No. 19-2005

UNITED STATES COURT OF APPEALS
FOR THE FIRST CIRCUIT

STUDENTS FOR FAIR ADMISSIONS, INC.,
Plaintiff – Appellant,

v.

PRESIDENT AND FELLOWS OF HARVARD COLLEGE
Defendant – Appellee,

On Appeal from the United States District Court
for the District of Massachusetts, Boston Division, No. 14-cv-14176
Before the Honorable Allison D. Burroughs, District Judge

BRIEF OF PROFESSORS OF ECONOMICS AS *AMICI CURIAE* IN SUPPORT OF DEFENDANT-APPELLEE AND AFFIRMANCE

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May 21, 2020

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INTEREST OF THE *AMICI CURIAE*[1]

Amici—Professor George A. Akerlof, Professor Sandy Baum, Professor Susan Dynarski, Professor Harry Holzer, Professor Hilary Hoynes, Professor Guido W. Imbens, Professor Helen F. Ladd, Professor David S. Lee, Professor Trevon D. Logan, Professor Alexandre Mas, Professor Michael McPherson, Professor Jesse Rothstein, Professor Cecilia Rouse, Professor Robert M. Solow, Professor Lowell J. Taylor, Professor Sarah Turner, Professor Douglas Webber, and Professor Janet L. Yellen—are leading economists and statisticians who regularly use and teach statistical analytical methods, including those used in this case by Appellant's expert, Dr. Peter S. Arcidiacono, and Appellee's expert, Dr. David Card. *Amici* include, among others, two Nobel laureates, the former chair of the Federal Reserve's Board of Governors, three former Chief Economists of federal agencies, current and former university administrators, editors of peer-reviewed journals, and multiple professors whose research focuses on higher education. *Amici* have a wide range of views about the appropriateness of using

[1] Counsel for *amici curiae* state that (1) this brief was written by counsel for *amici curiae* and not by counsel for any party, in whole or in part; (2) no party or counsel for any party contributed money that was intended to fund preparing or submitting the brief; and (3) apart from *amici curiae* and their counsel, no person contributed money that was intended to fund preparing or submitting the brief. Fed. R. App. P. 29(a)(4)(E). All parties have consented to the filing of this *amicus* brief pursuant to Federal Rule of Appellate Procedure 29(a)(2).

race as a factor in college admissions. They share the view, however, that Dr. Card is one of the most outstanding and respected scholars in the field of econometrics and applied economics, that his statistical analyses in this case were methodologically sound, and that the criticisms of the district court's consideration of Dr. Card's analyses in the Economists as *Amici Curiae* Brief in Support of Appellants are not credible. *See* Economists as *Amici Curiae* in Supp. of Appellant Br., *Students for Fair Admissions, Inc. v. President & Fellows of Harvard Coll.*, No. 19-2005 (1st Cir. Feb. 25, 2020). Biographies of *amici* are summarized in Appendix A to this brief.

STATEMENT OF FACTS

I. The Principles Of Regression Analysis

Regression analysis is a statistical tool that statisticians, economists, and many other researchers use to understand the relationship between multiple variables. It can show what impact a factor has on an outcome, when holding all other factors included in the analysis constant.

Designing regression analyses necessarily requires professional judgment. *See* James H. Stock & Mark W. Watson, *Introduction to Econometrics* 233, 316-17 (3d ed. 2011) ("Stock & Watson"); Daniel L. Rubinfeld, *Reference Guide on Multiple Regression*, *in* Fed. Judicial Ctr. & Nat'l Research Council, REFERENCE MANUAL ON SCIENTIFIC EVIDENCE 312 (3d ed. 2011) ("Reference Manual"),

https://bit.ly/2ypt7rl. That judgment extends to, among other things, which variables to include or exclude. Stock & Watson at 229-34, 317. Reasons for not including information in a regression analysis include that the information is not relevant, or that including such information would bias the results.[2] Reasonable economists may thus disagree about the proper construction of a regression model, without either being clearly wrong. The corollary of this principle is that analyzing more than one reasonably designed regression model "permits the skeptical reader to draw his or her own conclusions." *Id.* at 317.

While economists do have a degree of judgment in creating a model, their judgment is bounded by established principles of empirical data analysis that mitigate against the likelihood of a biased or unreliable result. A few key principles are at issue in this case.[3]

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[2] As an example, Harvard applications include the names of the applicant's parents. Accordingly, it is technically possible to include "number of letters in mother's first name" as a variable in a regression analysis. Both Dr. Card and Dr. Arcidiacono implicitly opted not to include that information as a variable, and for good reason: there is no reason to believe that this information is relevant for an applicant's chances of being admitted to Harvard.

[3] The district court *amicus* brief to which many these same *amici* were signatories, Am. Professors of Economics *Amici Curiae* In Supp. of Harvard Br., *Students for Fair Admissions, Inc. v. President & Fellows of Harvard Coll.*, No. 14-cv-14176 (D. Mass. Sept. 6, 2018), ECF No. 531, offered as an illustration of these principles the example of a car dealership seeking to analyze the factors that influence its monthly sales. That illustration retains its usefulness here, and this brief refers to it for further reference should the court find it helpful.

First, the expert must identify the variables that are related to the variable of interest and are expected to also be correlated with the outcome. By controlling for these variables, the regression model will attempt to remove from the raw correlation between the variable of interest and the outcome variable that correlation attributable to the control variables. *See* Reference Manual at 313-16.

