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ABSTRACT
         This paper examines two common criticisms of the method that
"U.S. News and World Report" used in its annual rankings of the academic
quality of colleges and graduate schools. There are constant changes to the
formula that make it impossible to interpret yearly shifts in a school's
relative ranking in terms of change in its academic quality and the overly
precise nature of the scores used to rank schools. This paper does not judge
the overall concept of academic quality rankings and the validity of
different indicators; it focuses on the extent to which methodological issues
may affect the interpretation of the "U.S. News" rankings. To gauge the
changes in ranking formulas, four types of change were identified and tracked
over 6 years: (1) changes in the weight assigned to an indicator; (2) the
removal of an indicator; (3) the addition of an indicator; and (4) changes in
an indicator's definition or methodology. Five graduate discipline rankings
and two undergraduate rankings (national university and national liberal
arts) were examined. Analyses show that it is generally not possible to
interpret year-to-year shifts in a school's rank in terms of its academic
quality. It is possible, depending on the ranking, to make cross-year
comparisons of a school's relative performance on between one-third and
three-quarters of the individual indicators used. Results of the error
analyses call into question the use of overall scores to assign schools to
individual ranks. Recommendations are made for improving the interpretability
and usefulness of the "U.S. News" rankings. Current "U.S. News" College and
Graduate School Ranking Methodology is appended. (Contains 15 tables and 15
references.) (SLD)

Quantifying Quality: Technical Issues Surrounding *U.S. News and World Report's* Rankings of U.S. Colleges and Graduate Schools

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Introduction

Every year, *U.S. News and World Report's* (*U.S. News*) rankings of the academic quality of colleges and graduate schools hit the newsstands[1]. Their arrival brings delight to some and dismay to others, depending on whether their institution rose or fell in the quality ratings. An improved ranking can lead to increased donations from proud alumni and more and better qualified students in next year's applicant pool (Monks and Enhrenberg, 1999). A fall can lead to tighter alignment of institutional benchmarks and goals with ranking criteria and pressure on admissions staff to bring in "better" applicants (Mufson, 1999). All the while, a question goes unanswered: What do these rankings really tell us about the quality of higher education?

As a step toward answering this question, this paper examines two common criticisms of the methodology that *U.S. News* uses to rank colleges and graduate schools. These are: (1) constant changes to the formula make it impossible to interpret yearly shifts in a school's rank in terms of change in its relative academic quality (Levin, 1999; Pellegrini, 1999), and (2) the score used to assign schools to ranks is overly precise, creating a vertical column where a group might more properly exist (Machung, 1998; Smetanka, 1998). The first section of this paper gives a brief introduction to the *U.S. News* rankings as well as the questions addressed by this study. The next section outlines the methodology used to answer these questions and the results of the analyses. The final section presents conclusions and recommendations.

Before proceeding, a caveat is in order. While many have questioned the overall concept of academic quality rankings as well as the validity of the different indicators and weights used, the author of this paper suspends judgment on those issues to focus on the extent to which methodological issues may impact the interpretation of the *U.S. News* rankings.

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[1] The term "rankings," as used in this paper, refers to a list of schools or universities that are ordered according to their overall score on a formula created by *U.S. News*. Thus, the business rankings are a list of business schools ordered according to their overall score on a formula that *U.S. News* uses to rank graduate schools of business, and the national university rankings are a list of schools ordered according to their overall score on a formula that *U.S. News* uses to rank national universities. The year appended to a ranking is the calendar year in which it was released – i.e., the 2000 education rankings were published in the year 2000.

Background on the *U.S. News* Rankings

U.S. News published its first rankings of the academic quality of colleges in 1983, the same year that the National Commission on Excellence in Education released *A Nation at Risk,* its influential report blasting the quality of education in America. Based on a survey of college presidents, the magazine listed Stanford, Harvard, and Yale as the top three national universities and Amherst, Swarthmore, and Williams as the top three national liberal arts colleges. By 1987, *U.S. News* had moved to a multidimensional approach, weighting and combining information on faculty accomplishments, student achievements, and institutional academic resources to produce an overall score on which to rank colleges. Rankings of graduate schools of business, engineering, law, and medicine/primary-care also appeared in this year and used a similar weight-and-sum approach (rankings of graduate schools of education did not appear until 1994).

The most recent rankings still use this basic approach. At the undergraduate level, schools are categorized by mission and region (e.g., national universities, national liberal arts colleges, regional universities, and regional liberal arts colleges). Up to sixteen pieces of information are collected on schools in each category, including academic reputation; freshmen retention and graduation rates; average test scores for entering students; per-student spending; and alumni-giving rate. These indicators are standardized, weighted, and summed to produce an overall score on which to rank schools in each category against their peers.

At the graduate level, schools are categorized by type – business, education, engineering, law, and medicine/primary-care. Depending on the type of school, data on up to fourteen indicators - including test scores, research expenditures, graduate employment rates, and reputation - are collected. Similar to the undergraduate rankings, the indicators are standardized, weighted, and summed to produce an overall score on which to rank schools in each category against their peers. Detailed information on the indicators and methodology that *U.S. News* uses to rank colleges and graduate schools is found in Appendix A.[2]

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[2] It is worth noting that several of the indicators - such as test scores, reputation, research expenditure, and faculty awards - have been used traditionally to measure quality (Hattendorf, 1993: Webster, 1986).

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Criticisms of the *U.S. News* Rankings

Almost two decades after their first publication, the college and graduate school rankings are among *U.S. News'* top issues in terms of sales generated (K. Crocker, personal communication, March 19, 1999). This demand has made them the focus of much criticism and debate, especially among the institutions that are the subject of the rankings. In addition to questioning the overall concept of ranking higher education institutions, much criticism has focused on the methodology used to produce the rankings. Gerhard Casper, then President of Stanford University, focused on some of these methodological concerns in a letter of protest he wrote to the editor of *U.S. News* in 1996:

> Could there not, though, at least be a move toward greater honesty with, and service to, your readers by moving away from the false precision? Could you not do away with rank ordering and overall scores, thus admitting that the method is not nearly that precise and that the difference between #1 and #2 - indeed, between #1 and #10 - may be statistically insignificant? Could you not, instead of tinkering to "perfect" the weightings and formulas, question the basic premise? Could you not admit that quality may not be truly quantifiable, and that some of the data you use are not even truly available (e.g., many high schools do not report whether their graduates are in the top 10% of their class)? Parents are confused and looking for guidance on the best choice for their particular child and the best investment of their hard-earned money. Your demonstrated record gives me hope that you can begin to lead the way away from football-ranking mentality and toward helping to inform, rather than mislead, your readers.[3]

However, the *U.S. News* rankings differ from most other rankings in that they assign weights to these indicators in order to combine them and produce a composite score.

