 States<sup>8</sup>, the applied population lab matched their home address as reported on their initial application to the matched Census block.<sup>9</sup> For the 1972 to 1980 applicants, we match their home address to the 1980 Census data. For those who apply from 1981 to 1989 we match their home address to their Census block for both the 1980 Census and 1990 Census. For the 1990 applicants we match them only to the 1990 Census. For applicants from 1991-1999 we match their home addresses to both the 1990 and 2000 Censuses and for applicants from 2000 on we match their home addresses to the 2000 Census blocks. We convert (inflate) all Census block median incomes to 2006 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 sum these two values to get a weighted Block median income.

### **Matching Results**

We are able to match more than 90 percent of all U.S. resident applicants by our procedure. That is, we have family income for more than 90 percent of all U.S. applicants to the University of Wisconsin from 1972 to 2006 based on Census block data (See Figure 1). Given the definition of income used and the design of Census Blocks we think of these values as akin to some combination of permanent income and community income of each applicant. The lowest

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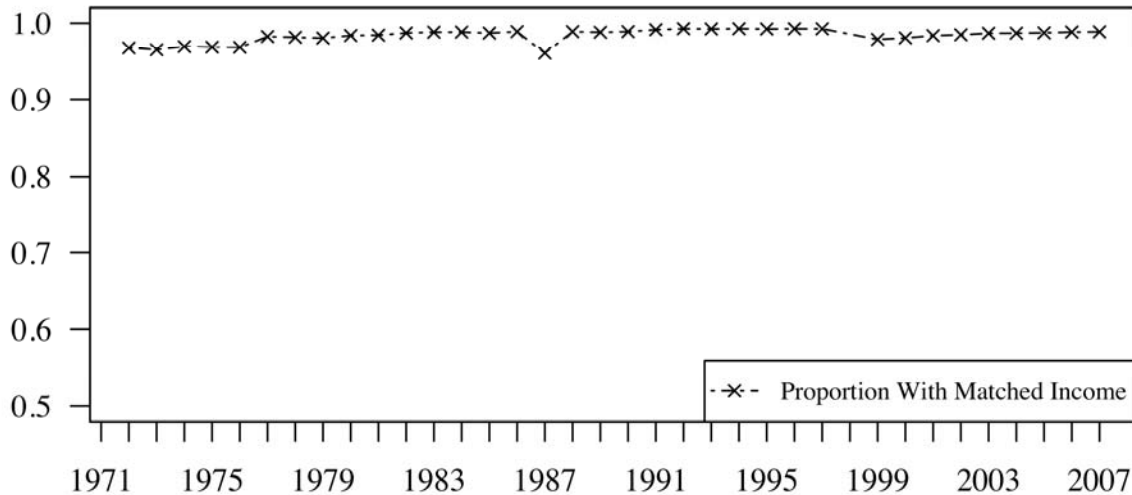
<sup>7</sup> Census tracts are defined as follows: "A small, relatively permanent statistical subdivision of a county or statistically equivalent entity, delineated for data presentation purposes by a local group of census data users or the geographic staff of a regional census center in accordance with 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.

<sup>8</sup> We are unable to include non U.S. residents from our analysis as we have no basis for assigning an income value.

<sup>9</sup> The address information for all of these applicants was provided to the applied population lab with a specially created ID. We were then supplied the Census data for each applicant tied only to the specially created ID. We were able to inflate the income values to 2006 dollars, to weight the various Census years as described above, and to merge these income data with other data on the applicants such as race and scores using only the specially created IDs.

percentage of matches was in the first year, 1972-73 for which we matched 87% of the applicants. The smallest applicant pool was the next year (1973-74) for which we had 16, 730 applicant files. The average number of applicants over all these years was 21754.

**Figure 1. Proportion of Applicants for Whom We Have Census Block Income, 1972 – 2007**



In addition to the family income estimates for all applicants we divide the sample into Wisconsin residents, Minnesota residents and all other states. Within state (Wisconsin residents) students are given priority on admissions and face a lower tuition. Thus part of our analysis is to ask whether the goal of encouraging Wisconsin students to apply and attend the university by these policies has maintained an applicant pool that is representative of the State’s income distribution. We do this by comparing the income of Wisconsin applicants to the State’s median income over this time period. We pay special attention to Minnesota because they too face a lower tuition than other non-Wisconsin residents due to a special tuition arrangement with that State. Here again we compare the income of applicants from Minnesota to their State’s median income. The question here is whether lower tuition has led to an applicant pool that is representative of the State’s income distribution. Finally for applicants from all other states who face the full out of state tuition, we compare the income of this pool of students to median U.S. income. It is this latter group that a priori we expect has become more (most) elite over time.