Failing to include a significant explanatory variable that is correlated with the outcome and also related to the variable of interest will lead to misleading inferences from the data. This statistical problem is known as "omitted variable bias." As a simple illustration, a model to analyze whether race affects Harvard admissions that failed to account for applicants' high school extracurricular activities could suffer from omitted variable bias if differences in extracurricular activities are correlated with race, because Harvard considers extracurriculars in its admissions decisions.

Second, a well-designed statistical analysis should reflect as closely as practical the population of interest and correctly identify the outcome being investigated. Stock & Watson at 314 ("[T]he true causal effect might not be the same in the population studied and the population of interest . . . because the population was chosen in a way that makes it different from the population of interest."). Consider, for example, a statistical study examining the effects of exercise on the cardiovascular health of adults aged twenty to forty. The

population in this model should be representative of all adults aged twenty to forty. Carving out a specific subgroup of adults—such as professional athletes—from the model may make its results unrepresentative of the population of interest.

Third, in evaluating a regression analysis, the modeling choices should be justifiable *a priori*, without first looking at relationships in the data. *Id.* at 229-30, 317. A researcher should be able to accept the arguments underlying the regression specification (that is, the selection of variables and relevant population) without having seen the results first. And an available explanatory variable should only be excluded when there is a compelling *a priori* explanation to exclude it. If the arguments depend on the specifics of what was observed in the data, they may reflect *ex post* rationalization of the model rather than a principled prior decision.

II. The Experts' Regression Analyses

Students for Fair Admissions, Inc. ("SFFA" or "Appellant") contends that Harvard's undergraduate admissions decisions exhibit bias against Asian American applicants. Its expert, Dr. Peter S. Arcidiacono, performed a regression analysis and concluded that there is statistical evidence in support of SFFA's claims.

Harvard asked Dr. David Card to assess whether Dr. Arcidiacono's statistical analyses were reliable. Based on his review of the record on Harvard's admissions process and his analyses of admissions data, Dr. Card concluded that they were not. Dr. Card concluded that Dr. Arcidiacono's regression models

mistakenly focused on applicants' GPAs and ACT/SAT scores ("academic factors") to the exclusion of other pertinent information about applicants; for example, Dr. Arcidiacono's models did not include applicants' ratings for personal factors. *See* JA2845:13-2846:13, 2985:8-15, 6048;[4] Expert Report of David Card ("Card Report"), ECF No. 419-33, ¶¶ 12-13 (Dec. 15, 2017). Dr. Card also concluded that Dr. Arcidiacono incorrectly narrowed the relevant population of his models by excluding so-called ALDC applicants (athletes recruited by Harvard's athletic teams, Harvard alumni's children, applicants on a Dean's or Director's Interest List, and faculty/staff's children) from his analysis. Dr. Card opined that there was no statistical justification to remove these applicants from an analysis of Harvard's admissions process. Similarly, Dr. Card found that Dr. Arcidiacono had inappropriately pooled all of the applicants from six admissions cycles into a single model, rather than analyze each year of admissions data separately.

In his own analysis, which corrected for what Dr. Card considered to be the flaws in Dr. Arcidiacono's, Dr. Card found no statistically significant evidence that Harvard's own admissions process was biased against Asian American applicants. Through his regression models—which included ALDC applicants within the models' population and examined each annual admissions cycle separately—Dr.

[4] References to "JA" are to the Joint Appendix.

Card analyzed the difference in admissions rates between Asian American applicants and others if all observed factors included in the regression model were equal. Dr. Card controlled not only for applicants' academic, extracurricular, and athletic qualities (for which Dr. Arcidiacono controlled) but also for other factors including personal ratings and contextual information such as their family background (for which Dr. Arcidiacono failed to control adequately). *See* JA2954:11-2955:21, 2976:14-2977:18, 3036:12-3037:22, 6048; Card Report ¶¶ 95-100. Implementing the modeling choices Dr. Card found to be more appropriate each reduced, and together eliminated, any statistically significant relationship between Asian American identity and the admission outcome. JA2896:15-2898:15, 6049.

Dr. Card's analysis showed that these non-academic factors likely accounted for the racial disparities in admission rates that Dr. Arcidiacono attributed to bias against Asian American applicants. *See* JA2971:1-3; 2989:1-25; 5711-5719; Card Report ¶ 18. Some factors were not individually quantified in Harvard's database, such as the quality of an applicant's personal essay and recommendation letters. Dr. Card thus noted that these missing data, not the alleged bias against Asian American applicants, likely explain any remaining racial disparities. *See* JA2971:15-2973:16; Card Report ¶¶ 147-48.

III. The District Court's Consideration Of The Regression Analyses

Following a bench trial at which both Dr. Arcidiacono and Dr. Card testified, the district court ruled in Harvard's favor. In finding that Harvard's admissions process did not discriminate against Asian American applicants, the court issued a detailed opinion evaluating both parties' statistical analyses and trial testimony.

In its examination of the experts' regression models of admission outcome, the district court focused on the experts' disagreements on three key issues, among others: (1) whether to include ALDC applicants in the regression models' population, (2) whether to pool applicants into a single model or examine applicants separately by year, and (3) whether to include personal ratings as a control variable. ADD74-80.[5] Although it found "both experts' approaches to be econometrically defensible," ADD75, the district court specified which modelling choices it found to be most probative of whether Harvard discriminates against Asian American applicants.

