

1 UNITED STATES DISTRICT COURT

2 DISTRICT OF MASSACHUSETTS

3
4 STUDENTS FOR FAIR ADMISSIONS, INC.,

5 Plaintiff,

Civil Action
No. 14-14176-ADB

6 v.

October 31, 2018

7 PRESIDENT AND FELLOWS OF HARVARD
8 COLLEGE, et al.,

Pages 1 to 206

9 Defendants.

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11 TRANSCRIPT OF BENCH TRIAL - DAY 13
12 BEFORE THE HONORABLE ALLISON D. BURROUGHS
13 UNITED STATES DISTRICT COURT
14 JOHN J. MOAKLEY U.S. COURTHOUSE
15 ONE COURTHOUSE WAY
16 BOSTON, MA 02210

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P R O C E E D I N G S

(The following proceedings were held in open court before the Honorable Allison D. Burroughs, United States District Judge, United States District Court, District of Massachusetts, at the John J. Moakley United States Courthouse, One Courthouse Way, Boston, Massachusetts, on October 31, 2018.)

THE COURT: Good morning, everyone. Happy Halloween. Give me two seconds.

MR. MORTARA: We have a very short issue Mr. Waxman and I would like to raise.

THE COURT: That is fine.

[Sidebar sealed and redacted.]

THE COURT: When you're ready, Mr. Waxman.

MR. WAXMAN: Thank you, Your Honor.

Just one housekeeping matter. I am not clear -- we had offered Defense Exhibit 685, which is at Tab 13, Volume 2. My records don't indicate whether the Court admitted it or not.

MR. MORTARA: Your Honor, to the extent there needs to be any record on this, no objection.

THE COURT: All right. My record shows it's been admitted. Karen's records.

MR. WAXMAN: Thank you.

EXAMINATION BY MR. WAXMAN: (Continued)

1 **Q.** Good morning, Professor Card.

2 **A.** Good morning.

3 **Q.** I believe that the last question I asked you was whether
4 or not you were concerned that your model was overfitted, and
5 that you said -- do you have any concern, and you said, I
6 don't, no. Which was then clarified as, I don't, period, no.

7 THE COURT: I like the whole Oxford comma debate.

8 MR. WAXMAN: Yes.

9 **Q.** Why do you have no concern that your model is overfitted?

10 MR. MORTARA: Your Honor, I object. We have to
11 return to the sidebar.

12 THE COURT: Okay.

13 [Sidebar sealed and redacted.]

14 BY MR. WAXMAN:

15 **Q.** Professor Card, do you recall my last question?

16 **A.** Yes, I do, I think.

17 **Q.** So why -- when you said you didn't have any concerns
18 about your model being overfitted, why do you have no
19 concerns?

20 **A.** Well, the primary interest in my analysis is on the
21 average marginal effect of Asian-American ethnicity. And
22 with regard to that marginal effect, I don't think that
23 there's any particular problem with, for example, including
24 many, many variables that represent academic strength, for
25 example, even though it might be hard to distinguish the

1 individual contributions of any one of them.

2 So you might say, for example, that if one was
3 focusing on the SAT, it might not be appropriate or might be
4 a concern to worry about them, that particular variable being
5 -- or that set of variables being potentially rather rich.

6 But for my purposes of estimating the effect on the
7 average marginal effect of Asian-Americans relative to
8 whites, which is the entire purpose of this exercise, I'm not
9 worried about that.

10 **Q.** Let's turn to parental occupation. And Mr. Lee, can you
11 take us to Demonstrative 10.47.

12 Can you walk us through this, please, Professor
13 Card?

14 **A.** Yes. So this is actually a summary of the four main
15 factors that are omitted from Professor Arcidiacono's model,
16 which, I believe, are, in fact, important variables in the
17 admissions process that help inform the way that admission
18 officers evaluate different candidates in terms of their
19 context and how they should be compared against other
20 students.

21 And in each case, the reason why the white sheet to
22 the left is shown, that's the summary sheet that goes along
23 with each application folder and shows kind of a summary of
24 some of the main information about the students, which my
25 understanding is that the admissions officers could easily

1 refer to quickly to find some of the most salient aspects of
2 a student.

3 And in each case, all four of these variables are,
4 in fact, included on this summary sheet. So parental
5 occupation. A student's intended career, whether or not they
6 had a staff interview, and, of course, the personal rating
7 are all included here.

8 So I'm trying to emphasize that not only are these
9 variables potentially salient for lots of different reasons,
10 but they're, in fact, directly on the summary sheet.

11 **Q.** So let's turn to the next demonstrative, 10.48, and talk
12 about parental occupation.

13 Is parental occupation considered in the admissions
14 process?

15 **A.** Yes. My understanding from, for example, some of the
16 training materials that are distributed to the interviewers
17 and the case studies mention specifically parental
18 occupation, I actually, in a conversation call with the Dean,
19 actually directly asked him about this because it seemed like
20 it was important, and he strongly confirmed that. And my
21 understanding is that it is, in fact, part of the process.

22 **Q.** And did you also hear testimony in this courtroom by
23 admissions officers to that effect?

24 **A.** Yes, I did. Mm-hmm.

25 **Q.** In the field of economics, is occupation considered a

1 useful variable to include in modeling?

2 **A.** Yes, in both economics and sociology, parental occupation
3 is one of the most important variables for understanding,
4 especially, intergenerational issues; issues of how a
5 family's background might translate to some outcome for
6 children of the next generation.

7 I guess it's no accident that many -- in many
8 cultures last names are based on occupations. My own last
9 name is actually an occupation.

10 And I think when an admissions officer -- so
11 there's a huge literature on that, in economics and
12 sociology. And when an officer was thinking about looking at
13 a student, it would be almost inconceivable that they
14 wouldn't think about that as one of the most important
15 variables in putting the students' achievement in context.

16 **Q.** In reviewing the data, did you determine that parental
17 occupation is one of the variables that varies by race?

18 **A.** Yes, I did.

19 **Q.** Please turn to Tab 11 in your binder, Volume 2, and tell
20 me when you've found Defense Exhibit 681.

21 **A.** Yes.

22 **Q.** What does this show?

23 **A.** So it's two slides showing -- or two exhibits showing
24 mother's occupation and father's occupation by
25 race/ethnicity.

1 MR. WAXMAN: Your Honor, we offer Defense Exhibit
2 681.

3 MR. MORTARA: No objection.

4 THE COURT: It's admitted.

5 (Defendant Exhibit 681 admitted into evidence.)

6 **Q.** Mr. Lee, let's turn to Demonstrative 10.49.

7 And Professor Card, let me ask you what this is
8 showing.

9 **A.** So this is an illustration -- this is a selected number
10 of mothers' occupations and fathers' occupations. The way
11 that I've classified them, there's over 20 of each of these,
12 so these are three for mothers and two for fathers that are
13 notably different for white students and Asian-American
14 students.

15 So one place where they differ is in terms of the
16 fraction of the mothers who are elementary and secondary
17 school teachers. So ten percent of all white applicants,
18 their mother is a -- is that kind of a teacher, or a
19 librarian, where, like, half as many Asian-Americans.

20 In terms of lawyers and judges, four percent of
21 white applicants are -- their mother is a lawyer or a judge
22 versus less than one percent of Asian-Americans.

23 Offsetting that you can see a stark difference in
24 terms of mothers who are in the computer and
25 mathematical-type occupations, which is much, much higher for

1 Asian-American kids.

2 On the father's side, business executive is much
3 more prominent among white applicants versus architecture and
4 engineering for fathers of Asian-Americans.

5 **Q.** And Professor Card, given that you found that parental
6 occupations varied by race, does that -- does omitting that
7 variable give rise to any concern about omitted variable
8 bias?

9 **A.** Yes, I think it would be a very important concern.

10 First, recall when we're talking about omitted
11 variable bias, there's really two things that are
12 particularly salient. One is, does the omitted variable
13 potentially differ by race groups, in this case whites and
14 Asian-Americans, and the answer clearly is yes.

15 And the second is, is that variable itself
16 important in the process. And the answer, again, is clearly
17 yes.

18 So this is exactly the situation where one would
19 be, I think, extremely concerned that excluding this variable
20 or the set of variables could give rise to omitted variable
21 bias, yeah.

22 **Q.** Did you hear Dr. Arcidiacono testify that he excluded
23 this variable because of what he says are year-to-year
24 fluctuations?

25 **A.** Yes.

1 **Q.** Let's turn to -- I guess it's Plaintiff's Demonstrative
2 38, slide 42.

3 Can you remind us -- this is one of Dr.
4 Arcidiacono's demonstratives. Can you remind us what this
5 shows?

6 **A.** So this is showing five occupational categories that
7 Professor Arcidiacono has noted vary somewhat in terms of the
8 fraction of applicants that are classified with their mother
9 or father and in that occupation group from year to year.

10 I would emphasize that most of the other groups are
11 much more stable than this, so these are the ones that he has
12 sort of highlighted as being the problematic ones.

13 **Q.** And are fluctuations like this common in economic data?

14 **A.** Yes. Actually, this kind of problem arises quite often,
15 and I've had to deal with it many times in my own research.

16 For instance, parental occupation is classified in
17 a different way in some of the older data sets that we use,
18 and then one has to try and make a concordance between the
19 way it's classified in one and in another. And oftentimes
20 that concordance is somewhat incomplete, and there's --
21 that's just an inevitable consequence of the fact that on the
22 one hand, this is a somewhat complicated variable and
23 classification systems change over time.

24 And that's exactly what's -- part of the reason why
25 results that we see here are arising.

1 **Q.** Let me ask you first. When you say fluctuations like
2 this in the data that you have to analyze over years in which
3 the system for coding or inputting occupations varies, does
4 this mean that including this data in your model is that the
5 data itself are unreliable?

6 **A.** No, not at all. Actually, the same thing happened with
7 the docket. So the docket changed, they introduced a new
8 docket in one year, and saw a bunch of states and parts of
9 states got moved, and so we have to deal with a change in the
10 classification system.

11 That's what -- you know, that's the kind of thing
12 that one has to do all the time in real research.

13 **Q.** Mr. Lee, can we have the next demonstrative.

14 And here I'm highlighting a couple of numbers from
15 2014 that Professor Arcidiacono focused on. Do you see those
16 changes in low-skilled and self-employed?

17 **A.** I do, yes.

18 **Q.** Do you know what explains the changes from the 2014 to
19 the 2015 cycle?

20 **A.** Yes. So occupations in the NEVO database are -- most of
21 them are coded in one of two types of systems. It's sort of
22 like the way students' standardized tests are reported in the
23 SAT or the ACT.