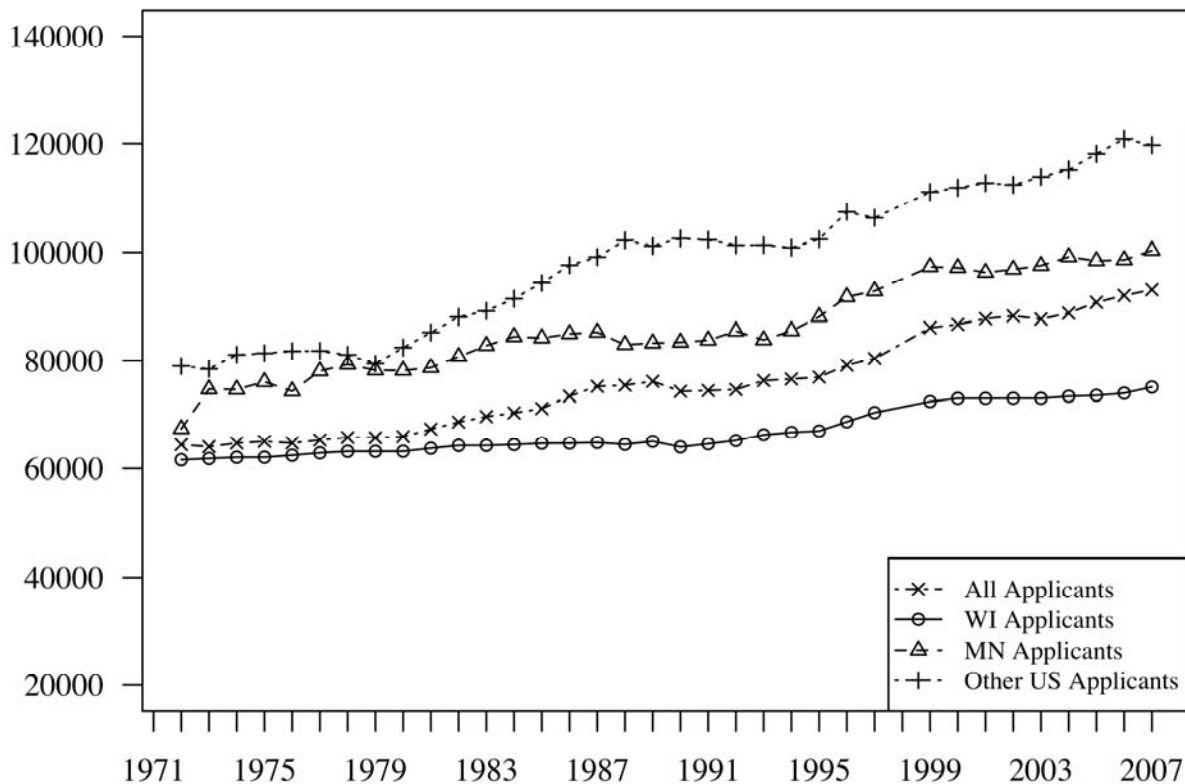
Finally since the question of whether or not the applicants have become more elite over time is really one of distribution in addition to the mean, we also present trends in the family income of those at the 10<sup>th</sup>, 25<sup>th</sup>, 50<sup>th</sup> (median), 75<sup>th</sup> and 90<sup>th</sup> points in the distribution over time. We do this by lining up all applicants within Wisconsin, Minnesota and all other states according to family income and selecting applicants at these points in the distribution for each year. These figures are in the appendix below.

## Findings

### Median Income of UW Applicants

We present our estimates of real median family income of UW applicants in Figure 2. Incomes have been adjusted for inflation using 2006 dollars as the base year. The graph portrays the income for all applicants and applicants from Wisconsin, Minnesota, and other parts of the United States. Two major points are apparent. First the real income levels of all families applying to the university have increased over time. Table 1 highlights this for the end points from 1972 to 2007. Second Wisconsin applicant income has clearly increased less than those applicants from Minnesota or other parts of the United States. Wisconsin real income has risen about 22.5% over these 36 years, while those from Minnesota 40.3% and those from elsewhere 49.9%. The shift in increases in Minnesota income relative to Wisconsin occurred during the mid-1990s. Up until that time both states had similar incomes, close to the median state income in the country. However, since that time, Minnesota income has increased relative to the national average, while Wisconsin income has considerably declined.<sup>10</sup>

**Figure 2. Real Median Income of Applicants, 1972 – 2007 (2006 \$)**



<sup>10</sup>Appendix Figure A2 shows the median family income in Minnesota, Wisconsin and the nation.