First, the district court agreed with Dr. Card that ALDC applicants should be included in the applicant population and that each year of applicants should have its own model. It reasoned "that excluding ALDCs distorts the analysis" because they are evaluated through the same admissions process as other applicants.

[5] References to "ADD" are to the Addendum filed with Appellant's Brief.

ADD54 n.43, 76-77. Similarly, the court concluded that Dr. Card's year-by-year analysis better reflected the realities of Harvard's admissions process; applicants in any given year are only competing against other applicants in that same year. ADD77. The effect of these choices were significant: even with all of Dr. Arcidiacono's other modeling choices, simply including ALDC applicants reduced the average marginal effect of Asian American identity on admission outcome by 25%. JA2402:4-18.

Next, the district court stated that it would consider Dr. Card's admission outcome models both "with and without the personal rating." ADD 75. After examining Dr. Arcidiacono's model that scrutinized the personal ratings, it found that "[t]here is a reasonable econometric basis for removing the personal ratings from the admissions models given the possibility that the personal ratings are affected by race." ADD76. At the same time, the court found that Dr. Arcidiacono's models that excluded the personal ratings likely overstated the effect of race due to omitted variable bias because the personal ratings captured critical applicant qualifications Harvard considered that may also be correlated with race. ADD68-72, 76. "[A]lthough the Court believes that including the personal rating results in a more comprehensive analysis, models with and without the personal rating are econometrically reasonable and provide evidence that is probative of the effect of race on the admissions process." ADD76.

The district court ultimately considered the results of two versions of Dr. Card's regression model: one that included personal rating as a control variable and one that excluded it.[6] With the personal ratings variable included, the model showed no statistically significant evidence of discrimination against Asian American applicants. In fact, the "model returns a slight positive average marginal effect for Asian American identity in three of the six admission cycles that the experts analyzed." ADD79. And even when the model excluded the personal ratings variable, "the lower probability of admission to Harvard that appears associated with Asian American identity is slight, with an average marginal effect of Asian American racial identity on admissions probability that is well below minus one percentage point."[7] *Id*. From this, the court concluded that "statistical disparities between applicants from different racial groups on which SFFA's case rests are not the result of any racial animus or conscious prejudice." ADD112.

Appellant filed this appeal following the district court's ruling. In support of that appeal, Appellant's *amici* criticize Dr. Card's methodology and the district

[6] The district court also added one feature of Dr. Arcidiacono's model to Dr. Card's regressions: an interaction term between race and disadvantaged status. ADD75-76.

[7] The effect was so slight that if Dr. Arcidiacono's interaction term is removed, the model without the personal ratings variable shows no statistically significant evidence of bias against Asian American applicants for five of the six years analyzed. JA3150:1-3152:3.

court's consideration of it. For the reasons set out in this brief, those criticisms are unfounded.

SUMMARY OF ARGUMENT

Of the many differences between Dr. Card's and Dr. Arcidiacono's regression analyses, Appellant's *amici* focus on just one. Specifically, they contend that the district court erred when it "[a]dopted" Dr. Card's model that included the personal ratings variable. Appellant's *Amici* Br. at 6. Based on our collective decades of training and experience in statistical methods, we are unanimous in the view that this contention is baseless, for two key reasons.

First, Appellant's *amici*'s critique of the district court's analysis of the personal rating variable—their core critique—misses the mark. Dr. Card's decision to include personal rating as a control variable was statistically appropriate. The personal ratings were a critical non-academic factor that Harvard considered in evaluating an applicant's qualifications and were not captured by any of the other variables in the model; excluding the personal ratings variable likely generates estimates that exaggerate the impact of race on admissions due to omitted variable bias. The district court's consideration of Dr. Card's model that controlled for personal ratings (along with one that did not do so) was reasonable, and not improper as a matter of empirical analysis.

Second, Appellant's *amici* do not dispute that Dr. Card's selection of the population—including ALDC applicants and creating year-by-year models—was appropriate for determining whether Harvard's admissions process discriminated against Asian American applicants (nor do they offer any argument to counter the district court's finding that these modeling decisions by Dr. Card were appropriate.) This concession is critical. Dr. Arcidiacono's treatment of the population was a core piece of his conclusion that Harvard's admissions process exhibited racial disparities. The court's finding that Dr. Arcidiacono's treatment of the population in his analyses did not accurately reflect Harvard's admissions process undercut his conclusions, regardless of how the personal ratings variable is treated.

ARGUMENT

I. DR. CARD'S INCLUSION OF THE PERSONAL RATINGS VARIABLE IN HIS MODEL WAS METHODOLOGICALLY SOUND; THE DISTRICT COURT'S CONSIDERATION OF THE MODEL WAS REASONABLE

The Appellant's *amici* focus their critiques entirely on the district court's consideration of Dr. Card's regression analysis that controlled for "personal ratings." Their criticisms lack merit.[8]

[8] As a preliminary matter, we note that even without the personal rating, the model returns only a slightly negative coefficient and average marginal effect of Asian American racial identity on admissions probability—effects that largely disappear if Dr. Arcidiacono's interaction term is removed. *See* ADD79;

Dr. Card's model that included the personal ratings variable was consistent with basic empirical modeling principles. The personal ratings were a critical non-academic factor that Harvard considered in evaluating an applicant's qualifications and were not captured by any of the other variables in the model. Excluding that variable thus likely results in an overstatement of the effect of race in the admissions process as a result of omitted variable bias. Appellant's *amici* offer no compelling *a priori* reason for excluding the personal rating variable. As a result, the district court's decision to consider a model that included the personal ratings variable (along with one that excluded it) was appropriate as a statistical matter.[9]

JA3150:1-3152:3. Similarly, in an alternative analysis, Dr. Card statistically adjusted academic, extracurricular, and personal ratings to eliminate the alleged racial bias as reported by Dr. Arcidiacono. Dr. Card found no statistical evidence of bias against Asian American applicants. *See* JA3016:14-3017:18, 5720.