[3] The full text of this letter is available at:
http://www-portfolio.stanford.edu:8050/documents/president/961206gcfallow.html

Casper's questions about the "football ranking mentality" employed by *U.S. News* go to the heart of the debate over college and graduate school rankings. If, as Casper states, "the difference between #1 and #2 - indeed, between #1 and #10 - may be statistically insignificant," what are the implications for the way in which the overall scores for schools are used to put them in rank order? In addition, if the weights and formula are constantly being "tinkered" with, how should one then interpret change in a school's rank from year to year?

Others have voiced these methodological concerns. In particular, critics have noted that yearly formula changes make it almost impossible to interpret shifts in a school's rank in terms of change in its relative academic quality: a college that is ranked 4th one year and 7th the next may have had no change in its performance relative to other schools, yet still have moved because of changes in the ranking methodology (Levin, 1999; Machung, 1998; Pellegrini, 1999). *U.S. News'* response to this issue has been that they prefer to make incremental changes every year to produce the "best possible rankings" than to use the same indicators every year to facilitate precise year-to-year comparisons.

Critics have also pointed out that the use of overall scores to rank schools magnifies small—and often insignificant—differences among schools, and that small changes by the school or the magazine can move a college half a dozen places up or down the ranking list (Crenshaw, 1999). *U.S. News* acknowledged this issue in 1998 when it began rounding overall scores to the nearest whole number in recognition, the editors noted, of the fact that small differences after the decimal point may reflect non-significant differences between schools (Thompson and Morse, 1998). Subsequently, the number of schools tied for overall score (and thus rank) increased dramatically.

While much criticism and debate has focused on the methodology used to produce the rankings, the majority of research has focused on the extent to which the rankings are used by students and parents (e.g., Art and Science Group, 1995; McDonough, Antonio, Walpole, and Perez, 1998) or their effect on institutions (e.g., Monks and Ehrenberg, 1999). The research presented in this paper addresses the two methodological concerns outlined above. In particular, this study answers the following questions:

(1) What is the extent of change in *U.S. News'* ranking formulas across years and what are the implications for interpreting shifts in a school's rank over time?

(2) How precise is the overall score that *U.S. News* uses to rank schools and what are the implications for assigning schools to discrete ranks?

Methodology and Results

Tracking Changes in Ranking Formulas across Years

In order to gauge the extent of change in the *U.S. News* ranking formulas over time, year-to-year changes to the indicators used in each formula were tracked across rankings published between 1995 and 2000 inclusive. Four types of changes were identified and tracked over this six-year period: changes in the weight assigned to an indicator; the removal of an indicator from a formula; the addition of an indicator to a formula; and, changes in an indicator's definition or methodology. Rankings examined included business, education, engineering, law, and medicine/primary-care at the graduate level and national university and national liberal arts at the undergraduate.

Changes in weights, methodology, and the addition or removal of indicators were generally easy to track, although it was not possible to fully track changes in weights at the undergraduate level as this information was not included until the 1998 edition of the guidebook. Changes in indicator definition were harder to identify as the wording for a definition could differ from one year to the next, while the underlying meaning might not. The following rule was used to identify an indicator definition change:

(1) The new wording must contain additional detail such as a date, money amount, percent, or other precise information not previously stated or implied.
(2) If the new wording does not include such detail, it should be recognized as changed by *U.S. News* in the guidebook text.

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Analyses focused on the types of changes that were made to the formula for each ranking, the total number of these changes across time, the proportion of non-change in each ranking formula, and the extent to which the amount of change in a ranking formula was related to the amount of movement in the relative ranks for schools in that ranking across the same time period.

Table 1 summarizes changes in the indicators used for each ranking from 1995 to 2000. The number of changes for each ranking, by type and overall, is shown in columns two through eight. The national university and national liberal arts college changes are shown in one column as they use the same formula. The final column in Table 1 reflects the total number of changes across all seven rankings (i.e., business, education, engineering, law, medical, national university/liberal arts, and primary care), again broken down by type.

Table 1. Changes in *U.S. News* Ranking Indicators, 1995-2000

	Business	Education	Engineering	Law	Medical	National University/ Liberal Arts	Primary Care	Total
Definition/ Methodology	4 (50)*	4 (67)	3 (37.5)	10 (72)	4 (100)	4 (50)	3 (60)	32 (60)
Weight	3 (37.5)	2 (33)	3 (37.5)	1 (7)	0	2 (25)	2 (40)	13 (25)
Addition	0 (0)	0 (0)	1 (12.5)	1 (7)	0	1 (12.5)	0	3 (6)
Removal	1 (12.5)	0 (0)	1 (12.5)	2 (14)	0	1 (12.5)	0	5 (9)
Total	8 (100)	6 (100)	8 (100)	14 (100)	4 (100)	8 (100)	5 (100)	53 (100)

*Column percentages are in parentheses.

Most changes were weight or definition/methodology changes, comprising 85 percent of all changes occurring over the six editions. Very few indicators were added to or removed from the ranking formulas, suggesting that *U.S. News* generally retained the same set of indicators for each ranking, but consistently refined and redefined these indicators over the years. (Of course, this redefining process can also change an indicator substantially).

The rate of change varied widely across rankings. While most rankings averaged between 6 and 8 formula changes over the six editions, the law rankings experienced 14 and the medical rankings only 4 changes over the same period. Several reasons account

for the larger number of changes in the law ranking's indicators, including *U.S. News'* responses to the complaints of law schools (who tend to complain more than other schools) and the release of new types of quality-related information by the American Bar Association.

While a ranking (e.g., the law rankings) may have experienced a large number of changes relative to other rankings, these changes may be concentrated in a small group of indicators that are constantly being refined. Different rankings of schools also use different numbers of indicators to compute their overall score, and thus two rankings that experience the same types and number of changes may differ in the number of indicators left unchanged overall. Figure 1 shows the proportion of unchanged indicators for each ranking between 1995 and 2000 inclusive.