**Table 1. Real Median Income of Applicants, 1972 and 2007 (2006 \$)**

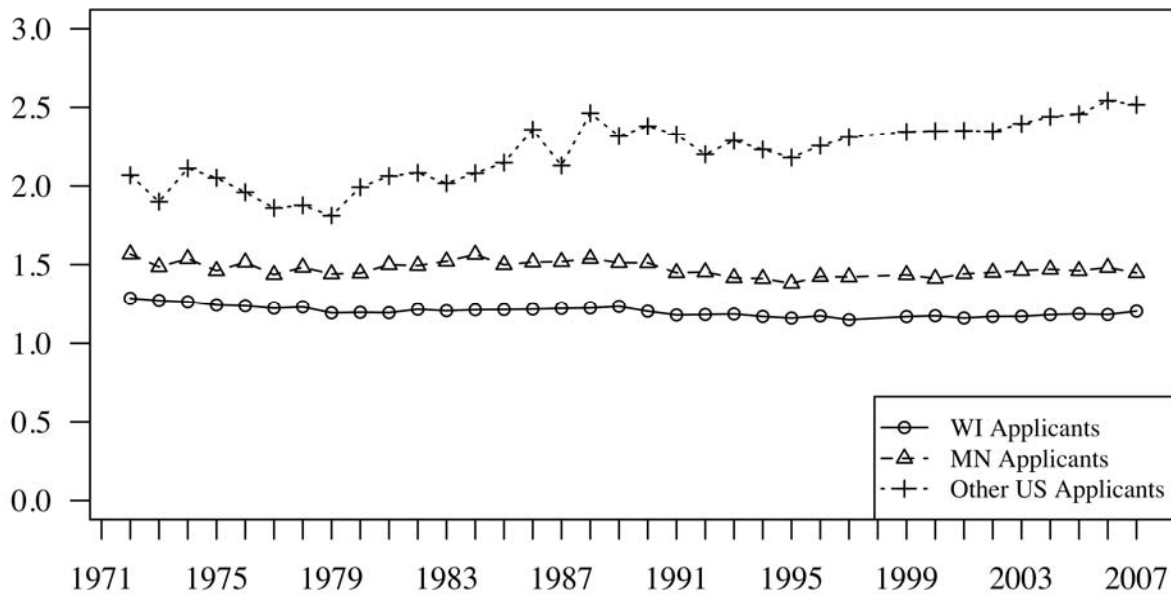
	WI	MN	Other US
<b>1972</b>	<b>\$63,891</b>	<b>\$72,968</b>	<b>\$86,632</b>
<b>2007</b>	<b>\$78,238</b>	<b>\$102,363</b>	<b>\$129,904</b>
<b>Percent Increase</b>	<b>22.5</b>	<b>40.3</b>	<b>49.9</b>

**Relative Income**

Although it is important to understand the changes in real income of applicants, it is also important to put those incomes in the context of income growth within the state or nation. To do that we adjust the real income figures against the average income in the respective state or nation for applicants from states other than Wisconsin and Minnesota. We show the results in Figure 3.

As expected, and indicated by ratios above 1.0, the relative income of families with children applying to the university are higher than the respective average incomes. Beyond that result however, there are three important results in Figure 3. First, Wisconsin applicants clearly have the lowest relative incomes at every point in time. Applicants from Wisconsin have incomes between 1.2 to 1.3 times higher than the average Wisconsin family. Second, these proportions are considerably lower than applicants from outside Wisconsin. Minnesota applicants have approximately 1.5 times more income than the average Minnesota family. And students from other states are much higher than the national income average that is used as their relative base. Over these years, their income averages between 1.8 to 2.5 times more than the average U.S. family. Third, the relative incomes in Wisconsin have actually fallen slightly over the 37 years of this study; Minnesota incomes have remained approximately the same; but out-of-state relative incomes have clearly gone up over time indicating that children from more well-off out-of-state families are applying to the UW.