When analyzing the data on a year-by-year basis, as Dr. Card did, it becomes clear that Dr. Arcidiacono's findings were driven by a relatively extreme correlation in a single year. *See* JA3150:1-3152:3, 5700, 5703; Card Report ¶ 147 & Ex. 19; ¶ 152 & Ex. 21; ¶ 153 & Ex. 22. We are not aware of any persuasive qualitative explanation for that result; SFFA has not, for example, argued that Harvard opted to discriminate against Asian American applicants in only one year out of six, nor articulated any reason why it would have done so. Accordingly, even if Appellant's *amici* were correct that the personal rating should be excluded, the statistical evidence still does not demonstrate that Harvard's admissions officers discriminated against Asian American applicants on even a remotely consistent basis.

[9] It is important to recognize that Appellant's *amici* distort the district court's analysis in their brief. They create the impression that the district court's ruling was based solely upon Dr. Card's model that included personal ratings as a control variable. Appellant's *Amici* Br. at 1, 6. That suggestion, however, is wrong.

A. Dr. Card's Decision To Include The Personal Ratings Variable, And The District Court's Consideration Of That Model, Is Methodologically Justified

Because this case aims to find the effect of race in Harvard's admissions process, a well-designed and transparent regression analysis would include all variables that are known to be used in the actual decision-making process, as long as they are not themselves the outcome of discrimination. The failure to include appropriate explanatory variables may produce unreliable results. Here, failure to control for real factors that Harvard considered in making admissions decisions that may be correlated with race—such as non-academic skills and the contents of personal essays and letters of recommendation—would lead to unreliable estimates about the effect of race in the admissions process. As we have explained, an available explanatory variable should be excluded only when there is a compelling *a priori* explanation for excluding it, such as if it is clear that the proposed

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The district court did exactly what Appellant's *amici* imply it did not: accept and consider the results of a regression analysis that *excluded* the personal ratings as a variable. It expressly stated that "models with and without the personal rating are econometrically reasonable and provide evidence that is probative of the effect of race on the admissions process." ADD76. The district court further recognized that without the personal rating, the model returns a slightly negative coefficient and average marginal effect of Asian American racial identity on admissions probability. ADD75. Appellant's *amici*, therefore, argue from an inaccurate premise and offer no argument that what the district court *actually* did was statistically unsound.

explanatory variable had no independent effect on the outcome and on the variable of interest, or if the values of the variable were assigned based on race.

Dr. Card's modeling was consistent with these fundamental modeling principles. Dr. Card included in his regression models all measurable factors that Harvard actually considered and recorded in its database, except one (described below). By including this broad range of variables—including the personal ratings—Dr. Card's model incorporates information that Harvard considered in making admissions decisions, such as personal essays and recommendation letters. The district court appropriately concluded that this made Dr. Card's model that included the personal ratings variable the "more comprehensive analysis." ADD76.

The one factor that Dr. Card excluded was Harvard's "overall ratings" for its applicants, and he provided a compelling *a priori* reason to exclude it.[10] As Dr. Card noted, the record suggested that an admissions officer may consider race in assigning an applicant's "overall rating." JA3019:2-22. Given this *a priori* evidence that race affected an applicant's overall rating, it was appropriate to exclude the overall ratings variable from the model.

[10] Dr. Arcidiacono also excluded the overall ratings from his admissions model. *See* JA2290:14-18.

Appellant's *amici* claim that if the district court and Dr. Card decided that the overall rating should be excluded because it is directly affected by race, the district court must also refuse to consider a model that incorporated the personal ratings variable. Appellant's *Amici* Br. at 30-31. But neither Dr. Arcidiacono nor Appellant's *amici* identify any *a priori* qualitative evidence suggesting that admissions officers consider an applicant's race in assigning personal ratings. *See infra* § II.C. Moreover, the district court repeatedly noted that Harvard's admissions officers "credibly testified that they did not use race in assigning personal ratings (or any of the profile ratings) and did not observe any improper discrimination in the admissions process." ADD69; *see also* ADD30, 45, 125. This "consistent, unambiguous, and convincing" testimony, ADD125, is an appropriate *a priori* justification to *include* the personal ratings variable. There was no similarly compelling reason to *exclude* the variable.

B. Excluding The Personal Ratings Variable From The Analysis Increased The Likelihood Of Omitted Variable Bias

Appellant's *amici* accuse the district court of error insofar as it recognized that the effect of race may be overstated due to omitted variables bias and that including the personal ratings variable was a reasonable approach to mitigate against it. Appellant's *Amici* Br. at 23. But this criticism ignores the statistical merits of Dr. Card's model that included the personal ratings variable.