Figure 1

Proportion of Indicators Remaining Unchanged in each *US News* Ranking, 1995 - 2000
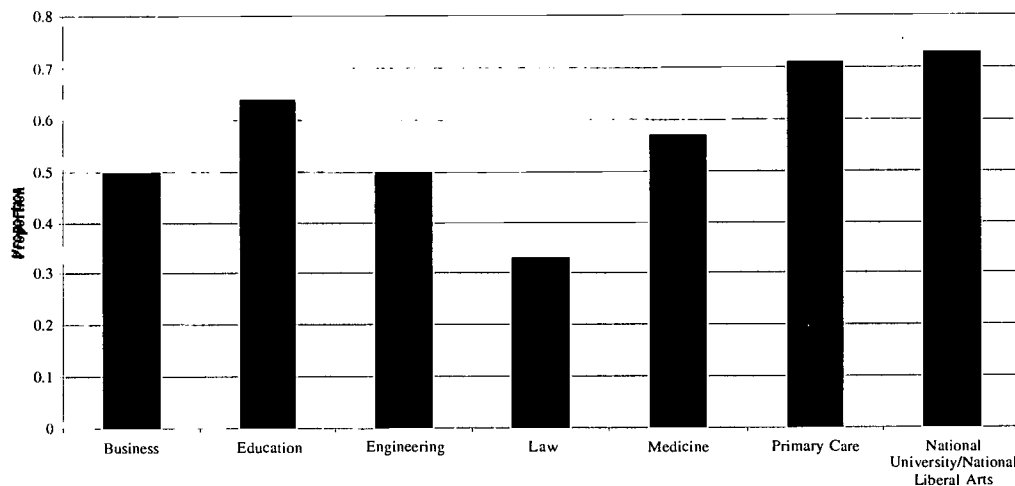
The undergraduate rankings (both national university and national liberal arts college) have the largest proportion (.73 approximately) of unchanged indicators. In contrast, only about one third of the law school indicators remained unchanged. For most rankings, however, about half to two thirds of the indicators remained unchanged over the six editions. This suggests that while it may not be always possible to interpret

changes in a school's overall rank across years, it is possible to track performance on individual indicators that have remained unchanged across the years. Most of the unchanged indicators are related to selectivity (e.g., test scores and the proportion of applicants accepted into the program) and institutional resources (e.g., student-faculty ratios).

In Table 2, a tick indicates when it is possible to make cross-year comparisons for a ranking. The criteria used to make this determination include the four types of indicator changes discussed above as well as more general formula changes. The latter occurred twice over the six editions examined here: In 1998 when overall scores were rounded to the nearest whole number, and in 1999 when a school's performance on each indicator was standardized before obtaining the overall rank score. While it was not possible to make cross-year comparisons for most rankings over the six years, the last column in Table 2 suggests that the ranking formulas may be stabilizing. Between 1999 and 2000, there were no changes in the formulas used to rank schools of education, engineering, law, and medicine, suggesting that change in a school's rank between 1999 and 2000 could be interpreted in terms of change in its relative academic quality.

Table 2. Ability to Make Comparisons Across Years for a Ranking, 1995-2000

Ranking	1995-1996	1996-1997	1997-1998	1998-1999	1999-2000
Business	√				
Education					√
Engineering					√
Law					√
Medical	√	√			√
National Liberal Arts					
National University					
Primary Care	√				√

It is important to remember that even when a formula appears to remain stable across years, there can still be difficulties with cross-year interpretation of ranks. This is due to problems with the accuracy of the information obtained and critics have pointed out several errors that have arisen due to mistakes (both accidental and deliberate) in reporting by institutions, and due to the differing ways in which schools compute figures

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for certain indicators (Machung, 1998, Smetanka, 1998, Stecklow, 1995, Wright, 1990-91). *U.S. News* has tried to reduce the error introduced by these practices by cross-checking data sent in by schools with data collected by debt-rating agencies, investors and national organizations such as the National Collegiate Athletic Association, and tightening up their survey questions, but issues still remain.

The final stage of the comparability analysis examined the extent to which the amount of change in a ranking formula is related to the amount of movement in schools' ranks for that ranking across years. Table 3 shows the correlation (r) between the 1995 and 2000 ranks for the top-fifty schools in each ranking in 1995.

Table 3. Correlation between 1995 and 2000 Ranks for the Top-Fifty Schools in 1995, By Ranking

Ranking	Correlation (r)
Business	.89
Education	.72
Engineering	.88
Law	.92
Medicine	.88
National Universities	.95
National Liberal Arts College	.94
Primary Care	.08

There is no definite relationship between the amount of change in the indicators for a ranking and the correlation between the 1995 and 2000 ranks for the top-fifty ranked schools in 1995. For example, while law schools experienced the most change in their indicators over the six editions of *U.S. News*, there was not much difference (r = .92) in the rank ordering of the top-fifty law schools in 1995 and their ordering in 2000. While varying amounts of change was experienced in the indicators used for the other rankings, they still show a high degree of similarity (with r's between .88 and .95) in the rank ordering of their top 50 schools in 1995 and 2000. The main exceptions to this are the education (r = .72) and primary-care (r = .08) rankings. The low correlation between the primary-care rankings in 1995 and 2000 can be explained by changes in the population of schools that *U.S. News* included in these rankings during this time period. In contrast, the low (relative to the other rankings) correlation between the 1995 and 2000 ranks of the top-fifty schools of education in 1995 is linked to the fact that 16 of the top

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50 schools in 1995 had experienced large changes in rank – of ten or more – by the 2000 edition. Table 4 shows the 16 schools of education. The first six schools all experienced a decline in rank, ranging from a drop of 10 places for the University of Southern California and the University of Iowa to a drop of 22 places for Syracuse University. The remaining schools all improved their rank since 1995. Improvement ranged from an increase of 10 places for the Rutgers University to a jump of 30 places for Arizona State University.