24 And so what happens is that in 2014 -- after 2014,
25 one of these systems is used more widely. And so the set of

1 parents who are coded in this one bucket of low skill goes
2 down.

3 Now, of course, that same kind of information is
4 actually being presented to the application officers or
5 admissions officers, so in some sense, they are dealing with
6 the same process when they're making their evaluation of each
7 student in context.

8 **Q.** So let me just make sure the record is clear about what
9 you're talking about when you're saying that the applicants
10 in 2014 had one system, which I gather you mean one form of
11 application in which they were given one series of choices to
12 report occupations, and then in 2015, there were two
13 different systems available that -- for applicants to use in
14 order to indicate their parents' occupation.

15 Is that correct?

16 **A.** There's a switch in the preponderance of the two systems,
17 yes.

18 **Q.** Okay. Let's turn to the next demonstrative. And here
19 I've highlighted a couple of numbers from the classes of 2018
20 and 2019 that SFFA focused on.

21 Do you know what explains the changes from the 2017
22 cycle to those cycles?

23 **A.** Yes, it's, again, a similar kind of problem.

24 So when one is asking someone their occupation,
25 sometimes the way that's done is one first asks if they have

1 a job; and if they do, they ask if you're unemployed --
2 excuse me, if you're unemployed, they don't ask any further
3 about your occupation, so the occupation then becomes
4 unemployed.

5 Another system that's actually used in most
6 government surveys is if one doesn't have a current job, one
7 is asked about the job they had most recently, and that's the
8 -- that's -- my understanding is that's exactly what's
9 happened here.

10 So, again, this is a kind of thing that would be
11 represented in the data that would be presented to the
12 admission officers themselves. So they -- I think they would
13 understand or would notice that there's no longer anybody
14 unemployed.

15 Now, of course that doesn't mean that they suddenly
16 got rid of unemployment in the economy for that class. What
17 it means is that those people -- the information that's being
18 captured in the system has changed a little bit.

19 Because I fit my model separately year by year,
20 this is of no particular consequence because the -- I'm
21 allowing presence of a student's mother or father to be in a
22 certain bucket to have a slightly different effect in
23 different years depending on what kind of classification,
24 who's moved around, exactly like I do with the docket.

25 So before the J docket was introduced, the other

dockets are kind of absorbing those students. Once the J docket is introduced, that set of students who are in that docket are treated separately. The fact we have different docket coefficients in different years, those variables are separate and it allows the model to capture that.

Q. And is the effect of fitting your model year to year, that the model is actually evaluating the parental occupation choices, indicators that the admissions office itself is looking at and considering?

A. Yeah, largely, yes.

Q. Did you do anything else to address the variation in occupation coding systems year by year?

A. Yes. So in response to concerns that Professor Arcidiacono raised, I did a very standard kind of check that one would do in this kind of analysis. So I took, first of all, the low-skilled type occupations, so some of the low-skilled occupations are amongst the ones that have a -- some fluctuations from year to year, and I made that into all one group, a larger bucket across all the years.

And then I took the occupations that would include unemployed, homemaker, other and put them in another bucket that's constant across all the years.

And I evaluated what would happen to my model if instead of using the slightly more granular information I was to use those two classifications one at a time or together,

1 and the results are extremely similar, virtually identical to
2 what I get with my main model.

3 **Q.** Well, let's look now, if you can, at Tab 12 of -- by the
4 way, I believe all of these are in Volume 2. So Tab 12 of
5 Volume 2.

6 And let me ask you this, when you've found Defense
7 Exhibit 683.

8 **A.** Yes.

9 **Q.** And is this showing the results of the sensitivity check
10 that you just described?

11 **A.** Yes, there's two sets of sensitivity checks in these two
12 sets of exhibits. Average marginal effect of Asian-American
13 ethnicity, after parental occupation variables are modified,
14 yes.

15 **MR. WAXMAN:** Your Honor, we offer Defense Exhibit
16 683 into evidence.

17 **MR. MORTARA:** No objection.

18 **THE COURT:** Admitted.

19 (Defendant Exhibit 683 admitted into evidence.)

20 **Q.** And so looking at Defense Exhibit 683, can you just show
21 what your conclusion was?

22 **A.** Right. So --

23 **Q.** Mr. Lee? Thank you.

24 **A.** So recall for -- in my main specification, the one that
25 we've been focusing on, the average marginal effect across

1 all the years was minus 0.05, not statistically significant,
2 and this is minus 0.07, which is essentially a trivial change
3 in the estimated marginal effect. And the same is true year
4 to year.

5 **Q.** Let me ask you to suppose that the occupation data were
6 as unreliable as Dr. Arcidiacono has opined. Would including
7 that data in the regression ruin the results?

8 **A.** Well, as I -- no. As I pointed out, I think when we were
9 talking about my hypothetical case of retirement, if you were
10 to include in our regression model some variable that's truly
11 garbage, it's truly, you know, so poorly measured that it
12 just doesn't represent anything useful, that doesn't hurt a
13 regression model. The regression model will just essentially
14 set that variable to have zero effects on everything and say,
15 well, you've given me garbage so I'm going to give you a zero
16 on that. And that then does not lead to any change in
17 anything else in the model. Especially with the kinds of
18 sample size I have here.

19 **Q.** So to be clear, Professor Card, you included parental
20 occupation in your model, correct?

21 **A.** I did, yes.

22 **Q.** Let's talk about intended career and look at
23 Demonstrative 10.53.

24 Is the applicant's intended career considered in
25 the admissions process?

1 **A.** Yes. Again, it's a variable that's included directly on
2 the summary sheet as shown in this slide. It's also a
3 variable that is -- comes up in discussions in the training
4 materials and case studies. It's also a variable that I
5 understand from depositions is important in evaluating and
6 comparing different candidates.

7 **Q.** And is intended career also a variable that varies by
8 race?

9 **A.** Yes.

10 **Q.** Would you please turn to Tab 7 in your binder.

11 Do you have it?

12 **A.** I do, yes.

13 **Q.** This is Defense Exhibit 677. And what is this document?

14 **A.** It's a summary of differences in intended career for
15 Asian-American and white applicants.

16 MR. WAXMAN: Your Honor, we offer Defense Exhibit
17 677.

18 MR. MORTARA: No objection, Your Honor.

19 THE COURT: It's admitted.

20 (Defendant Exhibit 677 admitted into evidence.)

21 **Q.** Turn, please, to Tab 8 in your binder, the next tab.

22 Do you find Defense Exhibit 678?

23 **A.** I do, yes.

24 **Q.** What is this?

25 **A.** It's a summary of intended concentration for

1 Asian-American and white applicants.

2 MR. WAXMAN: Your Honor, we offer Defense Exhibit
3 678 into evidence.

4 MR. MORTARA: No objection, Your Honor.

5 THE COURT: Admitted.

6 (Defendant Exhibit 678 admitted into evidence.)

7 **Q.** Please turn to Tab 10 in your binder.

8 **A.** Yes.

9 **Q.** What is this document -- well, this is on Defense Exhibit
10 680.

11 And what is it, please?

12 **A.** This is a summary of primary extracurricular activities
13 by race.

14 MR. WAXMAN: Your Honor, we offer Defense Exhibit
15 680 into evidence.

16 MR. MORTARA: No objection.

17 THE COURT: Admitted.

18 (Defendant Exhibit 680 admitted into evidence.)

19 **Q.** Mr. Lee, please project Demonstrative 10.54 on the
20 screen.

21 And let me ask you, Professor Card, what does this
22 show?

23 **A.** Well, this is showing in simple graphical form some of
24 the information contained in those documents that were just
25 admitted. So it's showing the share of applicants, white and

1 Asian-American, on the average across the six years in my
2 sample who state that their intended careers are medicine or
3 health, science, undecided, government or law, arts,
4 communications, design or social science. And this is a
5 selection of the possible careers they can list.

6 And you can see that there are some notable
7 differences. For example, white students are quite a bit
8 more likely to say that they intend to pursue a career in
9 government or law. They're also more likely to be undecided.
10 They're about equal in terms of their intention to pursue a
11 career in science.

12 And on the other hand, Asian-American students are
13 quite a bit more likely to say that they would intend to
14 pursue a career in medicine or health.

15 **Q.** So why are these differences on average between the two
16 groups important?

17 **A.** They're important because Harvard is thinking about
18 trying to get a set of students -- or my understanding, at
19 least, is Harvard is trying to get a set of students who will
20 have lots of diversity. And I think, for instance, having a
21 large fraction of students who all intend to pursue, for
22 example, a career in medicine would be -- would not
23 accomplish that goal. So, you know, they want to have
24 students who are, for instance, interested in pure science,
25 applied science, social science, humanities, political

1 science, government, things like that, and so having a too
2 unbalanced class would be a problem, I think.

3 **Q.** Mr. Lee, can you please project Plaintiff's Demonstrative
4 38, slide 34.

5 And Professor Card, I'm showing you this from one
6 of the demonstratives that Dr. Arcidiacono projected and
7 discussed.

8 Can you remind us what this shows?

9 **A.** Yes. So this is a selection of some of the intended
10 careers and the numbers of applicants classified as stating
11 that intended career from year to year from Professor
12 Arcidiacono's testimony.

13 **Q.** And Mr. Lee, can we have the next demonstrative.

14 I'm highlighting a couple of careers that I believe
15 Mr. Arcidiacono pointed out fluctuated significantly in one
16 or more years.

17 Do you see that?

18 **A.** Yes.

19 **Q.** And what does it show?

20 **A.** Well, it's showing -- this is a -- kind of an interesting
21 example of the kind of thing that happens in any kind of
22 coding system like this.

23 So it seems clear that in 2018, for some reason,
24 medicine was essentially not available. Now, I should remind
25 you that there are a very small number of students who are

1 filling in applications, pencil and paper and things like
2 that, so there's always, interestingly enough, a very small
3 number of students doing that even in this day. So you can
4 get rise of a very small number, not a complete zero.

5 But virtually everybody, it seems, that previously
6 would have said they're intending a career in medicine seems
7 to have moved to health. And you can see that in 2019 it
8 moves back.

9 Now, my understanding is that this is, in fact, the
10 kind of information that, again, the admissions officers
11 would themselves be seeing. So, and, of course, they know
12 that many, many students are intending a career in medicine
13 so they know that didn't suddenly disappear. So I think they
14 would fully understand the situation.

15 And so my understanding is that that's all that's
16 happened, is that one bucket has been relabeled. And, again,
17 because my model is fit year to year with separate variables
18 representing each of these intended careers, the variable
19 that represents health in 2018 is more or less taking the
20 place of the variable that represents medicine in all the
21 other years. So I think this is, again, not a concern. This
22 is, again, the kind of thing that arises in lots of other
23 situations, and economists and other social scientists have
24 to deal with and regularly deal with.