One approach to better understanding the likely impact of omitted variables on the estimate of the variable of interest is to study the impact of observable variables that may be correlated with the unobservable variables. Appellant's *amici* offer (*id.* at 27) an analysis that purports to show that Asian American applicants are stronger on the observable variables that are likely correlated with the personal ratings, suggesting that the reason the personal ratings are lower among Asian American applicants compared to those of other racial groups is discrimination among Harvard's admissions officers. However, their analysis is incomplete and not dispositive. In contrast to Appellant's *amici*'s analysis, as discussed below, Dr. Card provided data in his testimony and reports that show Asian American applicants did, indeed, have lower ratings among factors that are highly correlated with (and, in some cases, which inform) the personal ratings score.

First, Dr. Card showed that, on average, Asian American applicants are less likely than white applicants to receive strong scores collectively across the teacher and guidance counselor ratings.[11] *See* JA2993:14-2994:16, 6083. The district

[11] Appellant *amici*'s assertion that Dr. Arcidiacono's model controlled for the scores of personal essays and guidance counselor ratings is unavailing. As Dr. Card and the district court concluded, accounting for the numbers alone does not capture the actual content of said materials. ADD68 ("Importantly, however, although the school support ratings themselves provide only an overall numeric evaluation of recommendations, the school support materials are in fact more

court appropriately credited this analysis. It concluded that the teacher and guidance counselor recommendations themselves "presented Asian Americans as having less favorable personal characteristics than similarly situated non-Asian American applicants, and the school support ratings do not fully reflect more subtle racial disparities." ADD70. While acknowledging this analysis, Appellant's *amici* insist that the difference in school support ratings was small and, therefore, inconsequential. But as the district court observed, teacher and guidance counselor recommendations are "among the most significant inputs for the personal rating," ADD71 (citing Professor Card's testimony at JA2990:6-2992:2); there is no sound statistical basis for ignoring trends within those significant inputs in drawing inferences about unobservable data on the basis that the trends happen to be small. To the contrary, and as Appellant's *amici* themselves point out, "unobservable data is likely to be consistent with or even follow the observable data." Appellant's *Amici* Br. at 27.

Second, Dr. Card identified other relevant observable data as well. He used Dr. Arcidiacono's "non-academic admissions index"—which summarizes an applicant's strength across all non-academic factors—to show that Asian American applicants are less likely than white applicants to be in the top deciles of the index,

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nuanced and the substance of them informs perceptions about applicants across numerous dimensions."); JA2972:10-2973:16.

again suggesting that white applicants may outperform Asian American applicants in non-academic measures. JA2971:1-3, 3005:17-3010:18. Moreover, Dr. Arcidiacono's own regression models show that racial disparities in the personal ratings shrink as he adds more non-academic factors. JA2425:13-17. All of this evidence suggests that omitted variables, not racial bias, may explain the observed racial disparities in admissions. Here, because the observable data are correlated with race, it was reasonable for the district court to conclude that unobservable factors would likely be correlated with race as well—which implies that the effect of race on admissions was overstated without the personal rating variable due to omitted variable bias.

Despite their protests, Appellant's *amici* cannot escape the fact that by excluding the personal ratings variable, Dr. Arcidiacono necessarily omits various dimensions that play a key role in Harvard's admissions decisions. His model includes no adequate control variables regarding the quality of personal essays, recommendation letters, and school support materials—among other missing data—even though Harvard considered these in the admissions process. Failing to include a significant explanatory variable like the personal rating may cause race to be credited with an effect that is actually caused by the excluded variables. For this reason, the district court's consideration of Dr. Card's models that included the

personal ratings variable does not conflict with statistical methods; in fact, it is in line with sound modeling principles.

Appellant's *amici* have no answer to this analysis. Instead, they attempt to discredit the district court's reasoning by arguing that the district court improperly "veered into conjecture" by "speculating" in order "[t]o justify its self-contradictory decision." Appellant's *Amici* Br. at 16-23 (brackets omitted). But the footnote *amici* cite out of context, ADD70 n.48, does not detract from the statistical merits of Dr. Card's analysis and his inclusion of the personal ratings variable. As explained above, Dr. Card reasoned that factors not individually quantified in Harvard's database, such as the quality of an applicant's personal essay and recommendation letters, likely explain remaining racial disparities. *See* JA2971:15-2973:16, 2978:12-2980:21. The district court agreed: "Professor Arcidiacono's models account for some of these considerations, to some degree, through inclusion of the school support ratings, but much of the variation in applicants' qualities cannot easily be boiled down to econometrically digestible variables." ADD70. There is no serious dispute that this is correct; there are countless ways that race could influence a student's high school achievements, and many of them cannot be expressed as quantifiable variables. The district court did not err when it (correctly) observed that undisputed point and further (correctly)

observed that Dr. Arcidiacono's analysis may not adequately account for those omitted variables.

C. Dr. Arcidiacono And Appellant's *Amici* Do Not Identify Compelling *A Priori* Reasons Or Evidence That Personal Ratings Are Determined By Race

Appellant's *amici* argue that other evidence proves that bias against Asian American applicants—not any omitted variable—is the only explanation for disparities in personal ratings, and thus that excluding the personal ratings would not have led to an overstatement of the effect of race on admissions as a result of omitted variable bias. These arguments are flawed.