Table 4. Schools of Education with the Biggest Differences in *U.S. News* Rank between 1995 and 2000[a]

School	Rank						Change in Rank
	1995	1996	1997	1998	1999	2000	Between 1995 and 2000
University of Iowa	20	22	14	15	27	30	-10
University of Southern California	23	27	26	30	31	33	-10
University of Georgia	15	10	15	19	18	26	-11
SUNY-Buffalo	39	45	43	47	46	Not Ranked	At least –12
Boston University	31	37	32	43	Not Ranked	46	-15
Syracuse University	28	41	46	45	46	50	-22
Rutgers State University-New Brunswick	49	33	29	30	33	39	+10
University of Minnesota-Twin Cities	25	7	9	11	10	14	+11
University of Pittsburgh, Main Campus	44	Not Ranked	43	34	37	33	+11
Temple University	33	30	34	28	20	20	+13
George Washington University	45	39	37	30	34	30	+15
University of Michigan-Ann Arbor	22	9	8	6	8	7	+15
University of North Carolina-Chapel Hill	32	32	31	28	22	17	+15
University of Texas-Austin	27	19	12	13	11	12	+15
New York University	40	28	23	19	16	12	+28
Arizona State University-Main Campus	47	29	39	27	24	17	+30

[a]This table does not include schools that were not ranked in 1995 but appeared in the top 50 in the 2000 edition.

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Cross-year data for the top-fifty schools in other rankings were also examined to assess the extent to which similar movements in rank occurred (only data for the top 25 schools of medicine/primary-care and the top 40 national liberal arts colleges were available). Only nine business schools, one engineering school, eight law schools, no medical or primary-care schools, three national liberal arts colleges and two national universities differed by ten or more places in their 1995 and 2000 ranks.

It is not clear why there was more movement among schools of education compared to other types of schools. If changes in indicators (i.e., weight, definition, or other changes) are not responsible, movement could be due to changes in schools' performance on the indicators or errors or inconsistencies in the information reported by schools. Unfortunately, it is difficult to identify the real reasons for these movement patterns among schools of education over time, as well as why these differ from other rankings, as U.S. News did not print much information on schools' performance on the individual indicators until 1999.

Estimating Error or Uncertainty around the Overall Score

There is no universally agreed-upon set of information for creating academic quality rankings. Thus, various ranking efforts use indicators that differ in whole or in part from those used by others even when attempting to rank the same schools. It is not difficult to imagine that slight changes in the set of indicators used – such as the addition or removal of a single indicator – may move a school up or down a ranking, depending on how it performs on the indicator relative to other schools. To gauge the effect of slight changes in the set of indicators on the stability of the overall score and subsequent ranking for a school, a technique called jackknifing (Efron and Tibshirani, 1993) was applied to the data for the top-50 schools in each of the 2000 business, education, law, national liberal arts college, and national university rankings.[4]

First, a baseline regression model was created for each of the rankings, with schools' overall scores as the dependent or outcome variable and the indicators used for each ranking as the independent or predictor variables. The overall fit of the model to the

data was assessed in terms of the *adjusted* R Squared. Values of .9 and above were considered a good fit, meaning that the overall score predicted by the model for a school was highly correlated with the score produced by *U.S. News'* ranking formula, and that the regression model was an effective substitute for the weights-and-sum formula used by *U.S. News.* All models met this criterion, with *adjusted* Rs Squared varying between .99 for the national liberal arts college and national university models, .98 for the business school and law school models, and .95 for the education school model.[5]

An approximation to a standard error for each school's overall score was obtained using the following formula (Efron and Tibshirani, 1993):[6]

$$\hat{se}_{jackknife} = \sqrt{\frac{n-1}{n} \sum \left(\hat{\theta}_{(i)} - \sum \frac{\hat{\theta}_{(i)}}{n} \right)^2}.$$

where n is the number of regression models to be estimated and $\hat{\theta}_{(i)}$ is the predicted score for a school from the ith regression model with one indicator removed.

The removal of one indicator at a time for the jackknife regression models did not seem to affect substantially the overall *adjusted* R Squared in most instances. For example, for each of the 9 models estimated using the law school data, the *adjusted R* Squared never varied by more than .01 from the *adjusted R* Squared for the overall model (i.e., .98), suggesting that the indicators are contributing fairly similar information to the estimation of the overall score. As a result, the jackknife standard errors are quite small, varying, in the case of law schools, from a low of .74 for the University of Michigan,

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[4] No data was available for schools below the top-50 for most of the rankings.

[5] *U.S. News* does not make available in its magazine or on its website all the data it uses to rank schools, nor is this information available on request. On average, each ranking is missing information on two or three indicators. This was not a problem for this analysis, since the available indicators, as indicated by the adjusted R Squared values, almost perfectly replicated the overall scores produced by *U.S. News.* Thus, very little information was lost.

[6] While the "error estimate" obtained is not strictly a standard error, since the indicators are not randomly sampled, it may still be viewed as a general indication of the uncertainty around an overall score due to changes in the indicators used to compute that score. In addition, it is probably a conservative estimate of the uncertainty around scores as the indicators chosen by *U.S. News* tend to be highly correlated. A random

Ann Arbor to a high of 3.06 for Harvard University. A similar range of standard error values was obtained for all rankings except for schools of education. The regression model for schools of education was not as robust to changes in indicators and the *adjusted R* Squared dropped considerably (by .13) when one indicator in particular – *Research Expenditure* – was removed. The resultant jackknife standard errors for schools of education are therefore quite large, varying from a low of 1.78 for Stanford University to a high of 11.98 for the University of Southern California.

Differences in the standard errors for individual schools are due to differences in how the removal of different indicators from the equation affects the prediction of their overall score. For schools that have large standard errors, the removal of certain indicators makes it much harder to predict the overall score they received from *U.S. News*. For school with smaller standard errors, the removal of indicators does not reduce the precision of estimation of their overall score. This suggests that schools are differentially affected by the presence or absence of certain indicators in terms of their overall score and subsequent rank.

This error estimate was then used in a t-test to assess the extent to which one school's overall score was significantly different from that of another. The t-test formula employed was:[7]

$$t = \frac{x_1 - x_2}{\sqrt{\left(s\hat{e}_{x_1}\right)^2 + \left(s\hat{e}_{x_2}\right)^2}}$$

where x_1 is the overall score for school 1, x_2 is the overall score for school 2, $\left(s\hat{e}_{x_1}\right)^2$ is the squared jackknife standard error for school 1, and $\left(s\hat{e}_{x_2}\right)^2$ is the squared jackknife standard error for school 2.

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sample from the population of indicators would probably be less highly correlated, which would result in larger standard errors around schools' overall scores.

[7] Since there are, on average, 50 schools in each ranking, around 49 t-test comparisons were made for each school in the rankings. In order to control for the increased probability of a significant finding due to chance alone, a Bonferroni adjustment was applied.