**Figure 3. Relative Income of Applicants, 1972 - 2007**



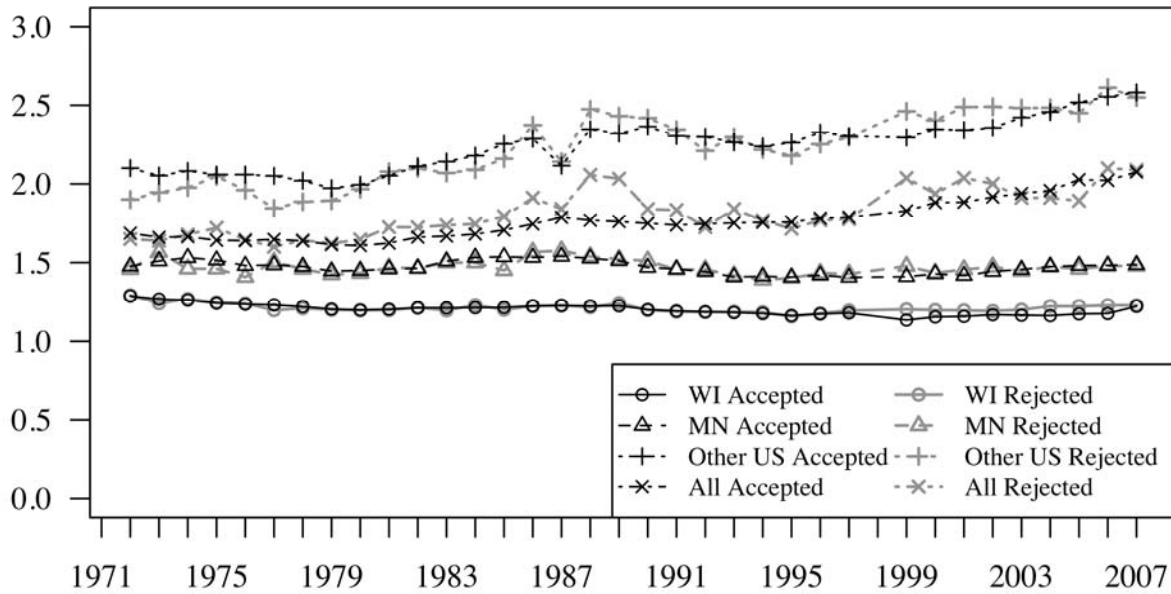
**Income of Applicants Compared to Those Admitted and Rejected**

Another important issue is whether there are major differences in income between those who apply to the university and those who are admitted.<sup>11</sup> To put the issue bluntly, does family income matter in the decision to admit students to the University of Wisconsin? The simple answer, for all categories of students is no. The data to arrive at this conclusion can be presented in a number of different ways. In Figure 4 we look over time at the relative incomes of those who apply and those who are admitted. In the appendix we present data on real incomes for our three separate groups of applicants. For the appendix tables we breakdown real incomes for different points in the income distribution to see if, for example, the very well off (the top 90% of Wisconsin income applicants) have higher admission rates than those at the lowest incomes (10%). The conclusions do not change. Among applicants, there is no consistent effect of income level on being admitted to the University of Wisconsin.

Figure 4 depicts the income levels of students who were admitted compared to those who were rejected. The results are striking in their similarity for all applicants, and for students coming from different states. The parity in admissions is depicted by how close each pair of lines are to each other. The pairs follow the relative incomes already discussed and depicted in Figure 3. In a few years higher income families seem to have higher rates of acceptance, but the reverse is also true. Overall the lines are very close together.

<sup>11</sup> Equally as important may be the distinction between those admitted and those who ultimately enroll. Unfortunately the full historical data are not available to address this issue. However, we will be using data from 1999-00 to 2007-08 to address this issue in subsequent reports.