25 **Q.** So does this, the variation that we see here, give you

1 any greater degree of concern than the fluctuations we
2 discussed in parental occupation categories?

3 **A.** No, not at all.

4 **Q.** And to be clear, you included intended career in your
5 model, correct?

6 **A.** Yes, I did.

7 **Q.** Now let's talk, switch gears and talk about the staff
8 interview indicator. And may we have Demonstrative 57,
9 please.

10 What is the -- what is a staff interview again?

11 **A.** So students who are applying to Harvard can request, at
12 their kind of initiative, an interview with an admissions
13 staff member, an admissions officer. And my understanding is
14 historically that was done at the campus and nowadays more
15 and more of it is done by Skype interview, but it's entirely
16 a process that's initiated by the student.

17 So the student -- there's information on how you
18 can request such a thing and the student would do that.

19 **Q.** And why do you include this variable in your model?

20 **A.** Well, again, there's, first of all, the fact that the
21 staff interview is indicated on the admissions in the summary
22 sheet I think is important. If a student has had a staff
23 interview, it means that one of these admissions officers has
24 actually talked to that student in person.

25 And just like when Professor Arcidiacono was

1 mentioning how Duke had moved to a process of trying to
2 interview students for their graduate program, I think that
3 kind of personal information and insight by someone who is
4 going to be present at the subcommittee and committee can
5 really fill in some holes about that student and help explain
6 or understand some issues, and that person could well turn
7 out to be an advocate for that person or potentially the
8 opposite. And so I think that it makes a lot of sense that
9 this would be an important variable.

10 Moreover, you know, as an empirical matter, it is
11 an important variable in the admissions process.

12 **Q.** Did you hear Dr. Arcidiacono explain that he excluded the
13 staff interview because ALDC applicants are
14 disproportionately likely to receive them?

15 **A.** Yes.

16 **Q.** Is that a reason to exclude the variable?

17 **A.** No, not at all. I mean, first of all, lots of other
18 non-ALDC students are interviewed. There is something like
19 500 students a year are interviewed. So when you think about
20 the burden on the admissions staff, quite a large amount of
21 interviews, and the ALDCs are in no way a majority of those
22 interviews.

23 And just because one group has a higher
24 representation I don't think is any reason -- in my model of
25 admissions, I'm going to actually have, of course, controls

1 for whether you're an A or an L or a D or a C. So that's
2 going to be itself represented by those variables, and then
3 any importance of the staff variable is going to be a
4 separate variable in the regression model.

5 And so both for ALDCs and for non-ALDCs, I'm going
6 to be identifying any additional impact of having had the
7 staff interview on the admissions rate. So it's a separate
8 variable in my model.

9 **Q.** Let me ask you to turn to Tab 30 in your binder and tell
10 me when you've found Defense Exhibit 708.

11 **A.** Yes.

12 **Q.** What is this?

13 **A.** This is a share of applicants who received staff
14 interviews who are ALDC categories.

15 MR. WAXMAN: Your Honor, we offer Defense Exhibit
16 708.

17 MR. MORTARA: No objection.

18 THE COURT: Admitted.

19 (Defendant Exhibit 708 admitted into evidence.)

20 **Q.** Did you hear Dr. Arcidiacono explain that Asian-American
21 applicants received staff interviews at a rate lower than
22 white applicants?

23 **A.** Yes.

24 **Q.** Is that a reason to include or exclude the variable?

25 **A.** No, not at all. First --

1 **Q.** Not at all as to include or exclude or neither?

2 **A.** My apologies. It's not --

3 **Q.** I just want to make sure I understand the answer.

4 **A.** Not at all a reason to exclude it.

5 First of all, about 16 percent of Asian-Americans
6 receive a staff interview. So it's not a trivial fraction --
7 excuse me, 16 percent of all people who get an interview are
8 Asians. Excuse me. So it's not completely out of line with
9 their share in the overall admission pool, which is in the
10 20s.

11 And lots of other variables differ substantially
12 between Asian-Americans and whites. For example, the share
13 in California, a lot of these parental occupation variables
14 we noted are different. The fraction of female applicants
15 amongst Asians, nearly half of the applicants are female, and
16 amongst whites it's only 45 percent. So there's a fairly
17 large gap even in that variable.

18 So there's lots of gaps between the Asian and white
19 applicants and so I don't think that's at all a reason to
20 exclude it. In fact, if we're concerned about omitted
21 variable bias, which I am, it's an important reason to
22 include it because it is a variable that differs, it is
23 important in the process, and so excluding it necessarily
24 leads to, in my view necessarily leads to omitted variable
25 bias.

1 **Q.** Did you hear Dr. Arcidiacono explain also that applicants
2 who receive staff interviews are disproportionately likely to
3 be admitted?

4 **A.** Yes.

5 **Q.** More likely to be admitted than applicants who do not
6 request and receive a staff interview?

7 **A.** Yes.

8 **Q.** Is that a reason to exclude the variable?

9 **A.** No, not at all. I mean, we don't exclude somebody who
10 has an academic rating of 1, which have very high admission
11 rates. So just because that's true is no basis for excluding
12 it. It makes no sense to me.

13 It's going to be included in the regression model
14 along with other variables, a lot of these other positive
15 tips, for example, or benefits or preferences or factors that
16 help influence admission officers' decisions, so I think it's
17 important to include it.

18 **Q.** Did you look at what would happen if you did exclude the
19 staff interview rating variable from your model?

20 **A.** I did, yes.

21 **Q.** Please turn to Tab 22 in your binder and tell me when
22 you've found Defense Exhibit 698.

23 **A.** Yes.

24 **Q.** What is it?

25 **A.** It's an exhibit from one of my reports showing the

1 average marginal effect of Asian-American ethnicity when they
2 exclude the staff interview.

3 **Q.** So is this the analysis that you just described? This
4 represents the results of the analysis you just described?

5 **A.** Yes.

6 MR. WAXMAN: Your Honor, we offer Defense Exhibit
7 698 into evidence.

8 MR. MORTARA: No objection.

9 THE COURT: It's admitted.

10 (Defendant Exhibit 698 admitted into evidence.)

11 **Q.** And what is the result?

12 **A.** Well, as you would expect, I think, the effect of
13 Asian-American ethnicity becomes slightly more negative, but
14 year to year and, again, overall, it's not statistically
15 significant.

16 So if one, for some reason, really wanted to
17 exclude it or felt that it was useful to find out what would
18 happen if one excluded it, it does not make any of the
19 estimated marginal effects statistically significant, and the
20 overall effect remains relatively small and negative, but --

21 **Q.** And to be clear, you did include the staff interview
22 rating in your model, correct?

23 **A.** I did, yes.

24 **Q.** Let's turn to --

25 MR. MORTARA: Can I object just a little bit? I

1 think you meant to say staff interview rating indicator, not
2 rating.

3 MR. WAXMAN: Thank you, Counsel.

4 **Q.** You included this variable in your model?

5 **A.** Yes. In fact, precisely as Mr. Mortara has said. This
6 is an indicator for whether a student got a staff interview.

7 **Q.** Let's turn now to the personal rating. And may we see
8 the next demonstrative, which is 10.58.

9 Why did you include the personal rating in your
10 model?

11 **A.** Well, the personal rating is one of the four ratings that
12 are conducted or made by admissions officers. My
13 understanding is that it's one of the important variables
14 that are evaluated and considered in the admissions process.
15 Every student who is admitted -- or every student who is
16 evaluated, excuse me, every student who has got an
17 application, they're given a personal rating, and my
18 understanding is that it's an extremely important part of the
19 overall process.

20 **Q.** What does the personal rating capture?

21 **A.** Well, my understanding is the personal rating is meant to
22 capture a wide variety of factors that the admissions
23 officers characterize as personal qualities. So they're
24 looking for evidence, I think, of issues like personal
25 integrity. I think Harvard is very concerned about admitting

1 students who have a high level of personal integrity.
2 They're looking for evidence of leadership skills. They're
3 extremely interested in leadership skills and trying to
4 educate leaders of the future. They're looking for
5 evidence -- one of the personal qualities that I think I've
6 is definitely mentioned in the training materials, and the
7 testimony has emphasized, they're looking for evidence that
8 an individual is someone who can interact with a group and
9 try and create groups and create cohesion among students.
10 And with their emphasis on that in all of their applications,
11 I think that's an example of an important variable for them.

12 **Q.** Does the personal rating reflect a range of information
13 in the application file and available to and considered by
14 the admissions officers that otherwise isn't quantified in
15 the -- in your model or Professor Arcidiacono's model?

16 **A.** Yes, clearly. Actually, I think all of the ratings
17 include information like that.

18 So, in fact, even the academic rating, which
19 there's a lot of quantified information, I've emphasized
20 before, I think yesterday, that even the academic rating has
21 a large component that isn't quantified. And the same is
22 true with the other ratings, but particularly for the
23 personal rating, my understanding is a lot of that
24 information about the presence of personal qualities is
25 coming from the teacher letters and narratives of the -- what

1 the teacher says about a student, what the guidance counselor
2 says, coming from the letter that an alumni interviewer is
3 providing, coming in many cases from additional kinds of
4 letters of support from community leaders and religious
5 leaders and things like that.

6 So that's going to be not quantified directly in my
7 dataset.

8 **Q.** And would the dataset otherwise quantify what the
9 admissions officer considers or gleans about the applicant
10 from the applicant's essays or personal statement?

11 **A.** It does include some quantification of that, and we're
12 going to talk about that in a moment.

13 **Q.** Okay. In your opinion, can a model that excludes the
14 personal rating accurately model Harvard's admissions process
15 and decisions?

16 **A.** No. My opinion is that if one looks at, for example,
17 analysis of the probabilities of admission, one can see very
18 clearly that having like a 2 or better on a personal rating
19 is extremely important. It's one of those four strengths I
20 was talking about when I talked about having one strength
21 versus two strengths versus three versus four. And very,
22 very clearly, someone who is rated with a personal rating of
23 2 versus someone who is rated with a personal rating of 3 is
24 assessed differently by the committee. And that's just a
25 very important feature that is helping them to distinguish

1 candidates.

2 **Q.** In addition to Dr. Arcidiacono's main model, do you
3 understand that he also constructed regression models of the
4 academic, extracurricular and personal ratings?

5 **A.** Yes.

6 **Q.** Let's talk first about his model for the personal rating.
7 Does it support a conclusion that the personal rating is
8 affected by race?

9 **A.** No, not in my opinion at all.

10 **Q.** Let's turn, Mr. Lee, please, to the next demonstrative
11 and ask you, please, to walk through this demonstrative for
12 us.