Dr. Arcidiacono's own regression models for the "academic rating" and "extracurricular rating" reveal the effect of omitted variables. Those models indicate that, holding all other factors in the models equal, Asian American applicants receive higher academic and extracurricular ratings—in other words, that there is bias *in favor* of Asian American applicants. JA2970:22-25; 2981:5-18. Dr. Arcidiacono's findings are implausible, because they would indicate that Harvard discriminates against Asian American applicants on one subscore only to discriminate in favor on two others—a finding that he has acknowledged as implausible. *See* Reply Expert Report of Peter S. Arcidiacono, *Students for Fair Admissions, Inc. v. University of North Carolina*, No. 14-cv-954 (M.D.N.C. Jan. 18, 2019), ECF No. 160-3, at 27 ("We would not expect UNC to, for example,

penalize African-American applicants in one of the ratings and then give them a bonus later for admission."). The more plausible explanation for these findings is that Dr. Arcidiacono's regression models are simply not reliable enough to measure all the applicant qualities that determine Harvard's assignment of these ratings. *See* JA2979:4-2980:21, 2981:5-2984:2. For example, an applicant's essay and recommendation letters may indicate strengths that are captured in the academic and extracurricular scores, just as they may indicate weaknesses captured in other scores; in either case, any disparities cannot be attributed to bias because these strengths and weaknesses are not controlled for directly. Even Dr. Arcidiacono agrees that his findings of racial disparities in the academic and extracurricular ratings are attributable to missing, unobservable data, not racial bias. *See* JA2447:21-2448:8. Yet when it comes to explaining gaps in the personal ratings variable, Appellant's *amici* say just the opposite.

Appellant's *amici* instead lean on alumni ratings as evidence that differences in the personal ratings can only be attributed to race. They contend that "[t]he disparity between Harvard's personal-rating scores and alumni personal-rating scores further confirms that Harvard's personal rating is affected by race." Appellant's *Amici* at 12. While Appellant's *amici* concede—as they must—that alumni rate Asian American applicants lower than applicants of other races on personal ratings, they argue that the disparity is less than half that of the racial

disparities in the personal ratings. *Id.* Although potentially informative, appellant's *amici* misplace their reliance on alumni ratings, because alumni rely on a much narrower set of information compared to admissions officers. As Dr. Card explained, "[a]n alumni personal rating reflects only the alumni interviewer's brief interaction with the applicant, whereas the personal rating assigned by Harvard admissions officers considers not just the alumni interview . . . but also the candidate's essays, teacher recommendations, secondary school report, and so on." Card Report ¶ 156; *see also* ADD14 n.13. Appellant's *amici* brush this off as a "dubious[]" distinction but offer no substantive counterargument. Appellant's *Amici* Br. at 13. That is because they cannot: this difference provides a reasonable, *a priori* explanation to believe that relying on alumni ratings to the exclusion of the personal ratings will result in omitted variable bias.

Appellant's *amici* also contend that Dr. Arcidiacono's academic decile analysis is more evidence of Harvard's racial bias in the personal rating. *Id.* at 14, 28. But again, Dr. Card demonstrated that the distribution of Asian American applicants in non-academic measures is shifted lower compared to that of white applicants. Essentially, "Asian-American applicants are more likely . . . to have weaker non-academic qualifications" than white applicants. Card Report ¶ 76; *see also* JA2993:14-2994:16, 6083. This finding remains true even if personal ratings are excluded from the non-academic qualifications. *Id.*

In any event, neither of these contestable points undermine Dr. Card's models or the district court's consideration of them as a matter of reasonable empirical judgment. Appellant's *amici* contend that the only logical conclusion from the evidence at trial makes any consideration of Dr. Card's model with the personal ratings variable statistically invalid. But they point to no compelling *a priori* justifications or evidence that this is so. On the contrary, Dr. Card's decision to include the personal ratings variable is a reasonable and transparent modelling approach, because it is a variable Harvard is known to use in its actual admissions process and reduces the likelihood that the coefficient on race is overstated due to omitted variable bias. The district court's consideration of this model was statistically appropriate.

II. DR. CARD'S TREATMENT OF THE POPULATION WAS METHODOLOGICALLY SOUND; THE DISTRICT COURT APPROPRIATELY ACCEPTED IT

On appeal, Appellant and its *amici* focus on the district court's analysis concerning the personal ratings variable. But there are two significant additional modeling choices with respect to which the district court expressly credited Dr. Card's model—and rejected Dr. Arcidiacono's: (1) whether to exclude so-called "ALDC" applicants from the model and (2) whether to pool applicants across all class years. Despite previously contesting both issues and having acknowledged the former as one of the "central statistical issues" in the case, *see* Economists as

Amici Curiae In Supp. of Students for Fair Admissions Br. at 1, *Students for Fair Admissions, Inc. v. President & Fellows of Harvard Coll.*, No. 14-cv-14176 (D. Mass. July 30, 2018), ECF No. 450, Appellant's *amici* now make no argument that the district court erred in crediting Dr. Card's model. This concession is significant, because Dr. Arcidiacono's treatment of the population was a core piece of his conclusion that Harvard's admissions process exhibited racial disparities. It undercuts Dr. Arcidiacono's conclusions, regardless of how the personal rating is treated.