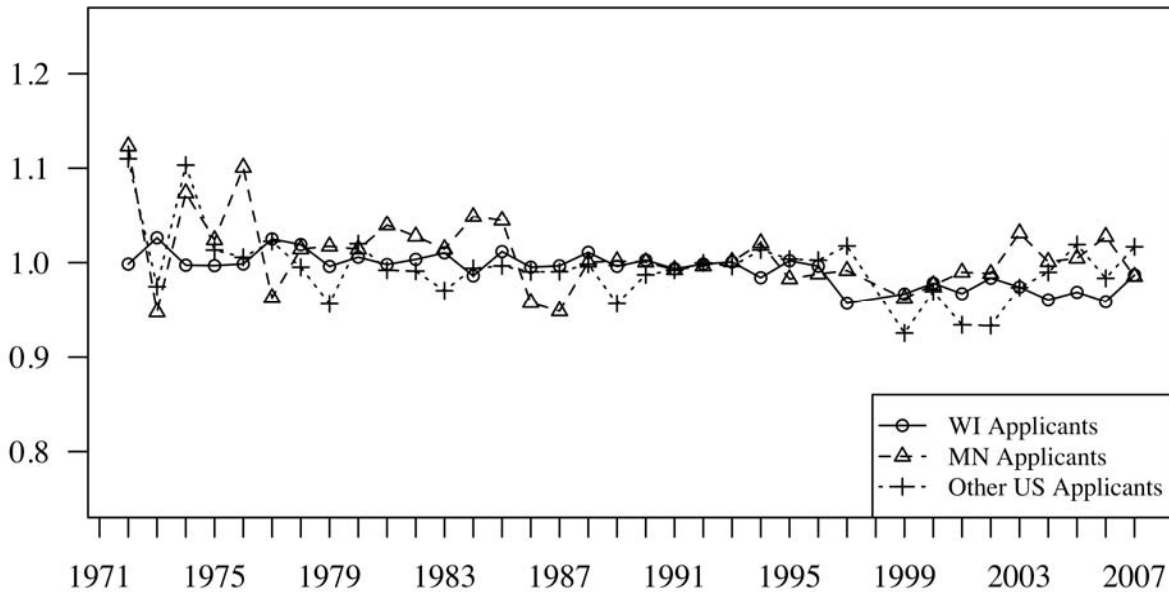
**Figure 4. Relative Income of Admitted Verses Rejected, 1972 - 2007**



Another way to depict these same numbers is to display the ratio, for each group, of those admitted to the university to those who applied. Parity is indicated by ratios of 1.0. As can be seen in Figure 5, although the first few years seem to move around more than those years after 1977, essentially all of these ratios are very close to 1.0 indicating there is no consistent effect of family income on admission decisions.<sup>12</sup>

<sup>12</sup> We have also carried out a number of more sophisticated statistical analyses using multi-variate methods. Although there are a number of interesting results among other covariates, family income never has a systematic, significant effect on the probability of being admitted or not.

**Figure 5. Income Ratio of Admitted Verses Rejected, 1972 - 2007**

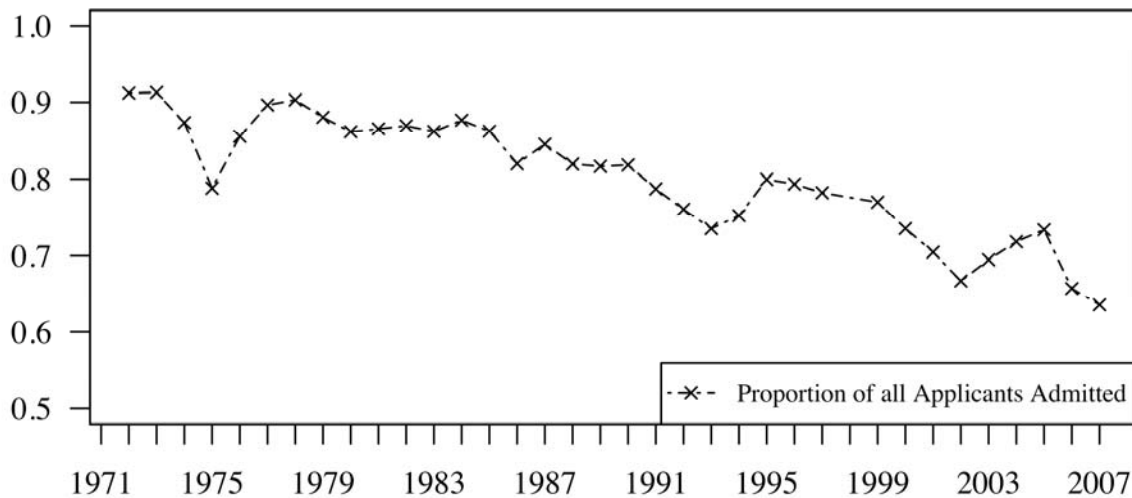


### **Admission Rates Over Time**

A final aspect of this study describes the general difficulty of being admitted to the University of Wisconsin. The question is if it has become more difficult for students who apply to be admitted to the university? The answer is yes and the decline in the probability of being admitted is significant. The results are shown in Figure 6. In the earliest years, the university accepted approximately 90% of those who applied. A rough rule at the time was that any student in the top half of their graduating class would be admitted. There were few high school course requirements that most students would not fulfill through the ordinary pursuit of the high school diploma.

That began to change around 1980, and the percentage admitted, with some wavering, continues to decline over time. In the last several years, the percentage admitted of those who applied has gone below 70% to 66% and 62% in the last two years respectively. Nevertheless as shown above, even as admission became more selective, income did not enter the admissions process.