13 **A.** Well, this is a summary of four things that I'd like to
14 try and raise about Dr. Arcidiacono's personal rating
15 conclusions and my personal rating conclusions.

16 **Q.** Excuse me, we'll go through these separately, but at the
17 outset, could you just explain at a high level the four
18 reasons -- your four conclusions?

19 **A.** Yes. So as I'm going to show next, Dr. Arcidiacono's
20 model explains very little of the variation in the personal
21 rating.

22 Secondly, I'm going to point out that Dr.
23 Arcidiacono's academic and extracurricular models, the models
24 he's developed for those ratings, actually show statistically
25 significant positive effects of Asian-American ethnicity.

1 I'm going to show -- third, I'm going to show that
2 Asian-American applicants are less strong on average than
3 white applicants on non-academic factors in the data.

4 And finally, I'm going to show, as a kind of
5 analysis, if one was concerned about bias in the ratings as a
6 whole, taking account of the fact that there's a positive and
7 statistically significant Asian-American gap in two of the
8 ratings and a negative gap in one of the ratings, if one was
9 concerned about bias as a whole, rather than throw out the
10 ratings, what one could do is adjust each of the ratings for
11 that racial component and then use the racially adjusted
12 ratings in the model.

13 And I'll show that when I do that, again, one gets
14 essentially the same results as I got in my main model.

15 **Q.** All right. Well, let's start with number one.

16 And let me ask you, what type of information cannot
17 be captured in Dr. Arcidiacono's personal rating model?

18 You mentioned a couple of things like the teacher
19 evaluations. But can you speak more generally about the
20 kinds of information that is in the file and considered by
21 the admissions committee that is not captured in his personal
22 rating model?

23 **A.** Yes. So one -- obviously one set of variables is a close
24 reading of the teacher letters and the guidance counselor
25 letters, as I mentioned before.

1 A second very important component emphasized in the
2 admissions materials and in the testimony is the individual's
3 personal essay and personal statement. And so a lot of
4 students spend a lot of time writing these personal essays
5 and trying to particularly emphasize things like obstacles
6 that they have overcome or special accomplishments that they
7 have made, and these -- my understanding is that those kind
8 of -- that kind of information would be very important in
9 evaluating some of these personal qualities.

10 **Q.** So let me just ask you a question about the teacher
11 evaluations and the guidance counselor evaluations. Each one
12 of these evaluations independently gets a rating by the first
13 reader, correct?

14 **A.** Yes, and potentially by second readers. It would be
15 updated if a second reader felt it should be updated.

16 **Q.** And why doesn't that fully capture whatever is in those
17 recommendations about the personal qualities of the
18 applicant?

19 **A.** So that's an extremely important question.

20 The rating is assigned to the teacher letter as a
21 whole. The teacher letter, of course, is trying to get
22 across these multiple dimensions of the student. So the
23 teacher is writing probably about the academic
24 accomplishments of the students. That would be the natural
25 thing they would probably write in many cases first just to

1 reassure Harvard that this is a very strong academic
2 candidate because that's, of course, primary, first order
3 concern for Harvard.

4 Then they would be talking about potentially their
5 extracurricular or athletic accomplishments.

6 And then they would be talking about -- not
7 necessarily in this order, of course, but then they would be
8 talking about their personal qualities, things like, are they
9 a leader, have they had a leadership role in some kind of
10 activity on campus or even off campus in some personal
11 community.

12 And so the letter has -- the rating for the teacher
13 letter, for example, teacher letter -- teacher 1, has to kind
14 of summarize all four of those dimensions. So just looking
15 at it by itself, it's got a combination of those four
16 features.

17 **Q.** Now let's talk for a minute about the academic and
18 extracurricular ratings which Dr. Arcidiacono also modeled.

19 Do those two ratings, academic and extracurricular,
20 also reflect factors that are outside the data?

21 **A.** Yes, very much so. As I mentioned with reference to
22 academic, for instance, the kind of information that's used
23 to distinguish particularly an academic 1 or 2 would include
24 much more than just test scores and GPA because, of course,
25 there's many, many students, many more students applying to

1 Harvard that have virtually perfect, only one or two
2 questions wrong on the SAT or ACT, virtually perfect GPA than
3 there is gets an academic 1 or 2.

4 And that difference is driven by things like some
5 information about the student's context and information about
6 the high school that they're in, which the admissions
7 officers are normally -- especially for any high school that
8 has a significant number of students going to Harvard or
9 applying to Harvard over -- in the past, the admissions
10 officers normally specialize in individual schools and know a
11 lot about that context. And they would be able to know if
12 this student has these kind of accomplishments from that
13 school is that, like, really an outstanding accomplishment.
14 If the student came from a disadvantaged high school and has
15 very good test scores, very good standardized test scores,
16 that's a really important accomplishment; whereas if they
17 came from an upper middle class high school in a place where
18 lots and lots of students have very high test scores, that's
19 a much different kind of accomplishment.

20 So that kind of understanding of the credentials --
21 the quantified credentials, I think, is just crucial in
22 translating quantified credentials into a rating. And the
23 same thing, of course, is true with extracurricular.

24 **Q.** Before we turn to extracurricular, let me just ask you,
25 did you hear testimony in this case, or did you see from your

1 review of the application files, indications in files that an
2 applicant had, you know, won the national math contest or had
3 written a publishable paper or had had her work evaluated by
4 a faculty member?

5 **A.** Yes.

6 **Q.** And would any of that information be part of the
7 quantifiable data that is captured in the -- in Professor
8 Arcidiacono's model of the academic rating?

9 **A.** No.

10 **Q.** Okay. I interrupted you before you got to the
11 extracurricular rating.

12 Why is there information about the extracurricular
13 rating that's not captured in the data?

14 **A.** Well, my understanding is that, again, it would be things
15 like, not just are you a participant in junior varsity sports
16 or something like that, but what level of accomplishment you
17 had, what role you played in a team, things like that. And
18 that would be pretty important in assessing extracurricular
19 strengths.

20 **Q.** Would you please turn to Tab 15 of your binder, and tell
21 me when you've found Defense Exhibit 688.

22 **A.** I've got it, yeah.

23 **Q.** What is this?

24 **A.** This is a series of exhibits, average marginal effect of
25 Asian-American ethnicity on profile ratings, pseudo R-squared

1 for the profile ratings models, average marginal effect in
2 Professor Arcidiacono's regression models, and average
3 marginal effect on receiving a personal rating of 2 or
4 higher, modifying Professor Arcidiacono's model.

5 **Q.** And are these all exhibits that you've prepared based on
6 data obtained and from evaluating Professor Arcidiacono's
7 models?

8 **A.** Yes.

9 MR. WAXMAN: Your Honor, we offer Defense Exhibit
10 687.

11 MR. MORTARA: No objection.

12 THE COURT: It's admitted.

13 (Defendant Exhibit 687 admitted into evidence.)

14 **Q.** Mr. Lee, can we have, please, Demonstrative 61.

15 And we may have to take a little bit of a deep
16 breath here because I'm noticing a concept that I may have
17 forgotten to ask you about in the retirement hypothetical.

18 But let me just ask you at a general level, what is
19 this showing?

20 **A.** Yes. So this is showing the concept of each of these
21 different models that's somewhat important in understanding
22 the model. And that is on the vertical axis, there's a scale
23 between zero and 100 percent, and the -- that representation
24 of what's called -- and I apologize for the jargon, it's
25 called an R-squared or even a pseudo R-squared. And it's a

1 summary representation between zero and 100 percent of the
2 fraction of the variation from student to student in the
3 particular thing we're looking at.

4 So, for example, in the first column we're looking
5 at the academic rating. And so this is a summary of the
6 variation from student to student and whether they're
7 assigned a 1, or a 2, or a 3, or a 4 academically that can be
8 explained by the factors included in Professor Arcidiacono's
9 model. So that would be the yellow components. So in the
10 case of academic rating it's 57 percent.

11 And then, of course, the other balance of the 100
12 percent, or 43 percent in this case, is attributed to factors
13 outside the model. So that would be the components like
14 national competitions, like the evaluation in context, like
15 variables that Professor Arcidiacono has not included in his
16 models, parental occupation or something like, that that
17 could potentially be informing the determination of the
18 rating but are not in the data as he used it.

19 THE COURT: This is just the qualitative versus the
20 quantitative?

21 THE WITNESS: Yes, that's one way to think about
22 it. It's the part of the qualitative that's not quantifiable
23 in the data, yes.

24 THE COURT: And how do you come up with that
25 percentage?

1 THE WITNESS: So the result of the estimation, it's
2 one of the things that comes out when you run -- estimate one
3 of these models. It actually tells you this number. Or it's
4 possible to calculate it very straightforwardly.

5 So loosely speaking, it's taking the predictions
6 from the model and comparing them to who actually got what
7 actual score, actual rating, trying to make an assessment of
8 how often it got -- how closely it was able to reproduce the
9 right answer.

10 **Q.** Let me ask a question just to make sure I'm fully
11 understanding this.

12 So with respect to the academic rating regression,
13 is this R-squared statistic, tell me if I'm wrong, the
14 R-squared statistic shows that of the data that is captured
15 in Dr. Arcidiacono's model, it will explain 57 percent of the
16 actual rating that an applicant receives by the reader?

17 **A.** I would state it slightly differently. I think it would
18 be helpful to get this straight.

19 **Q.** Fine.

20 **A.** So think of -- there's lots of different students.
21 There's 150,000 students here in this -- he's pooling the six
22 years. And so there's an enormous range of variation as we
23 emphasized in the individual variation in the ratings. And
24 this is saying, okay, think of a way to summarize -- think of
25 a quantitative summary statistic that you could develop of

1 how much variation there is from student to student on this 1
2 to 4 scale. And now what fraction of that student-to-student
3 variation is explainable by the factors in the model.

4 **Q.** And what do we see with respect to the personal rating
5 regression and the extracurricular rating regression?

6 **A.** Well, one can see a very important difference.

7 The quantifiable factors in the model are strongest
8 or most richest with respect to academic variables. When we
9 get to the personal rating regression, the factors in
10 Professor Arcidiacono's model can only explain about 29
11 percent of the overall student-to-student variation. And
12 when we get to the extracurricular, it only explains 13
13 percent.

14 So there's a much wider range of these unobserved
15 factors -- unquantifiable qualitative factors that Your Honor
16 was talking about. And so that's 71 percent of the personal
17 rating and 87 percent of the extracurricular rating.

18 **Q.** Would it be fair to say, maybe not, that what the
19 R-squared calculation is -- is measuring is the explanatory
20 power of the model, how much of the observed outcome the
21 model can explain?

22 **A.** That would be absolutely, precisely correct. And
23 oftentimes when someone says, you know -- an economist says
24 to another economist, what's the explanatory power of your
25 model, I would respond what the R-squared was.