A. Dr. Card's Inclusion Of ALDC Applicants Has Strong Justification

The first of these two methodological disagreements was whether to include ALDC applicants in their models' populations. Dr. Arcidiacono excluded them; Dr. Card included them. Dr. Arcidiacono admitted that this was one of the "most important" differences between his and Dr. Card's models, JA2311:16-22, and that it was material to his conclusion that Harvard's admissions process exhibited racial disparities, *see* JA2399:11-2400:7, 2402:4-18. The district court found that excluding ALDC applicants "distorts the analysis," ADD77, and credited Dr. Card's model on that basis. "Overall, including ALDCs leads to a model that more accurately reflects how the admissions process works[.]" *Id*.

The district court's decision in this regard was correct as a matter of reasonable empirical analysis. At issue here is another principle we outlined

above: that the model's population of interest must be defined properly. The question the experts in this case sought to answer is: "Considering all applicants to Harvard and controlling for other factors we observe that are important for admissions decisions, are there significant differences in admissions rates between different demographic groups?" The population at issue here is all applicants to Harvard, not a gerrymandered subset that leaves out "30% of Harvard's admitted students."[12] ADD76-77. The district court adhered to this statistical modeling principle when it found Dr. Card's models that included ALDC applicants to be the most probative, and Appellant's *amici* offer no argument to the contrary.

B. Dr. Card Properly Examined Each Year of Applications Separately

Dr. Card and Dr. Arcidiacono also disagreed about whether to pool applicants across multiple years into a single population. Dr. Arcidiacono did, while Dr. Card analyzed each applicant year separately. Dr. Card's decision not to pool applicants was well justified. Harvard administers its admissions process on an annual cycle. This means there are various changes year-to-year: a new committee makes admission decisions, the standards for scores and ratings may

[12] Indeed, Dr. Arcidiacono has included special category applicants like legacies in at least one prior analysis of college admissions, and never explained his decision to depart from his prior methodology. *See* Peter Arcidiacono et al., *Representation Versus Assimilation: How Do Preferences in College Admissions Affect Social Interactions?*, 95 J. Pub. Econ. 1, 5 & n.19 (2011) (analyzing racial preferences in the undergraduate admissions process), https://bit.ly/36gNEvb.

shift, and the features of the applicant pool may change. *See* JA2918:21-2921:15, 6057. Essentially, admissions decisions in one year are independent of those in others—applicants from 2011 are not competing against applicants from 2014. Dr. Card's decision not to pool applicant data across years in the way that Dr. Arcidiacono did was scientifically sound and supported by strong *a priori* justifications.

For these reasons, the district court appropriately concluded that "Professor Card's year-by-year approach conforms to the reality that the effect of various characteristics in the admissions process may change slightly between years, as Harvard's institutional interests or admissions policies shift or when the composition of the applicant pool changes." ADD77. Again, Appellant's *amici* are silent this point, although Dr. Arcidiacono's treatment of population is another modeling choice that undermines Dr. Arcidiacono's conclusions.

CONCLUSION

For the foregoing reasons, *amici* believe that the criticisms advanced by Appellant's *amici* are unpersuasive. The district court's agreement with the bulk of Dr. Card's analysis is reasonable and reliable as a matter of statistics, and this Court should affirm.

Respectfully submitted,

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Dated: May 21, 2020

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I hereby certify that on May 21, 2020, I electronically filed the foregoing document with the United States Court of Appeals for the First Circuit by using the CM/ECF system. I certify that the following parties or their counsel of record are registered as ECF Filers and that they will be served by the CM/ECF system:

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Appendix A

AMICI CURIAE

George A. Akerlof is a University Professor at the McCourt School of Public Policy at Georgetown University and the Daniel E. Koshland, Sr. Distinguished Professor Emeritus of Economics at the University of California, Berkeley; he was honored with the Nobel Prize in Economic Sciences in 2001 for his theory of asymmetric information and its effect on economic behavior. Professor Akerlof was educated at Yale and the Massachusetts Institute of Technology, where he received his Ph.D. in 1966, the same year he became an assistant professor at Berkeley. He became a full professor in 1978. He is also the 2006 President of the American Economic Association. He served earlier as vice president and member of the executive committee. He also has been on the North American Council of the Econometric Association. Professor Akerlof's research interests include sociology and economics, theory of unemployment, asymmetric information, staggered contract theory, money demand, labor market flows, theory of business cycles, economics of social customs, measurement of unemployment, and economics of discrimination.

Sandy Baum is a nonresident senior fellow for the Center on Education Data and Policy at the Urban Institute and professor emerita of economics at Skidmore College. Dr. Baum earned her B.A. in sociology at Bryn Mawr College, where she is currently a member of the Board of Trustees, and her Ph.D. in economics at Columbia University. She has written and spoken extensively on issues relating to college access, college pricing, student aid policy, student debt, affordability, and other aspects of higher education finance. Dr. Baum has co-authored the College Board's annual publications *Trends in Student Aid* and *Trends in College Pricing* since 2002. Through the College Board and the Brookings Institution, she has chaired major study groups that released proposals for reforming federal and state student aid. She has published numerous articles on higher education finance in professional journals, books, and the trade press. Recent work includes studies of how behavioral economics can inform student aid policy, the NSF-funded *Educational Attainment: Understanding the Data*, and Urban Institute briefs on graduate student enrollments and financing. She is the lead researcher on the Urban Institute's college affordability website and is the author of *Student Debt: Rhetoric and Realities of Higher Education Financing* and co-author of *Making College Work: Pathways to Success for Disadvantaged Students*. She is a member of the Board of the National Student Clearinghouse.