**Figure 6. Proportion of All Applicants Admitted, 1972 – 2007**



### *Conclusions*

The principal question addressed in this study was how has access to the University of Wisconsin-Madison changed in terms of family income during the last 35 years? The answer depends on the residency of the applicant. For Wisconsin residents the answer is not very much. There is little evidence of Wisconsin becoming a more elite institution. In terms of real, 2006 dollars, family income of Wisconsin resident-applicants has increased only 22% from 1972 to 2007. If we convert that income to relative income for the state in respective years, the results are even more positive. Essentially between 1972 and 2007 median family income of Wisconsin applicants was unchanged, fluctuating slightly between 120% and 130% of the median state income.

For applicants from Minnesota, real income of applicants increased more than those from Wisconsin at about 40% over this period. That difference is not reflected, however, in the relative income which is stable at about 150% of the income of the median Minnesota family. The differences in real income reflect a considerable increase in Minnesota income compared to Wisconsin income beginning in the mid-1990s.

The pattern over time is considerably different for applicants from other parts of the United States. The increases have been considerable both in terms of real income (increasing 50%) and in terms of income relative to the median national income (increasing from 180% to 250% of the national median). Thus non-Minnesota, out-of-state applicants have always come from higher income families and the relative income of those families has increased considerably over time.

Overall, because the vast majority of applicants are from Wisconsin (averaging 59.32 percent over the 35 years), the news in terms of applicants is generally positive: real income of applicant families has not risen dramatically, and relative income for all but out-of-state, non-Minnesota families, has remained consistent over these three plus decades.

The second question we analyzed was whether there was a difference between those who applied and those who were admitted. Here the news again is positive and in this case uniform across all levels of income and all geographic groups. With a few exceptions, most going against admission of higher income students, over these years there is no perceptible difference in the trends in the median family incomes of those accepted or rejected for admission. The same finding occurs at income levels other than the median income. Thus those accepted or rejected coming from the lowest or highest income groups also display close to identical incomes. Across all these results, family income appears to have no affect on the decision to admit or reject an applicant to the University of Wisconsin.

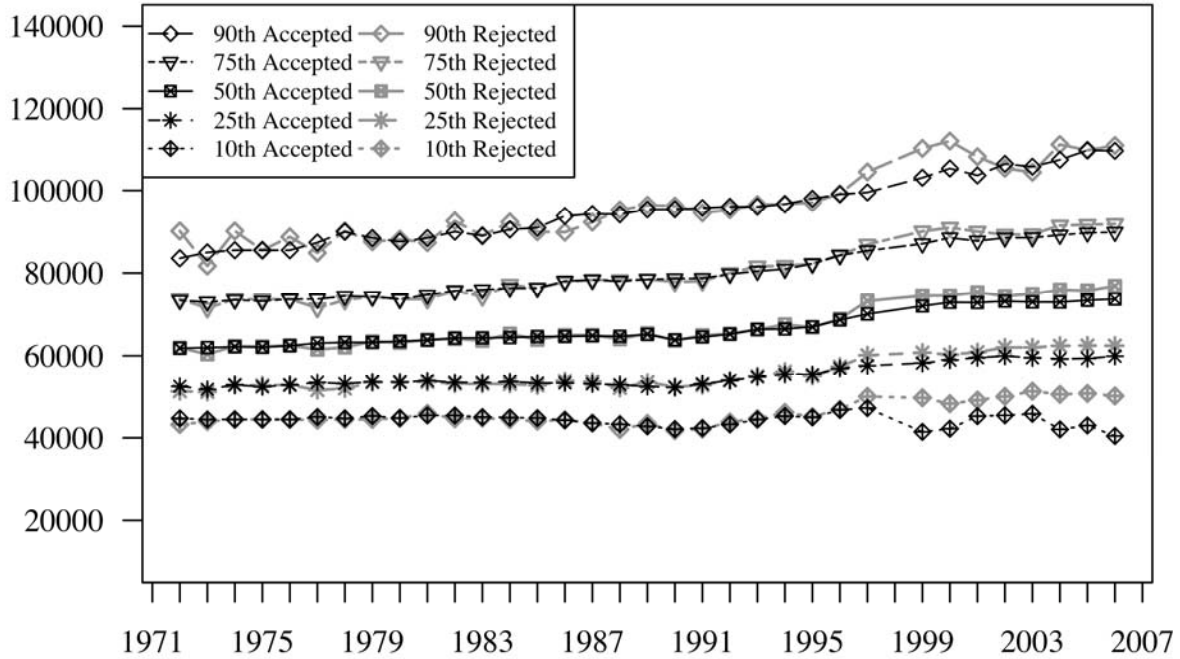
Finally, we note that the rate of acceptance has declined considerably over the years. From 1972 to approximately 1985 the acceptance rate was close to 90%. That declined to about 80% through 1999. However, since 2000 the rate has declined to 62%. As there have been more applicants, the University has clearly become more selective in its admissions. The good news is that that selection has not been based on family income or elite socioeconomic status.