1 **Q.** Why is it important to think about the magnitude of the
2 unexplained variance?

3 **A.** Yes. So this is getting back to a question that Your
4 Honor asked yesterday.

5 When the unexplained component is larger, it means
6 that more of the variation from student to student is being
7 determined by unobserved factors, as far as my model is
8 concerned. It doesn't mean that the application officers --
9 admissions officers don't see them. They see this amazing
10 range of material that I don't see.

11 So it means that more and more the variation is
12 being determined by factors outside of my particular data, or
13 our particular data. Professor Arcidiacono and I have access
14 to the same data. But, and that opens up more and more of a
15 possibility that those unobserved factors are leading to
16 inadvertent omitted variable biases in the model. Because
17 now with 71 percent of the variation unexplained, there's
18 just a lot more possibilities for things that we're not
19 measuring driving any difference that we're seeing attributed
20 to variables inside the model; for example, the difference
21 between Asian-American and white students.

22 **Q.** Mr. Lee, can we have Demonstrative 62, please.

23 Let's now focus, Professor Card, on the second of
24 four reasons that you mentioned. Did Dr. Arcidiacono
25 conclude that there is an effect of Asian-American ethnicity

1 for the other ratings he modeled?

2 **A.** Yes, his models show statistically significant effects of
3 Asian-American ethnicity on all three ratings. Positive
4 effects for academic and extracurricular ratings.

5 **Q.** Can we have Demonstrative 63, please.

6 Can you explain using this demonstrative what he
7 found?

8 **A.** Yes. So in the upper right panel, I'm showing a kind of
9 illustration of the -- of the Asian-American average marginal
10 effect in academic rating, the extracurricular rating, and
11 the personal rating.

12 So the average marginal effect, or the magnitude of
13 the effect associated with being Asian-American relative to
14 white in the academic rating, all three of these are
15 statistically significant, is positive. The magnitude for
16 the extracurricular rating is also positive but bigger, quite
17 a bit bigger. And the personal rating is comparable to the
18 extracurricular rating but negative.

19 And what I'm showing down below there is the
20 ratings themselves. And the way that I think about this is
21 the following: What's going on is an admissions officer is
22 looking at a file, and they've got the quantitative
23 information that I have and they've got the qualitative
24 information that they in addition see. And when it comes to
25 on average, again, on average, comparing Asian-American

1 students and white students, they're able to see and they
2 successfully report that qualitative information, which is on
3 average leading them to give a higher score to -- higher
4 rating to Asians than whites on the academic dimension.

5 So they're digging into the file and finding
6 information that is assuring that -- or giving them the
7 impression, leading them to conclude that this student is
8 better than the quantitative information indicates.

9 And on average that's what they're finding for
10 Asian-Americans, they're finding that they're better than the
11 quantitative information than whites.

12 And when we come to the extracurricular, they're
13 doing the same thing. So they're looking through the file
14 material. They're seeing information on the qualitative
15 side, which is giving them information so that they reach a
16 conclusion that the Asian-American students are better than
17 the white students conditional on the quantitate information
18 that I have.

19 And then what will Professor -- and Professor
20 Arcidiacono is arguing, and I agree with that, that that's
21 the right interpretation of those two variables.

22 **Q.** Which is what interpretation?

23 **A.** The interpretation that there's unobserved factors that
24 they're seeing in the qualitative information.

25 But then when it comes to the personal rating, what

1 he's asserting is that the same officers are digging into the
2 file, they've previously found positive information on the
3 academic dimension, positive information on the
4 extracurricular dimension relative to the quantitative
5 information, but then they're, in some sense, suppressing or
6 even putting a negative spin on things so that they --
7 they're actually exerting a bias against Asian-American
8 students in assigning the personal rating.

9 So that's how he is interpreting this exercise,
10 which I find very, very hard to understand or believe.

11 **Q.** Okay. Can you explain why?

12 **A.** Well, for the reasons I've just said. I don't think --
13 it just doesn't seem plausible to me that an officer who is
14 going through the file and looking at the individual by
15 individual, looking at students and on the average finding
16 very positive unobserved features about extracurricular
17 dimensions and academic dimensions and reporting that so that
18 on average the Asian students appear to be, or are coded as
19 more strong than can be justified on the basis of the
20 quantitative information.

21 And yet, that same officer is going and somehow
22 exerting bias against Asian-Americans when it comes to
23 assigning the personal rating. So it's like there's some
24 kind of schizophrenia going on. They're somehow on the one
25 hand positively giving boosts to Asian-Americans, but then on

1 the other hand giving them this negative animus, basically,
2 in assigning the personal rating.

3 And I just don't find -- I just do not find that
4 understandable or consistent.

5 **Q.** Did you hear Dr. Arcidiacono testify that he reached the
6 conclusion that because Asian-Americans are stronger on
7 factors that are captured in the data that affect the -- I'm
8 sorry. Withdraw the question.

9 Did you hear Dr. Arcidiacono testify that he
10 reached the conclusion that because Asian-Americans are
11 stronger on factors captured in the data that affect the
12 personal rating?

13 Did you hear that conclusion? That his conclusion
14 that the personal rating average marginal effect at -- one
15 reason why he reached the conclusion that the average
16 marginal effect for the personal rating was lower is that he
17 found that Asian-Americans are stronger on factors, those
18 factors that are quantifiable that affect the personal
19 rating?

20 **A.** Yes. He asserts that they are stronger on those.

21 **Q.** Do you agree with that?

22 **A.** No.

23 **Q.** Why not?

24 **A.** Well, I'm going to look, in the next series of slides,
25 I'm going to look carefully at the kinds of information, this

1 qualitative information and information that's summarized in
2 the teacher evaluations and the alumni interviewer
3 evaluations, and I'm going to show that that's not correct.

4 **Q.** Did you see Dr. Arcidiacono present various statistics
5 showing personal ratings of applicants of different races
6 within academic index deciles?

7 **A.** Yes.

8 **Q.** Are those analysis illuminating?

9 **A.** Not in my opinion, no. And the reason why is that it's
10 true that those academic index variables, which is GPA and
11 SAT, inform, you know, and are very highly related to
12 academic index, but when it comes to the personal -- academic
13 rating. When it comes to the personal rating, those
14 variables are almost uninformative. And so making that
15 comparison is not very informative at all.

16 **Q.** Mr. Lee, can we please show Plaintiff's Demonstrative
17 38.11 and 38.117 next to each other.

18 I'm showing you two of Dr. Arcidiacono's
19 demonstratives.

20 What does this show?

21 **A.** Well, the left panel shows the percentage of applicants
22 receiving a 1 or a 2 by academic decile, on the academic
23 rating, and if you focus on the top six deciles, which are
24 the top half of the class, and, of course, there's such a
25 large group of students applying to Harvard that that's kind

1 of the relevant group, you can see that when you go from --
2 Mr. Lee -- yeah, there.

3 When you go from the sixth to the tenth decile, in
4 fact, the fraction of students who are classified as having
5 an academic 1 or 2 virtually doubles. So there's a very
6 strong relationship between the academic index and the
7 academic rating. Not perfect, but it's correlated.

8 **Q.** And what about the next demonstrative of Professor
9 Arcidiacono?

10 **A.** So this demonstrative -- let me point out one important
11 thing about this demonstrative. The scale of this
12 demonstrative is no longer zero to 100 percent. The scale of
13 this demonstrative is only zero to 30 percent. So it's, in
14 my view, a slightly -- one has to interpret this extremely
15 carefully.

16 **Q.** Can we see the two side by side again?

17 **A.** So if you look at the one on the left, it's zero to 100.
18 You look at the one on the right, it's zero to 30.

19 **Q.** Okay.

20 **A.** So then focusing on the one on the right with the
21 personal rating, again, focusing on the top six deciles of
22 the academic index, you notice that when you go from the
23 sixth decile to the tenth decile, where the fraction of
24 students who get classified as a 1 or 2 academically has gone
25 up substantially. The fraction of students who get

1 classified with a higher personal rating has only gone up by
2 a very small amount.

3 So illustrating this very extremely important point
4 that that academic decile or academic variables alone are not
5 particularly informative about the personal rating. It's a
6 different dimension of students. And I think it's not very
7 helpful to focus on the relationship between the academic
8 decile and the personal rating because they're different
9 things.

10 **Q.** Mr. Lee, can we have Demonstrative 65, please.

11 What is this showing?

12 **A.** So this is putting them now on the same scale. So this
13 is showing the academic deciles from 6 to 10, now in the 100
14 percent scale, and it's comparing what happens to the
15 fraction of students within academic rating of 1 or 2, which
16 is rising as we've just shown, from around 50 percent to 98
17 percent. Whereas the personal rating, the fraction of
18 students with the personal rating of 1 or 2, has gone from 22
19 to 25 percent.

20 So there's very, very different content from
21 academic variables like SAT and GPA in the academic dimension
22 represented by the academic rating versus the personal
23 dimension represented by the personal rating.

24 THE COURT: Wait, sorry. You just lost me.

25 So you're saying that the personal ratings --

1 you're basically just saying they're pretty flat across the
2 academic rating so there's no correlation between the two.

3 Is that what you said?

4 THE WITNESS: Yes, Your Honor. Thank you.

5 They're not -- there's a slight correlation.
6 You've gone from 22 to 25.5, but it's not anything like the
7 correlation with academic. And this difference is pretty
8 small, the 21.7 to 25.5. So there's a small component, but
9 it's just not the first order of things that's going on.

10 **Q.** Let's turn, please, to the next demonstrative, 66. And
11 we're going to focus on the third conclusion that you drew
12 with respect to Professor Arcidiacono's model.

13 Professor Arcidiacono, I think you said you heard
14 him testify that he had some confidence in his bias
15 conclusion that when you look at Asian-Americans, generally,
16 they are stronger than whites on those non-academic factors
17 that are in the data.

18 And I want to ask you again whether you agree or
19 disagree with that conclusion.

20 **A.** I disagree with that.

21 **Q.** And why is this important?

22 **A.** Well, it's important because my understanding is it's the
23 basis of Professor Arcidiacono's conclusion that there's
24 animus against Asians in assigning the personal rating, and
25 so this is really a fundamental fact in his conclusion.

Q. Can we -- can you please turn to Tab 16 in your binder.

Do you see Defense Exhibit 692?

A. I do, yes.

Q. What is that document?

A. It's a series of exhibits showing share of applicants in top decile of non-academic admissions indexes by race; percentage of Asian-American and white applicants with profile ratings of 1 or 2; percentage of Asian-American and white applicants with school support and alumni rating of 2 or better by academic rating; share of applicants who collectively receive strong school support, alumni interview, and non-academic profile ratings; share of Asian-American and white applicants with strong non-academic ratings; distribution of some with school support scores; distribution of some with school support and alumni interview scores.