Susan Dynarski is a professor of public policy, education, and economics at the University of Michigan, where she holds appointments at the Gerald R. Ford

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Harry Holzer is the John LaFarge, Jr. S.J. Chair and Professor at Georgetown University. He joined the McCourt School (then known as the Georgetown Public Policy Institute) as Professor of Public Policy in the Fall of 2000. He served as Associate Dean from 2004 through 2006 and was Acting Dean in the Fall of 2006. He is also currently an Institute Fellow at the American Institutes for Research, a Nonresident Senior Fellow at the Brookings Institution, a national affiliate of the Stanford Center on Poverty and Inequality, and a Research Affiliate of the Institute for Research on Poverty at the University of Wisconsin at Madison. He has also been a faculty director of the Georgetown Center on Poverty, Inequality and Public Policy. He received his BA (1978) and Ph.D. (1983) in Economics from Harvard University. Prior to coming to Georgetown, Professor Holzer served as Chief Economist for the U.S. Department of Labor and professor of economics at Michigan State University. He has also been a Visiting Scholar at the Russell Sage

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Hilary Hoynes is a Professor of Economics and Public Policy and holds the Haas Distinguished Chair in Economic Disparities at the University of California, Berkeley. From 2011 to 2016, she was the co-editor of the leading journal in economics, the American Economic Review. She specializes in the study of poverty, inequality, food and nutrition programs, and the impacts of government tax and transfer programs on low-income families. Current projects include evaluating the effects of the access to the social safety net in early life on later life health and human capital outcomes, examining the effects of the Great Recession on poverty and the role of the safety net in mitigating income losses, and estimating the impact of Head Start on cognitive and non-cognitive outcomes. Her work has been published in leading journals such as the American Economic Review, the Review of Economics and Statistics, the American Economic Journal: Economic Policy, and Econometrica. She received her PhD in Economics from Stanford in 1992 and her undergraduate degree in Economics and Mathematics from Colby College in 1983. Prior to joining the Goldman School, she was a Professor of Economics at the University of California, Davis. Professor Hoynes is a member of the American Academy of Arts and Sciences, the American Economic Association's Executive Committee, the National Academy of Sciences Committee on Building an Agenda to Reduce the Number of Children in Poverty by Half in 10 Years, and the California Task Force on Lifting Children and Families out of Poverty. Previously, she was a member of the Federal Commission on Evidence-Based Policy Making and the Advisory Committee for the National Science Foundation, Directorate for the Social, Behavioral, and Economic Sciences.

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David S. Lee is Chemical Bank Chairman's Professor of Economics and Public Affairs at Princeton University. He has research interests in labor economics and econometrics. He has worked on issues of inequality in the labor market, and has also worked on the analysis of elections, and how they can be used in quasi-experimental empirical analysis of the impacts of unions in the labor market, and policy convergence in Congress. Professor Lee is continuing his work on various labor market issues as well as on econometric methodologies appropriate for analyzing experiments and quasi-experiments. He received his Ph.D. from Princeton and has previously held appointments in economics departments at Harvard, Berkeley, and Columbia.

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Douglas Webber is an Associate Professor in the Economics Department at Temple University and a Research Fellow at the Institute for Labor Economics. He has published on a wide variety of topics in the fields of labor economics and the economics of higher education, including: earnings inequality, expenditures in higher education, the gender pay gap, the economic returns to college major, and student loan debt. His research has appeared in scholarly journals such as the Journal of Labor Economics, Labour Economics, the Journal of Policy Analysis and Management, and the Economics of Education Review, as well as popular press outlets such as the New York Times and the Chronicle of Higher Education. He currently serves as a co-editor at the Economics of Education Review and Contemporary Economic Policy. He has testified in front of both the U.S. Senate and U.S. House of Representatives on the topic of student loan policy and higher education finance. Dr. Webber holds Bachelor's Degrees in Economics and Mathematics from the University of Florida, as well as Master's and Ph.D. Degrees in Economics from Cornell University.

Janet L. Yellen is a Distinguished Fellow in Residence with the Economic Studies Program at the Brookings Institution and is the former Chair of the Board of Governors of the Federal Reserve System. Prior to her appointment as Chair, Dr. Yellen served as Vice Chair of the Board of Governors, taking office in October 2010. Dr. Yellen is Professor Emerita at the University of California, Berkeley, where she was the Eugene E. and Catherine M. Trefethen Professor of Business and Professor of Economics and has been a faculty member since 1980. She took leave from Berkeley for five years starting August 1994. She served as a member of the Board of Governors of the Federal Reserve System through February 1997, and then left the Federal Reserve to become chair of the Council of Economic Advisers through August 1999. She chaired the Economic Policy Committee of the Organization for Economic Cooperation and Development from 1997 to 1999. She served as President and Chief Executive Officer of the Federal Reserve Bank of San Francisco from 2004 to 2010. She is a member of both the Council on Foreign Relations and the American Academy of Arts and Sciences. She has served as President of the Western Economic Association, Vice President of the American Economic Association, and a Fellow of the Yale Corporation. She graduated *summa cum laude* from Brown University with a degree in economics in 1967 and received her Ph.D. in Economics from Yale University in 1971. She

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