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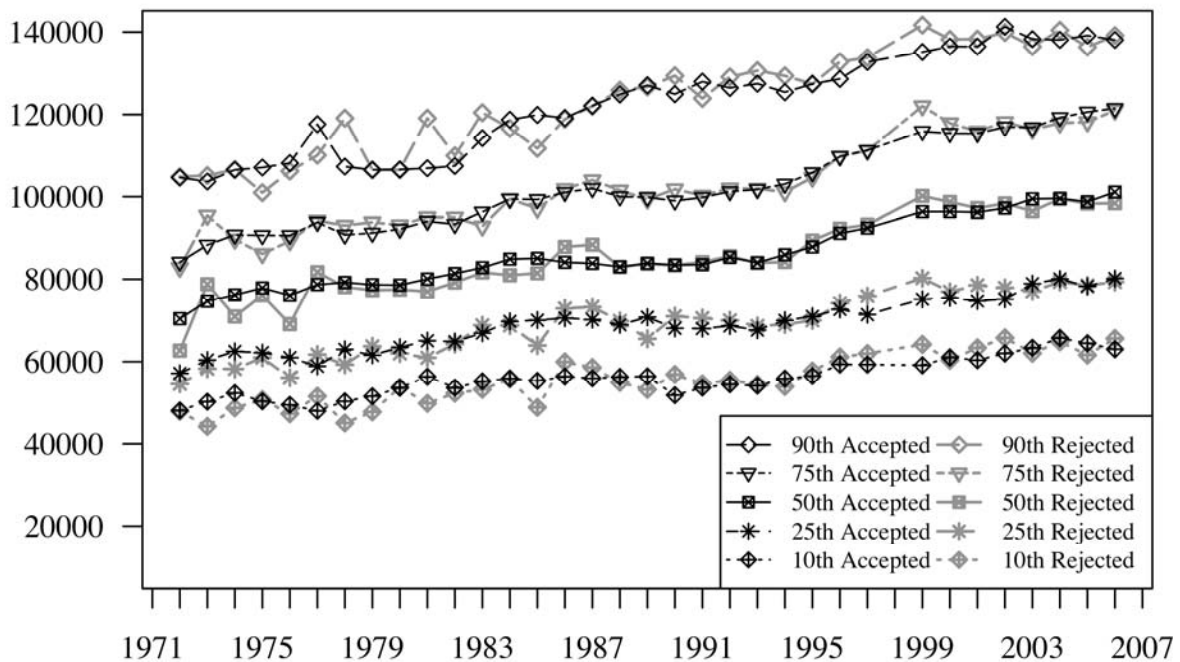
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Appendix A1: Distribution of those admitted and rejected over time by State

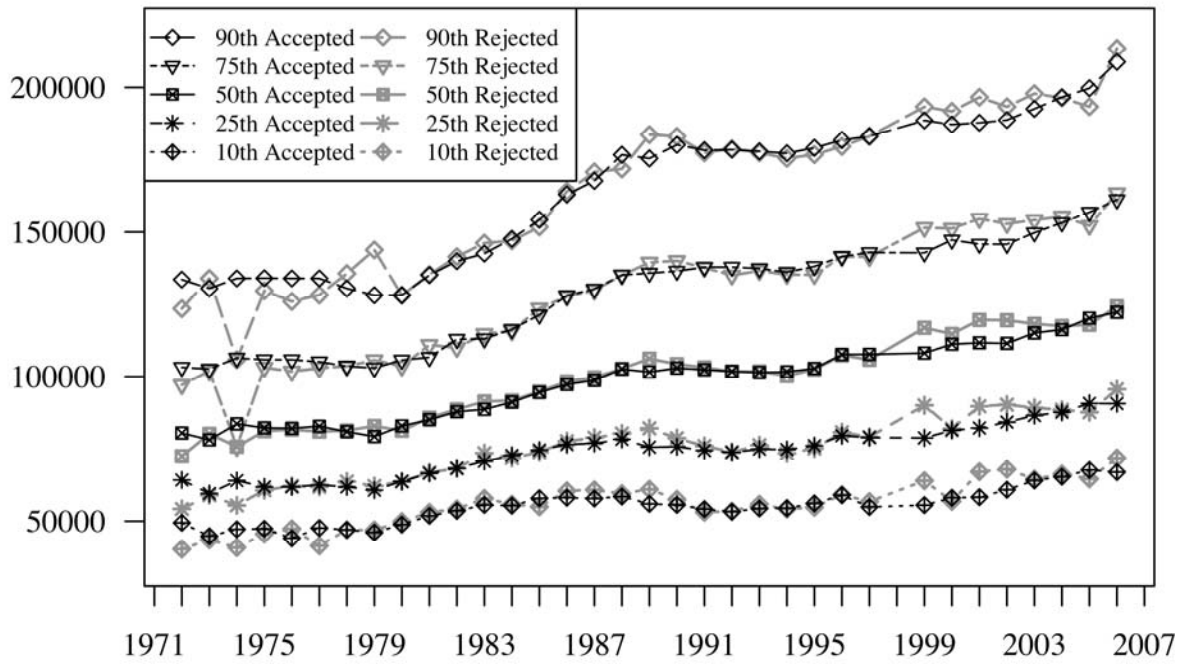
### Distribution of Median Family Income for Wisconsin