Q. Are these all exhibits that you prepared in order to evaluate Dr. Arcidiacono's claim that the non-academic factor that Asian-American applicants are stronger than white applicants on the observed non-academic factors in the model?

A. Yes.

Q. And so does this summary fairly reflect the strength of Asian-American applicants across the various non-academic factors?

A. Across the observable components, yes.

MR. WAXMAN: Your Honor, we offer Defense

1 Exhibit 692.

2 MR. MORTARA: No objection, Your Honor.

3 THE COURT: Admitted.

4 (Defendant Exhibit 692 admitted into evidence.)

5 **Q.** May we have the Demonstrative 67, please.

6 What does this show?

7 **A.** So now I'm going to focus on three very important
8 variables that we've discussed in some aspects before in my
9 testimony and also other people have talked about. Excuse
10 me. And that is the teacher 1 recommendation, the teacher 2
11 recommendation rating, and the guidance counselor
12 recommendation.

13 So these are the three ratings which together
14 Harvard calls the school support ratings. So each applicant
15 gets a letter of recommendation from two teachers and from a
16 guidance counselor, and so this is the summary of the ratings
17 that are assigned to those three letters.

18 **Q.** And do those ratings inform the personal rating?

19 **A.** Yes, I think that's very clear they do, yes.

20 **Q.** Let's look at the next Defense Demonstrative, 68.

21 What does this show?

22 **A.** Excuse me.

23 So this shows the -- for each groups of students
24 classified by their academic rating of having a 1, so that's
25 the two columns on the left, or having an academic rating of

1 2, that's the two columns in the middle, or groups of
2 students that have academic rating of 3, on the right, I'm
3 showing within each of those groups the fraction of white
4 students and Asian-American students for whom the sum of
5 these three school support ratings -- excuse me.

6 **Q.** Take your time.

7 **A.** Excuse me. I'm not used to talking this long.

8 **Q.** Your lectures may be shorter than my oral arguments.

9 **A.** Yes.

10 So this is showing the sum of those school support
11 ratings. So to remind you, each of the ratings is from 1 to
12 4. And 1 is good -- 1 is outstanding, 2 is quite good, 3 is
13 kind of, pretty good, and 4 is not so good.

14 And so a student that got, for example, on the
15 three ratings, got three 2s would get a 6, and that would be
16 a quite a strong rating. A student who got, of course, three
17 1s would be a 3. That would be almost unheard of. But a
18 student who got, say, two 2s and a 3, they would get 7.

19 So I'm going to classify as having two 2s and a 3
20 or better. And that's what this shows. So the fraction --
21 amongst students who get an academic rating of 2, the
22 fraction of white students in that bucket who have the sum of
23 the school support ratings, these three ratings that's less
24 than 7, is around 43 percent, and the fraction of Asian
25 students in that category is -- who have that sum of ratings

1 less than 7 is around 37 percent.

2 **Q.** And does that relationship, the relative percentage of
3 the white applicants versus Asian-American applicants also
4 hold for those applicants who got an academic rating of 1 and
5 an academic rating of 3?

6 **A.** Yes, you can see that in the graph quite clearly.

7 **Q.** And what do you conclude from those results?

8 **A.** Well, it's important to classify the students by academic
9 rating.

10 **Q.** And why is that?

11 **A.** Well, the reason why is because, remember, as we talked
12 about a moment ago, the teacher -- the rating that's assigned
13 to the teacher letter is a single rating, but the teacher
14 letter is containing information about academic and
15 non-academic factors.

16 So what I'm trying to do by classifying conditional
17 academic rating of 2, for example, focusing on the middle
18 panel, I'm saying, well, imagine that the teacher has --
19 excuse me -- the admissions officer has pulled out of that
20 teacher letter the academic information in that letter and
21 putting that together with other information has decided that
22 this student is an academic 2, then the other components of
23 what's left after we hold constant to that is informing these
24 non-academic qualities.

25 So the non-academic qualities for students who are

1 assigned an academic 2 are obviously higher for white
2 students than for Asian students.

3 **Q.** Now, I see in your next demonstrative that we have a
4 little shading around academic rating 2. Can you tell us why
5 or what you're going to do with that?

6 **A.** I can, yes.

7 **Q.** Why, and what are you going to do with it?

8 **A.** Well, one might be concerned that I've somehow fixed --
9 chosen the 7 number strategically. And so what I'm going to
10 do is I'm going to take the students that are assigned an
11 academic rating of 2, and I'm going to show the full
12 distribution of the sum of the school support scores.

13 **Q.** All right. May we have the next demonstrative, please,
14 68 -- or 69.

15 So what is this showing?

16 **A.** So recall, the school support, the 3 ratings could be 3
17 for unbelievably outstanding student. They could be 4 if you
18 got two 1s and a 2 all the way up to 7, as I mentioned
19 before, which would be two 2s and a 3.

20 And we can see in each of these sort of better
21 ratings buckets white students are overrepresented relative
22 to Asian students who are more likely to be in that set of
23 categories amongst the students who have an academic rating
24 of 2.

25 **Q.** And what does the next demonstrative show?

1 **A.** So it shows that that preponderance of white students in
2 the better side of the distribution is offset or balanced out
3 by a preponderance of Asian students on the lower side.

4 So Asian students are, in particular, much more
5 represented in the 9 category, which would be three 3s, which
6 would still be quite a good category but not nearly as good
7 as the others.

8 **Q.** Did you conduct the same analysis for students with an
9 academic rating of 1 and an academic rating of 3?

10 **A.** Yes.

11 **Q.** And what did you find?

12 **A.** I found that the pictures look very, very similar.

13 **Q.** And are those results reflected in Defense Exhibit 692 in
14 evidence?

15 **A.** Yes, they are.

16 **Q.** Did you hear Dr. Arcidiacono testify that white and
17 Asian-American applicants actually have similar school
18 support ratings?

19 **A.** Yes.

20 **Q.** How did he reach that conclusion?

21 **A.** Well, one very important thing he did was he focused
22 entirely on the non-ALDC group. And so that's an important
23 group which I believe should be included, and when we're --
24 we know that's almost 30 percent of all the admitted
25 students, and so this is a very large group in terms of high

1 performers in the admissions pool.

2 And so by excluding them, it gives, in my view, a
3 biased picture of the difference between whites and Asians.

4 **Q.** And did he -- did his analysis look, as you did, within
5 different academic ratings or different academic index
6 deciles?

7 **A.** Not that I recall, no.

8 **Q.** So even though virtually all of his other analyses are
9 keyed to the academic index or the academic ratings, in this
10 respect he did not do that control, correct?

11 **A.** Yes, that's absolutely correct, yes.

12 **Q.** Did you consider how Asian-American applicants fare on
13 other factors that inform the personal rating?

14 **A.** Yes. So I went and looked at the two ratings variables
15 that are provided by the alumni interviewer.

16 **Q.** And do those also inform the personal rating?

17 **A.** Yes. My understanding is one of those ratings is, in
18 fact, the alumni interviewers ratings of personal qualities
19 of the student and the other is an overall rating of the
20 student.

21 **Q.** Let's look at Demonstrative 71, please, Mr. Lee.

22 What is this showing?

23 **A.** So this shows from the summary sheet for each student the
24 location of the alumni interviewer information. So the
25 alumni interviewer scores the students on the same scale, and

1 that one of the reasons for that document, that interviewer
2 guide, is really for purposes of alumni interviewers to
3 understand the Harvard process.

4 **Q.** And the next demonstrative, please.

5 **A.** So what I'm going to do now is I'm going to sum the three
6 ratings for the school support variables, so teacher 1,
7 teacher 2, guidance counselor, and I'm going to add to those
8 three the alumni interviewer rating and the alumni
9 interviewer overall rating and the alumni personal rating.
10 So now there's going to be five scores that can be -- again,
11 I mean, it's technically possible to have five 1s. So it's
12 possible that somebody actually has a 5. A very good score
13 would be something like four 2s and a 3, which would be
14 around 11. So I'm going to --

15 **Q.** Can we look at the next demonstrative. I think this may
16 help in your explanation.

17 So what is this showing?

18 **A.** So now I'm going to focus, as I did before, but now
19 adding in two more ratings, so now there's five ratings. And
20 I'm going to look at the fraction of students who have the
21 five ratings summing to 11 or lower, so equivalent to four 2s
22 and a 3 or better. So quite a strong rating. But I'm going
23 to do that, again, for the same reasons as before, because I
24 want to try and isolate the component of the school support
25 and alumni evaluation that's apart from their academic

1 evaluation. And I'm going to compare -- within each of the
2 1s, the 2s and the 3s, I'm going to compare the fraction of
3 Asian-American and white students that have 11 or lower of
4 scores.

5 And you can see across the three buckets that white
6 students are more likely to get the better sum of scores.

7 **Q.** And did you review how Asian-American -- strike that.

8 Can we have the -- well, there we go.

9 THE COURT: Hold on one second.

10 (Discussion off the record.)

11 **Q.** So you've now highlighted, again, the comparison among
12 applicants who have an academic rating of 2. And, again, why
13 have you done that, and what are we going to see next?

14 **A.** Well, we're going to look at the full histogram, the full
15 representation of sums of scores again.

16 **Q.** Okay. May we have the next demonstrative, Mr. Lee.

17 So on Demonstrative 74, what are we seeing?

18 **A.** So here we're seeing is the sum of school support; again,
19 focusing on Asian and white students who receive an academic
20 rating of 2, and I'm showing the fractions of students who
21 get 5. There are, you know, some students with a 5, 6, 7, 8,
22 9, 10, 11, 12. So that would be the better ratings. And you
23 can see on the -- kind of the better half of the
24 distribution, white students are uniformly more represented
25 there. So more likely to get a 9 than Asian students, more

1 likely to get a 10 and so on.

2 And if we go to the right side of the graph --

3 **Q.** Can we have Demonstrative 75, please?

4 Yes, thank you.

5 **A.** -- we can see that the opposite pattern is there.

6 So, again, the white students are represented more
7 in the higher end of the ratings with better ratings and the
8 Asian students are represented in the lower end.

9 **Q.** And did you conduct a similar analysis with respect to
10 applicants who received an academic rating of 1 and an
11 academic rating of 3?

12 **A.** Yes, I did.

13 **Q.** And is that analysis reflected in Defense Exhibit 692?

14 **A.** Yes.

15 **Q.** And what did you conclude?

16 **A.** I concluded that the same pattern is present in both --
17 in those other groups as well.