The results of these comparisons are summarized in Tables 5 through 9 (see attached tables after Appendix A). In each table, schools are ordered by their overall ranking score across the heading and down the rows. Read across the row for a school in order to compare its performance with the schools listed in the heading of the chart. The symbols indicate whether the overall score of the school in the row is significantly lower than that of the comparison school in the heading (arrow pointing down), significantly higher than that of the comparison school (arrow pointing up), or if there is no statistically significant difference between the two schools (circle). The blank diagonal represents where a school is compared against itself.

If there were no error around the overall scores for schools, Tables 5 through 9 would only consist of arrows pointing up and down, except for instances where two schools have the same overall score and are tied for rank. This is not the case. For example, in the business school rankings comparison table (Table 5) Harvard is listed first in the row and heading as it has the highest overall score among business schools. However, reading across the row, it appears that Harvard's overall score of 100 is not significantly different from that of nine other schools that are ranked beneath it. These include Stanford, which is tied for first rank with Harvard with an overall score of 100, and University of California, Berkeley, ranked tenth with a score of 90. Only schools ranked below tenth have scores that are significantly lower than Harvard's.

In general, when the overall score for a school is compared to that of every other school in its ranking (top-fifty schools only), three groups emerge: schools that score significantly higher, schools that score significantly lower, and schools with scores that are not significantly different. This pattern is consistent across all the comparison tables. For example, among the business schools in Table 5, three distinct groupings emerge. The first group comprises 10 schools at the top of the rankings, extending from first-ranked Harvard to tenth-ranked University of California, Berkeley. These schools have scores that are not significantly different from each other but that are significantly higher than all other schools' scores. The second grouping extends from eleventh-ranked Dartmouth, University of California Los Angeles, and the University of Virginia to nineteenth-ranked Carnegie Mellon. These schools have scores that are not significantly

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different from each other but that are significantly lower than the top-ranked schools in the first group and significantly higher than the lower-ranked schools in the third grouping. The third group is the largest. It comprises 31 schools, extending from twentieth-ranked Indiana University to forty-eighth-ranked University of Georgia, University of Illinois-Urbana Champagne, and the University of Notre Dame. These schools all have scores that are not significantly different from each other but that are significantly lower than the scores of schools in the first two groups.

This three-groupings pattern is evident for all rankings except schools of education. There are only two groupings evident in Table 6. The first group comprises the top-three-ranked schools of education – Harvard University, Stanford University, and Teacher's College/Columbia University. These schools have scores that are not significantly different from each other but that are significantly higher than the scores for almost all other schools in the top fifty. The second group of schools extends from fourth-ranked University of California-Berkeley to the four schools tied for fiftieth rank. These schools all have scores that are not significantly different from each other but that are significantly lower than the scores of most schools in the top group. This two-grouping effect occurs because schools of education are more sensitive to changes in the indicators used than other types of schools. This results in larger standards errors around their overall score and fewer significant differences between the scores of neighboring schools.

Conclusions and Recommendations

The results of these analyses show that, given the number and annual nature of changes to each ranking formula, it is generally not possible to interpret year-to-year shifts in a school's rank in terms of change in its relative academic quality. Depending on the ranking, it is possible to make cross-year comparisons of a school's relative performance on between a third to three-quarters of the individual indicators used. While not experiencing much change to their ranking formula over time, schools of education have experienced markedly more movement in their ranks than other schools. It is not evident why this has occurred or what it says about the *U.S. News* rankings as a measure

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of the relative quality of these schools. The overall rate of change in the ranking formulas appears to be slowing and it was possible to make cross-year comparisons of schools' ranks for almost all rankings between 1999 and 2000.

The results of the error analyses call into question the use of overall scores to assign schools to individual ranks. The analyses show that when interpreting scores for school with the aid of their standard errors, precision blurs and schools start to group in bands rather than discrete ranks. The results confirm the critics' sense of unease at the precision of a single score, particularly in the case of the education rankings.

At least five recommendations can be made for improving the interpretability and usefulness of the U.S. News rankings. First, U.S. News needs to stabilize their ranking methodology. This is particularly important since the rankings are annual in nature and imply some kind of comparability. A related issue to consider is whether the rankings need to be annual in nature. While there is an obvious commercial value to annual rankings, particularly one that keeps changing the winners, it is doubtful whether there is an educational or consumer value.

Second, U.S. News needs to recognize the uncertainty around schools' overall scores. The results of this analysis suggest that it would be more accurate to group schools in bands than to assign them discrete ranks. This approach would avoid the misleading effect that small changes in a school's rank from year to year produces in terms of the public perception's of its academic quality.

Third, the schools of education rankings need to be reassessed since they do not seem to "hold together." Better comparisons might emerge if they were divided into two more conceptually coherent groups – e.g., those that are primarily research oriented and those that are primarily teacher-training oriented. U.S. News already does this for schools of medicine – i.e., there is an overall ranking of medical schools as well as a ranking of schools that focus on the training of primary-care physicians.

Fourth, in order to be accountable to consumers, U.S. News needs to make available all data used to create the rankings. Currently, US News only publishes information for the top-ranked schools and less or no information on lower-ranked

schools. While space constraints may make it difficult to publish this information in the magazine, no such restrictions apply on the *US News* website.

A final general recommendation is that *U.S. News* should adopt a model similar to that used by *Consumer Reports* for reporting its quality ratings. *Consumer Reports* rates products, but does not allow the product manufacturers to use these ratings in their advertising. Similarly, *U.S. News* should not allow schools to use their ratings in their promotional materials or other advertising. This approach might relieve some of the tension and debate that currently surrounds the rankings and make their annual arrival on newsstands a less stressful event for the higher education community.