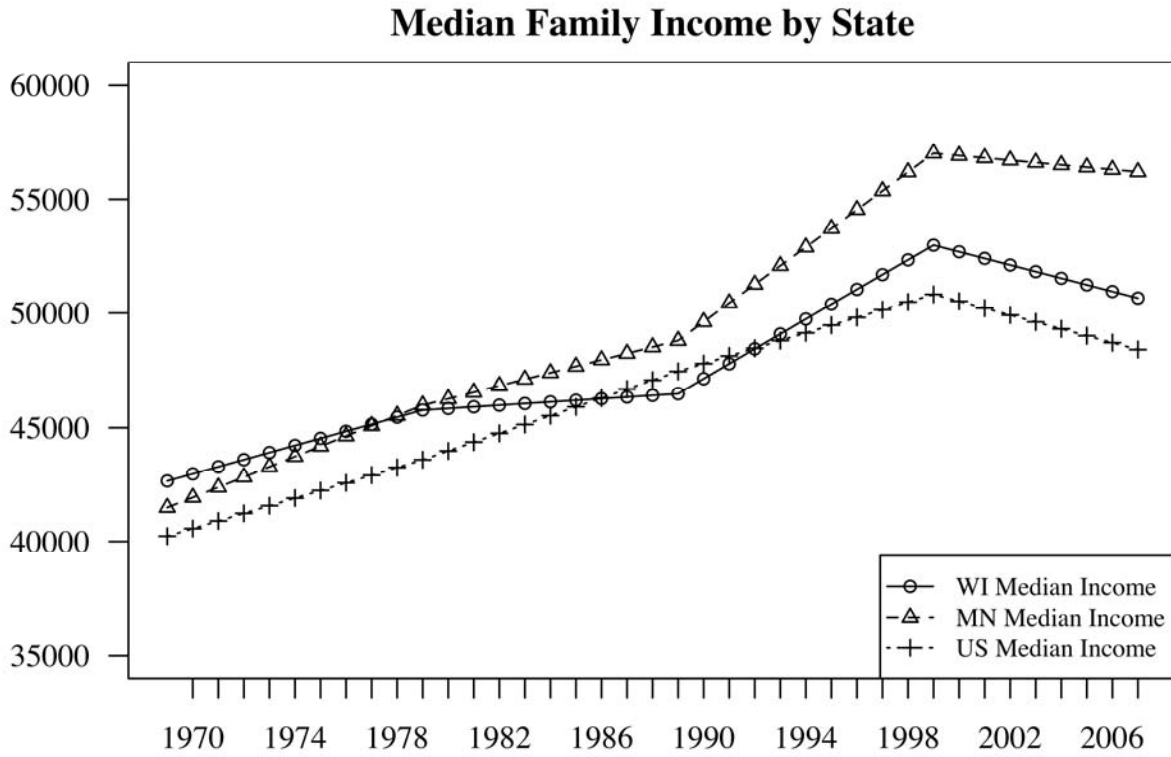
### Distribution of Median Family Income for Minnesota



## Distribution of Median Family Income for Other US



Appendix A2: Median Family Income By States: 1969-2007



Source: <http://www.census.gov/hhes/www/income/histinc/state/state1.html> and <http://www.census.gov/hhes/www/income/income07.html> accessed on March 9, 2009.