18 **Q.** Did you analyze whether the data that show the school
19 support ratings and the alumni ratings inform the personal
20 ratings?

21 **A.** I did, yes.

22 **Q.** And can we have Defense Demonstrative 76, please.

23 What is this showing?

24 **A.** Yes, so this is a way to show how different variables in
25 the context of Professor Arcidiacono's model of the personal

1 rating contribute to the overall explanatory power of that
2 model.

3 So just to remind you, that's the extent to which
4 the model can successfully explain the student-to-student
5 variability in the personal rating.

6 So he presents a series of five models. And,
7 again, the -- the height of each bar is representing the
8 explained power of the model.

9 So if we start with just demographics, so just
10 focusing only on differences across the race groups, that
11 explains 6.8 percent of the variation. If we add in academic
12 information, all those different academic variables that
13 Professor Arcidiacono uses, it rises a little bit to 9.5
14 percent.

15 And this illustrates the point we were making
16 before that academic variables, despite their richness and
17 availability in the dataset, explain a relatively modest
18 fraction of the overall variation in the personal rating.

19 If we add in the interaction variables that
20 Professor Arcidiacono often uses in his specifications, you
21 can see it really doesn't make that much difference to that
22 specification.

23 If we add in the context variables, so these are
24 the variables representing information from the college board
25 and schools and neighborhoods, that adds some more to the

1 data.

2 Finally, though, the big jump is when we add in
3 these ratings variables. And I'd like to try and explain a
4 little bit more clearly how that works. And I think it would
5 be helpful to go back to my hypothetical of retirement.

6 So imagine that I have the model that I call the
7 sparse model over here, with just age and salary, and then I
8 think about adding in health as a new variable. The
9 explanatory power that health will add to the model is the
10 part of health that can't already be explained by age. So
11 when you add a new variable to a regression model with other
12 variables in the model, the additional contribution to the
13 explanatory power represents the contribution of the part of
14 that new set of variables that are added that couldn't be
15 explained by the variables that were already in the model.
16 So it would be the component of health that if I adjusted
17 health for age, it's that component of health. Not the part
18 that is correlated perfectly with age but the other part.

19 And so exactly what's going on here is when we add
20 in the information from the ratings variables, the part of
21 that that's not explained by academics and context and so on,
22 that's when we get this big jump in explanatory power.

23 So one can see that more than twice as much of the
24 personal rating, explanatory powers -- or twice as much of
25 the explanatory power is coming from those variables as, for

1 example, than demographics and academics alone.

2 So much more of the personal rating is driven by
3 this academics-adjusted addition of the ratings variables.

4 MR. WAXMAN: Thank you.

5 Your Honor, this is a good stopping point.

6 THE COURT: Wait. Hold on a second.

7 It's driven by the academics adjusted addition?

8 THE WITNESS: Yeah, so -- Your Honor, as I was
9 trying to make the case with the hypothetical, so if I took
10 my sparse model and added health --

11 THE COURT: Yeah.

12 MR. WAXMAN: I think you mean the richer model.

13 THE WITNESS: Excuse me, the richer model.

14 -- and I added health, then the R-squared would go
15 up by the amount of information contained; age-adjusted
16 health. Because age was already in the model and it was
17 trying to do the best it could with just age.

18 I add in health, the part of that that's adding to
19 the explanatory power is the part of health that can't be
20 explained by age.

21 And so in this context with the personal rating,
22 it's the part of these ratings variables that I've added to
23 the model that couldn't be explained by the academics.

24 THE COURT: So you're saying that the difference in
25 the personal ratings between Asian applicants and white

1 applicants is being driven by the school support and alumni
2 rating?

3 Is that what we're talking about?

4 THE WITNESS: This is the overall explanatory power
5 only.

6 THE COURT: You just lost me where you're
7 explaining it's the part not explained by anything else but
8 the part of what?

9 THE WITNESS: The part of the variable you added
10 in, the new variable you've added in.

11 THE COURT: Well, adding to what?

12 THE WITNESS: Oh, to the model.

13 THE COURT: But which factor are -- are we talking
14 about the personal rating here, just the personal rating?

15 THE WITNESS: Yes. Excuse me. So these are
16 different versions of Professor Arcidiacono's model of the
17 personal rating. I apologize for not making that clear.

18 THE COURT: So you're saying that the difference
19 between white applicants and Asian applicants is being
20 largely driven by the ratings variables.

21 THE WITNESS: I'm not saying that in this graph
22 here. This graph here is just about the overall explanatory
23 power of the model.

24 So we were talking about, like, how much can the
25 model explain, and I was pointing out that it had relatively

1 low explanatory power and so on.

2 THE COURT: Yeah.

3 THE WITNESS: I'm trying to sort of separate just
4 assessing the explanatory power of the model in this stage.
5 I'm going to come back, you know, after the break and talk
6 about how that's related to the gaps, but for now I'm just
7 trying to assess the explanatory power. And I'm saying if
8 you take a model that only has --

9 THE COURT: Of his model, right?

10 THE WITNESS: Yes, these are all his models, yes.

11 THE COURT: Okay. I think I have it.

12 MR. WAXMAN: Your Honor, after the break, we're
13 going to be looking at a line graph representation of this
14 that I think, I hope, will make clear to both of us the
15 difference between average marginal effect and explanatory
16 power in this context.

17 THE COURT: All right. Thank you.

18 (Recess, 11:11 a.m.)

19 THE COURT: So I feel like the most important
20 decision I make every day is about what time we're having
21 lunch. It's certainly what everyone is most interested in.

22 So is everyone all right with a half-hour lunch
23 break today to just try and make up some of the time we're
24 losing at the other end? Will that give everybody enough
25 time?

1 How about you? Can you manage with a half an hour
2 break?

3 THE WITNESS: Yeah, sure.

4 THE COURT: We'll recess a little early this
5 afternoon. It's a national holiday.

6 THE WITNESS: Yes. That would be fine.

7 THE COURT: So let's go till 12:30 and we'll recess
8 from 12:30 to 1:00.

9 MR. WAXMAN: Very good, Your Honor.

10 BY MR. WAXMAN:

11 **Q.** So Professor Card, this issue that Her Honor was asking
12 about I think I will come back to somewhat later. But let me
13 just ask you a couple of questions that perhaps will clarify
14 what this means and doesn't mean.

15 To be clear, in addressing the court's question,
16 are you saying that the difference in the ratings that are
17 quantified in the data explains the average differences
18 across race in the personal rating?

19 **A.** No.

20 **Q.** Do you believe that the effect of Asian-American
21 ethnicity on the personal rating that's estimated by Dr.
22 Arcidiacono's model reflects a genuine effect of race or
23 rather the effects of factors outside of the data?

24 **A.** I believe it reflects factors outside of the data.

25 **Q.** And so what do you learn from the factors in the data

1 like ratings about those factors outside the data?

2 **A.** So what we're trying to do is follow this logic of a
3 pattern which is often true; that the observable factors
4 inside the data that most inform the personal rating, which
5 are as shown in this slide here, those school support and
6 alumni interview ratings, those factors are stronger for
7 white students than for Asian students when we hold constant
8 academic factors.

9 **Q.** Did you also compare Asian-American and white applicants
10 on other factors besides the five that we've already talked
11 about, on other factors that inform the personal rating?

12 **A.** Yes, I did. I actually took Professor Arcidiacono's
13 model 5 and added some additional contextual-type variables,
14 parental occupation and so on, and showed that those
15 variables also lead to an increase in explanatory power.

16 **Q.** Did you conduct an analysis that looks at all of the
17 non-academic measures in the data?

18 **A.** Oh, yes, I did.

19 **Q.** And why is it relevant to look at non-academic factors in
20 general?

21 **A.** Well, as we've been talking about, I think, extensively,
22 there's obviously differences across candidates on average.
23 So Asian-American students are stronger in academic factors,
24 white students are stronger on non-academic factors, and so
25 trying to understand differences, particularly as they inform

1 the personal rating. What I've shown here is that personal
2 rating is representing mostly non-academic factors, and so
3 what I did was I took my overall admissions model and I
4 isolated all the factors in that model that are non-academic
5 components. And I used just those components to rank the
6 students by their strength. So this would be some
7 combination of all the factors in my model except the
8 academic variables.

9 **Q.** And then if we may have Defense Demonstrative 10.77,
10 please.

11 What is this showing?

12 **A.** So this shows when I look at this total combination of
13 all non-academic factors that white students are
14 substantially more highly represented in the top three
15 deciles.

16 **Q.** And to be clear, these are the top three deciles of the
17 non-academic index?

18 **A.** Yes. So these -- as I said, the personal rating is
19 largely informed by these non-academic factors. So in
20 understanding how the observable features differ between
21 whites and Asians, I use this construct of the total summary
22 of their non-academic strengths. And one can see very
23 clearly that the white students are stronger on these
24 non-academic dimensions.

25 **Q.** Now, does your analysis -- in creating the non-academic

1 index, did you also include the personal factor as a
2 non-academic factor?

3 **A.** The personal rating, yes.

4 **Q.** Yes.

5 And did you also include the ALDC attributes as
6 non-academic factors?

7 **A.** I did, yes.

8 **Q.** What happens if you remove the ALDC attributes and the
9 personal rating as factors?

10 **A.** So I did that exercise as shown on the next slide.

11 **Q.** Can we have Demonstrative 78, please.

12 And what is this showing?

13 **A.** It shows the same pattern still persists. So even when
14 you take all these non-academic factors but turn off any
15 preference given to the As or Ls or Ds or Cs, so that that's
16 no longer part of any difference, and completely throw out
17 the personal rating, which I believe is an overly extreme
18 assumption, but do that, it's still the case, and on the
19 remaining non-academic dimensions white students are more
20 highly represented in the top deciles than Asian students.

21 **Q.** Does Dr. Arcidiacono analyze the non-academic index as
22 well?

23 **A.** I believe he does, yes.

24 **Q.** And does he agree with you that white applicants are
25 stronger than Asian applicants on the non-academic index?

1 **A.** Well, again, the analysis that he presents focuses on a
2 subset of white students and Asian students, the non-ALDC
3 students. And, of course, what I showed before was ALDC
4 students on many, many non-ALDC components are much stronger.
5 And so throwing away that group gives rise to, in my view, a
6 biased perception of the non-academic strengths of white
7 students versus Asian students.

8 THE COURT: Okay. Stop for a second.

9 So non-academic, you've taken out the academic
10 rating, you've taken out the personal rating. What's left in
11 here is just extracurriculars and --

12 THE WITNESS: No, Your Honor. There's a whole
13 range of variables, all of the school support and variables
14 like that and all of the contextual variables, parental
15 occupation, things like that.