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Table 5. Business Rankings 2000

Column headers (read top to bottom, each a university):

- University of Notre Dame
- Univ. of Illinois-Urbana-Champaign
- University of Georgia
- Wake Forest University
- University of California-Davis
- Texas A&M Univ.-College Station
- Southern Methodist University
- Georgia Institute of Technology
- Brigham Young University
- University of California-Irvine
- Boston College
- University of Wisconsin-Madison
- Univ. of Maryland-College Park
- Thunderbird Graduate School
- Rice University
- Penn State University-Univ. Park
- Case Western Reserve University
- Tulane University
- Arizona State Univ.-Main Campus
- University of Arizona
- Michigan State University
- Georgetown University
- University of Minnesota-Twin Cities
- Washington University in St. Louis
- University of Rochester
- Ohio State University
- Vanderbilt University
- Purdue University-West Lafayette
- University of Southern California
- Emory University
- Indiana University-Bloomington
- Carnegie Mellon University
- Univ. of North Carolina-Chapel Hill
- Yale University
- Cornell University
- New York University
- University of Virginia
- Univ. of California-Los Angeles
- Dartmouth College
- Univ. of California-Berkeley
- Univ. of Michigan-Ann Arbor
- Duke University
- University of Chicago
- Columbia University
- Northwestern University
- Massachusetts Institute of Tech.
- University of Pennsylvania
- Stanford University
- Harvard University

Row labels (read bottom to top, each a university):

- Harvard University
- Stanford University
- University of Pennsylvania
- Massachusetts Institute of Tech.
- Northwestern University
- Columbia University
- University of Chicago
- Duke University
- Univ. of Michigan-Ann Arbor
- Univ. of California-Berkeley
- Dartmouth College
- Univ. of California-Los Angeles
- University of Virginia
- New York University
- Cornell University
- Yale University
- Univ. of North Carolina-Chapel Hill
- Carnegie Mellon University
- Indiana University-Bloomington
- Emory University
- University of Southern California
- Purdue University-West Lafayette
- Vanderbilt University
- Ohio State University
- University of Rochester
- Washington University in St. Louis
- University of Minnesota-Twin Cities
- Georgetown University
- Michigan State University
- University of Arizona
- Arizona State Univ.-Main Campus
- Tulane University
- Case Western Reserve University
- Penn State University-Univ. Park
- Rice University
- Thunderbird Graduate School
- Univ. of Maryland-College Park
- University of Wisconsin-Madison
- Boston College
- University of California-Irvine
- Brigham Young University
- Georgia Institute of Technology
- Southern Methodist University
- Texas A&M Univ.-College Station
- University of California-Davis
- Wake Forest University
- University of Georgia
- Univ. of Illinois-Urbana-Champaign
- University of Notre Dame

Table 6. Education Rankings 2000

Column headers (top of matrix, listed left-to-right as printed, reading rotated):

- Syracuse University
- Lehigh University
- George Mason University
- College of William and Mary
- University of Connecticut
- University at Buffalo
- Purdue University-West Lafayette
- Boston University
- Univ. of California-Santa Barbara
- University of Tennessee-Knoxville
- Texas A&M-College Station
- State University New York-Albany
- Utah State University
- Rutgers State Univ.-New Brunswick
- Florida State University
- Univ. of North Carolina-Greensboro
- Cornell University
- University of Arizona
- University of Southern California
- University of Pittsburgh
- University of Missouri-Columbia
- University of Florida
- University of Iowa
- George Washington
- Pennsylvania State University
- University of Washington
- University of Colorado-Boulder
- University of Georgia
- University of Maryland-College Park
- University of Kansas
- Boston College
- University of Oregon
- Temple University
- Northwestern University
- University of Virginia
- Univ. of North Carolina-Chapel Hill
- Arizona State University
- Indiana University-Bloomington
- University of Minnesota-Twin Cities
- Michigan State University
- University of Texas-Austin
- New York University
- University of Pennsylvania
- Univ. of Illinois-Urbana-Champaign
- University of Wisconsin-Madison
- Ohio State University-Columbus
- University of Michigan-Ann Arbor
- Vanderbilt University
- University of California-Los Angeles
- University of California-Berkeley
- Teachers College, Columbia Univ.
- Stanford University
- Harvard University

Row labels (left side of matrix, top-to-bottom):

1. Harvard University
2. Stanford University
3. Teachers College, Columbia Univ.
4. University of California-Berkeley
5. University of California-Los Angeles
6. Vanderbilt University
7. University of Michigan-Ann Arbor
8. Ohio State University-Columbus
9. University of Wisconsin-Madison
10. Univ. of Illinois-Urbana-Champaign
11. University of Pennsylvania
12. New York University
13. University of Texas-Austin
14. Michigan State University
15. University of Minnesota-Twin Cities
16. Indiana University-Bloomington
17. Arizona State University
18. Univ. of North Carolina-Chapel Hill
19. University of Virginia
20. Northwestern University
21. Temple University
22. University of Oregon
23. Boston College
24. University of Kansas
25. University of Maryland-College Park
26. University of Georgia
27. University of Colorado-Boulder
28. University of Washington
29. Pennsylvania State University
30. George Washington
31. University of Iowa
32. University of Florida
33. University of Missouri-Columbia
34. University of Pittsburgh
35. University of Southern California
36. University of Arizona
37. Cornell University
38. Univ. of North Carolina-Greensboro
39. Florida State University
40. Rutgers State Univ.-New Brunswick
41. Utah State University
42. State University New York-Albany
43. Texas A&M-College Station
44. University of Tennessee-Knoxville
45. Univ. of California-Santa Barbara
46. Boston University
47. Purdue University-West Lafayette
48. University at Buffalo
49. University of Connecticut
50. College of William and Mary
51. George Mason University
52. Lehigh University
53. Syracuse University

Table 7. Law Rankings 2000

Column headers (left to right, reading the rotated labels across the top):
University of Cincinnati, Baylor University, University of Tennessee-Knoxville, Arizona State University, University of Alabama, University of Colorado-Boulder, University of Utah, Tulane University, University of Connecticut, University of California-Davis, Wake Forest University, University of Arizona, Ohio State University, Indiana University-Bloomington, University of Wisconsin-Madison, University of California, Fordham University, Brigham Young University, Boston University, Washington University in St. Louis, University of Georgia, College of William and Mary, University of Washington, University of Notre Dame, Emory University, Univ. of Illinois-Urbana-Champaign, George Washington University, Boston College, Univ. of North Carolina-Chapel Hill, University of Iowa, Washington and Lee University, University of Minnesota-Twin Cities, Vanderbilt University, University of Southern California, Univ. of California-Los Angeles, University of Texas-Austin, Georgetown University, University of Pennsylvania, Northwestern University, Duke University, Cornell University, University of Virginia, University of California-Berkeley, University of Michigan-Ann Arbor, University of Chicago, Columbia University, New York University, Harvard University, Stanford University, Yale University

Row headers (top to bottom):
Yale University
Stanford University
Harvard University
New York University
Columbia University
University of Chicago
University of Michigan-Ann Arbor
University of California-Berkeley
University of Virginia
Cornell University
Duke University
Northwestern University
University of Pennsylvania
Georgetown University
University of Texas-Austin
Univ. of California-Los Angeles
University of Southern California
Vanderbilt University
University of Minnesota-Twin Cities
Washington and Lee University
University of Iowa
Univ. of North Carolina-Chapel Hill
Boston College
George Washington University
Univ. of Illinois-Urbana-Champaign
Emory University
University of Notre Dame
University of Washington
College of William and Mary
University of Georgia
Washington University in St. Louis
Boston University
Brigham Young University
Fordham University
University of California
University of Wisconsin-Madison
Indiana University-Bloomington
Ohio State University
University of Arizona
Wake Forest University
University of California-Davis
University of Connecticut
Tulane University
University of Utah
University of Colorado-Boulder
University of Alabama
Arizona State University
University of Tennessee-Knoxville
Baylor University
University of Cincinnati

Table 8. Liberal Arts Rankings 2000

Row labels (top to bottom):

Amherst College
Swarthmore College
Williams College
Wellesley College
Pomona College
Bowdoin College
Carleton College
Haverford College
Middlebury College
Wesleyan University
Davidson College
Smith College
Washington and Lee University
Claremont McKenna College
Grinnell College
Bryn Mawr College
Vassar College
Colgate University
Bates College
Colby College
Hamilton College
Mount Holyoke College
Oberlin College
Trinity College
Macalester College
University of the South
Bucknell University
Connecticut College
Barnard College
College of the Holy Cross
Colorado College
Kenyon College
Franklin and Marshall College
Whitman College
Union College
Lafayette College
Scripps College
Rhodes College
Bard College
DePauw University
Occidental College
Centre College
Denison University
Furman University
Lawrence University
Wheaton College
Beloit College
Dickinson College
Skidmore College
Sarah Lawrence College
Willamette University

Column labels (left to right):

Willamette University
Sarah Lawrence College
Skidmore College
Dickinson College
Beloit College
Wheaton College
Lawrence University
Furman University
Denison University
Centre College
Occidental College
DePauw University
Bard College
Rhodes College
Scripps College
Lafayette College
Union College
Whitman College
Franklin and Marshall College
Kenyon College
Colorado College
College of the Holy Cross
Barnard College
Connecticut College
Bucknell University
University of the South
Macalester College
Trinity College
Oberlin College
Mount Holyoke College
Hamilton College
Colby College
Bates College
Colgate University
Vassar College
Bryn Mawr College
Grinnell College
Claremont McKenna College
Washington and Lee University
Smith College
Davidson College
Wesleyan University
Middlebury College
Haverford College
Carleton College
Bowdoin College
Pomona College
Wellesley College
Williams College
Swarthmore College
Amherst College

The table body is a pairwise comparison matrix of symbols (◄, ●, ►) for each college pairing.

Table 9. National University Rankings 2000

Column headers (left to right):
Princeton University, Harvard University, Yale University, California Institute of Technology, Massachusetts Institute of Tech., Stanford University, University of Pennsylvania, Duke University, Dartmouth College, Columbia University, Cornell University, University of Chicago, Northwestern University, Rice University, Brown University, Johns Hopkins University, Washington University in St. Louis, Emory University, University of Notre Dame, University of California-Berkeley, University of Virginia, Vanderbilt University, Carnegie Mellon University, Georgetown University, Univ. of California-Los Angeles, University of Michigan-Ann Arbor, Univ. of North Carolina-Chapel Hill, Wake Forest University, Tufts University, College of William and Mary, Brandeis University, University of California-San Diego, New York University, University of Rochester, Georgia Institute of Technology, University of Southern California, University of Wisconsin-Madison, Boston College, Case Western Reserve University, Lehigh University, University of California-Davis, University of California-Irvine, Univ. of Illinois-Urbana-Champaign, Pennsylvania State University, Tulane University, Univ. of California-Santa Barbara, University of Washington, Yeshiva University, Pepperdine University, Rensselaer Polytechnic Institute, University of Texas-Austin

Row labels (top to bottom):
Princeton University
Harvard University
Yale University
California Institute of Technology
Massachusetts Institute of Tech.
Stanford University
University of Pennsylvania
Duke University
Dartmouth College
Columbia University
Cornell University
University of Chicago
Northwestern University
Rice University
Brown University
Johns Hopkins University
Washington University in St. Louis
Emory University
University of Notre Dame
University of California-Berkeley
University of Virginia
Vanderbilt University
Carnegie Mellon University
Georgetown University
Univ. of California-Los Angeles
University of Michigan-Ann Arbor
Univ. of North Carolina-Chapel Hill
Wake Forest University
Tufts University
College of William and Mary
Brandeis University
University of California-San Diego
New York University
University of Rochester
Georgia Institute of Technology
University of Southern California
University of Wisconsin-Madison
Boston College
Case Western Reserve University
Lehigh University
University of California-Davis
University of California-Irvine
Univ. of Illinois-Urbana-Champaign
Pennsylvania State University
Tulane University
Univ. of California-Santa Barbara
University of Washington
Yeshiva University
Pepperdine University
Rensselaer Polytechnic Institute
University of Texas-Austin

Appendix A

Current *U.S. News* College and Graduate School Ranking Methodology

The current method that *U.S. News* uses to produce college rankings has three basic steps.[8] First, colleges in the U.S. are placed into categories based on mission and region.[9] Colleges within each category are ranked separately. Second, *U.S. News* collects data from each school on up to 16 separate indicators of what it believes reflects academic quality. As Table 10 indicates, each indicator is assigned a weight in the ranking formula that reflects the judgement of *U.S. News* about which measures of quality matter most. Column 4 of Table 10 shows the weight that each indicator (shown in column 3 of Table 10) receives within its category and column 2 shows the weight this category receives in the overall ranking formula. For example, a school's acceptance rate is 15 percent of its Student Selectivity category score or rank, and the Student Selectivity category contributes 15 percent to a school's overall score and rank.

Indicators are standardized and then combined (using weights) to produce an overall score for each school. These scores are re-scaled. The top school is assigned a value of 100, and the other schools' weighted scores are calculated as a proportion of that top score. Final scores for each ranked school are rounded to the nearest whole number and ranked in descending order. *U.S. News* publishes the individual ranks of only the top schools; the remainder is grouped into tiers.

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[8] For more information see http://www.usnews.com/usnews/edu/college/corank.htm

Table 10
U.S. News Indicators and Weights for the 2000 College Rankings[a]

Ranking Category	Category Weight	Indicator	Indicator Weight
Academic Reputation	25%	• Academic Reputation Survey	• 100%
Student Selectivity	15%	• Acceptance Rate • Yield • High School Standing – Top 10% • SAT/ACT Scores	• 15% • 10% • 35% • 40%
Faculty Resources	20%	• Faculty Compensation • Faculty With Top Terminal Degree • Percent Full-time Faculty • Student/Faculty Ratio • Class Size, 1-19 Students • Class Size, 50+ Students	• 35% • 15% • 5% • 5% • 30% • 10%
Retention Rate	20%	• Average Graduation Rate • Average Freshmen Retention Rate	• 80% • 20%
Financial Resources	10%	• Educational Expenditures Per Student	• 100%
Alumni Giving	5%	• Alumni Giving Rate	• 100%
Graduation Rate Performance	5%	• Graduation Rate Performance	• 100%

[a]These indicators and weights are for the national liberal arts and national university rankings only.

A similar methodology is employed for the graduate school rankings. *U.S. News* collects data from each program on indicators of what it believes reflect academic quality. Each indicator is assigned a weight based on *U.S. News'* judgment about which measures matter most. Data are standardized, and standardized scores are weighted, totaled, and re-scaled so that the top school receives 100; other schools receive a percentage of the top score. Schools are then ranked based on the score they receive.

The five major disciplines examined yearly are business, education, engineering, law, and medicine. Master's and doctoral programs in areas such as the arts, sciences, social sciences, humanities, library science, public affairs, and various health fields are ranked only by reputation and are generally evaluated every third year. The specific indicators and weights used for rankings within each of the five major disciplines are outlined in Tables 11 through 15.

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[9] *U.S. News* uses a modification of the classification system developed by the Carnegie Foundation for the Advancement of Teaching in order to classify colleges and universities. The Carnegie system is a generally accepted classification system for higher education.

Table 11. *U.S. News* Indicators and Weights for the 2000 Business Rankings

Ranking Category	Category Weight	Indicator	Indicator Weight
Reputation	40%	(1) Academic Survey	• 60%
		(2) Non-academic Survey	• 40%
Placement Success	35%	• Mean Starting Salary and Bonus	• 40%
		• Employment at Graduation and Three Months Later	• 20% and 40%
Student Selectivity	25%	• Mean Graduate Management Admission Test Scores	• 65%
		• Mean Undergraduate Grade Point Average	• 30%
		• Proportion of Applicants Accepted	• 5%

Table 12. *U.S. News* Indicators and Weights for the 2000 Education Rankings

Ranking Category	Category Weight	Indicator	Indicator Weight
Reputation	40%	• Academic Survey	• 60%
		• Non-academic Survey	• 40%
Student Selectivity	20%	• Average Verbal, Analytical and Quantitative GREs	• 30% each
		• Proportion of Applicants Accepted	• 10%
Faculty Resources	20%	• Ratio of Full-time Doctoral and Master's Degree Candidates to Full-time Faculty	• 25% and 20%
		• Percent of Faculty Given Awards	• 20%
		• Number of Doctoral and Master's Degrees Granted in the past school year	• 15% and10%
		• Proportion of Graduate Students Who Are Doctoral Candidates	• 10%
Research Activity	20%	• Total Research Expenditures	• 75%
		• Research Expenditures Per Faculty Member	• 25%

Table 13. *U.S. News* Indicators and Weights for the 2000 Engineering Rankings

Ranking Category	Category Weight	Indicator	Indicator Weight
Reputation	40%	• Academic Survey	• 60%
		• Non-academic Survey	• 40%
Student Selectivity	10%	• Average Quantitative and Analytical GREs	• 45% each
		• Proportion of Applicants Accepted	• 10%
Faculty Resources	25%	• Ratio of Full-time Doctoral and Master's Degree Candidates to Full-time Faculty	• 25% and 10%
		• Proportion of Faculty Members of NAE	• 25%
		• Number of Ph.D Degrees Granted in the last school year	• 20%
		• Proportion of Faculty Holding Doctoral Degrees	• 20%
Research Activity	25%	• Total Research Expenditures	• 60%
		• Research Expenditures Per Faculty Member	• 40%

Table 14. *U.S. News* Indicators and Weights for the 2000 Law Rankings

Ranking Category	Category Weight	Indicator	Indicator Weight
Reputation	40%	• Academic Survey	• 60%
		• Non-academic Survey	• 40%
Student Selectivity	25%	• Median LSAT Scores	• 50%
		• Median Undergraduate GPA	• 40%
		• Proportion of Applicants Accepted	• 10%
Placement Success	20%	• Employment Rates at Graduation and Nine Months Later	• 30% and 60%
		• Bar Passage Rate	• 10%
Faculty Resources	15%	• Average Expenditures Per Student For Instruction etc.	• 65%
		• Student to Teacher Ratio	• 20%
		• Average Expenditures Per Student For Financial Aid etc.	• 10%
		• Total Number of Volumes in Law Library	• 5%

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Table 15. *U.S. News* Indicators and Weights for the 2000 Medicine and Primary-Care (in parentheses where different) Rankings

Ranking Category	Category Weight	Indicator	Indicator Weight
Reputation	40%	• Academic Survey • Non-academic Survey	• 50% (60%) • 50% (40%)
Student Selectivity	20%	• Mean MCAT Scores • Mean Undergraduate Grade Point Average • Proportion of Applicants Accepted	• 65% • 30% • 5%
Faculty Resources	10%	• Ratio of Full-time Science and Clinical Faculty to Full-time Students	• 100%
Primary Care Rate (Primary Care Only)	30%	• The Percentage of MDs From a School Entering Primary-care Residencies, Averaged Over 1997, 1998, and 1999	• 100%
Research Activity (Medicine only)	30%	• Total Dollar Amount of National Institutes of Health Research Grants Awarded to the Medical School and its Affiliated Hospitals, Averaged for 1998 and 1999	• 100%

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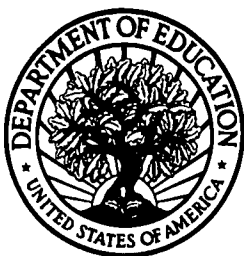
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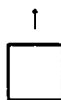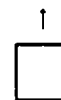| The sample sticker shown below will be affixed to all Level 1 documents	The sample sticker shown below will be affixed to all Level 2A documents	The sample sticker shown below will be affixed to all Level 2B documents
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