16 THE COURT: So you've left everything in except the
17 ALDC effects and the personal rating?

18 THE WITNESS: And the academic variables per se,
19 SAT and GPA and so on. Yes.

20 BY MR. WAXMAN:

21 **Q.** I had a question based on your last answer, but I can't
22 remember what the answer is, so let me just ask you.

23 Among the group -- I think you've testified that
24 among the ALDC applicants, independent of any tip that they
25 receive, I believe we saw a chart showing that on every

1 measure, every rating they get substantially higher ratings
2 than non-ALDCs; is that correct?

3 **A.** Yes. And they're also -- when you combine ratings, one
4 also sees that, remember, that they are more multidimensional
5 and so they are a much stronger group, yes.

6 **Q.** And what percentage, approximately, of the ALDCs are
7 white applicants?

8 This isn't a memory game. If you don't remember,
9 you can just give an adjective.

10 **A.** A relatively high fraction. I actually have a document
11 we've prepared, but I don't quite remember off the top of my
12 head.

13 **Q.** Do you recall what share of the ALDC applicants are
14 Asian-American?

15 **A.** I know that only two percent of all -- two or three
16 percent of all Asian-Americans are ALDCs, which is a slightly
17 different question.

18 **Q.** Yeah.

19 So what is -- what is the effect in terms of being
20 able to compare really strong white applicants with really
21 strong Asian applicants if you exclude all ALDCs?

22 **A.** Well, in my view, that gives an inappropriate assessment
23 of the white applicant pool because, of course, amongst the
24 strongest people in the white applicant pool are the ALDC
25 groups.

1 So when I do this non-academic comparison -- again,
2 let me emphasize, in that second set of charts I was turning
3 off any particular tip given for A or L or D or C. So I was
4 just trying to isolate these other components of strength as
5 represented here.

6 **Q.** And so to sum up, Professor Card, what is your view about
7 the relative strength of white and Asian-American applicants
8 on factors in the data that inform the personal rating?

9 **A.** My assessment is that they are stronger. The white
10 students are stronger than Asian-American students on the
11 factors that are most relevant for informing the personal
12 rating, the observable factors.

13 **Q.** And why is that important?

14 **A.** Well, as I said, economists often argue that if the
15 observed factors inside the data that inform a particular
16 variable are in one direction, then the unobserved factors
17 may well be in that same direction.

18 **Q.** And is that, in fact, the reasoning that Dr. Arcidiacono
19 uses in his interpretation of the positive average marginal
20 effect for Asian-American ethnicity that he observed in
21 modeling the academic rating and the extracurricular rating?

22 **A.** Yes, precisely.

23 **Q.** Did you do any other analysis to examine that conclusion?

24 **A.** Yes, I did.

25 **Q.** Can we have Defense Demonstrative 10.79.

1 And let me ask you what this shows.

2 **A.** Well, I think this is going to more directly address Her
3 Honor's question about the average marginal effect between
4 Asian-Americans and whites in these different models that
5 Professor Arcidiacono developed for explaining the personal
6 rating.

7 So what I've done here is I've taken each of his
8 models from 2, 3, 4, 5, so model 2 starts with just
9 demographic variables and academic variables and goes on.
10 And what I've shown is the average marginal effect for
11 Asian-American ethnicity relative to whites and the
12 probability of receiving a personal rating of 2 or better.

13 And so according to his model 2, for example, this
14 very sparse model that only has demographics in academic
15 variables, there's a seven percentage point gap in the
16 probability of receiving a 2 or better between
17 Asian-Americans and whites.

18 **Q.** This is a 2 or better on the personal rating?

19 **A.** 2 or better on the personal rating, yes.

20 **Q.** What are you indicating by the R-squared value for model
21 2?

22 **A.** Well, we saw that before the break. The slide that we
23 were talking about shows the R-squared of that model is quite
24 low. In fact, when I showed that slide, I showed that that's
25 mostly the demographic factors. The academic variables

1 themselves don't add much at all to the personal rating, and
2 that's the point we've tried to emphasize earlier in my
3 testimony as well.

4 So the academic variables per se don't really
5 inform the personal rating very much.

6 So that's the starting point.

7 If you go to model 3, this is the model that he
8 shows that adds some of the interaction variables that he
9 uses in many of his models. Of course that doesn't change
10 the average marginal effect for Asians versus whites much.

11 When we add the contextual variables, so these are
12 the variables representing high school and neighborhood
13 variables, we can see an important change. Now instead of
14 seven percent it goes down to six percent, so it's 15
15 percent, 16 percent smaller effect. And so those variables
16 are -- they're also adding some explanatory power to the
17 model, but importantly, those variables are different and are
18 helping to explain the gap.

19 But then when we go to model 5 where we add in the
20 personal variables, so now we're adding the variables, the
21 observed variables that are most relevant for determining the
22 personal rating, we can see not only does the R-squared go
23 up, which is -- the previous slide showed, but importantly,
24 now the unexplained gap between Asian-Americans and whites is
25 only half as big as it started before.

1 So this is the kind of analysis that economists
2 often do. They take a model and add more and more of the
3 observable variables that they have and they say, well, this
4 is a situation where as I add more variables, and
5 particularly when I add these variables that are most
6 informative to the personal rating, I see that I have removed
7 a very large component of the average marginal effect of
8 Asians and whites.

9 And I would be concerned because there are so many
10 unobserved factors left out, I would be concerned that if I
11 had access to more and more of that information, this trend
12 would continue and one could easily, in my view, logically
13 conclude that it may well be that it's a zero if you could
14 account for all of those factors.

15 So the observed variables are moving in this
16 direction. There's a very large unobserved component. If,
17 following Professor Arcidiacono's logic, the unobserved
18 variables move in the same direction as the observed
19 variables, then this would tend -- this trend would continue
20 and could reach the ceiling.

21 **Q.** Can you summarize your conclusion regarding factors
22 outside the data and the personal rating?

23 **A.** So my view is that just as factors outside the data
24 account for the unobserved positive average marginal effect
25 for Asian-Americans in the academic rating, and account for

1 the large positive unobserved gap between Asian-Americans and
2 whites, the average marginal effect in the extracurricular
3 rating, so there's unobserved factors that the admissions
4 officers are finding on top of the -- any kind of
5 quantitative factors, my interpretation is that exact same
6 explanation is the most logical and sensible for the negative
7 personal rating.

8 **Q.** Let's turn to Defense Demonstrative DD 10.80. And let's
9 focus on the last personal rating conclusion.

10 And let me ask you to assume now, contrary to the
11 conclusion that you've expressed, that race really does
12 influence the ratings in ways estimated by Dr. Arcidiacono's
13 models.

14 And let me ask you first, would that justify
15 throwing the ratings out?

16 **A.** No. I don't think that would be the right thing to do at
17 all.

18 **Q.** What would -- why wouldn't you throw the ratings out?

19 **A.** Well, because the ratings include all of this information
20 and they capture some of the information that I can't
21 quantify. And so if one was concerned about that, it
22 wouldn't make sense to throw them out entirely.

23 **Q.** And so what did you do?

24 **A.** So instead of throwing them out entirely, what I did was
25 I took Professor Arcidiacono's models for these three ratings

1 variables, and they all have a component -- an Asian-American
2 effect, and I turned off that effect.

3 **Q.** So let's see the next demonstrative, if we could.

4 And what is this -- is this -- this is showing the
5 effects, the estimated average marginal effect of
6 Asian-American ethnicity on the three ratings that
7 Dr. Arcidiacono modeled?

8 **A.** Right. So just to remind you, for instance, the
9 extracurricular effect here is representing the fact that
10 controlling for all of the observed variables in the model
11 that Professor Arcidiacono, his model 5, his most complete
12 model, richest model for the extracurricular rating, there is
13 still a large, or relatively large unexplained Asian-American
14 effect. So they're getting higher extracurricular ratings
15 than can be explained by factors in the data. Similar for
16 the academic rating and similar for the personal rating.

17 **Q.** What does the next slide show?

18 **A.** The next slide visually illustrates that I turned them
19 off. So I take those three components, but only the race
20 components of the three variables, the three ratings
21 variables, and I turn off that, but leave in all the other
22 components in his prediction models.

23 **Q.** Would you please turn to Tab 18 in your volume?

24 **A.** Yes.

25 **Q.** And what is -- this is document Defense Exhibit 694.

1 What is it?

2 **A.** So it's average marginal effect of Asian-American
3 ethnicity in my models with profile ratings adjusted to
4 remove what Professor Arcidiacono claims to be racial
5 effects.

6 **Q.** Does this reflect the analysis you just described?

7 **A.** Yes.

8 MR. WAXMAN: Your Honor, we'd offer Defense Exhibit
9 694.

10 MR. MORTARA: No objection.

11 THE COURT: It's admitted.

12 (Defendant Exhibit 694 admitted into evidence.)

13 **Q.** Mr. Lee, if we can have Demonstrative 83, please.

14 So what is this showing?

15 **A.** So this shows if I take Professor Arcidiacono's models,
16 turn off these race components for the ratings, the three
17 ratings variables, and then predict each person's ratings
18 from his models with what's left after taking out these
19 potential effects of race, then include those variables as
20 the ratings in the model, so these would be ratings that are
21 in some sense purged of any unexplained racial differences.

22 When I do that analysis, I get average marginal
23 effects from year to year that look quite similar to the
24 estimates I had before. None of them are individually
25 significant. Some are positive, some are negative. The

1 average marginal effect across all the years is minus .011.
2 So eleven one-hundredths of a percentage point. Not
3 statistically significantly different from zero.

4 So my conclusion is from that that if one believed
5 that the right thing to do was to turn off the race component
6 on the ratings, to imagine that there's some kind of racial
7 bias that's generating these phenomena, then I would get --
8 in fact, after taking off the race component of the three
9 ratings, I would get more or less the same results as I get
10 from my main specifications.

11 **Q.** Which is in every -- if I'm correct, in every instance
12 results that are not statistically significant than zero?

13 **A.** Not statistically significantly different from zero, and
14 especially, for example, the overall rating is quite small in
15 magnitude and could have easily occurred by chance. Would be
16 quite consistent with there, in fact, being no difference at
17 all.

18 **Q.** Did you hear Mr. Mortara speak during his opening
19 statement about a different analysis that you conducted in
20 your opening report in which you did entirely throw the
21 personal rating out of the model?

22 **A.** I did, yes.

23 **Q.** Why did you do that analysis?

24 **A.** Well, it's like the kind of analysis I did in the chart
25 where we walk from my model, which I believe is the correct

1 model and includes all the variables that should be included,
2 and make the series of changes that Professor Arcidiacono
3 makes.

4 So one way to start that analysis and to understand
5 the differences between his model and my model would be to
6 exclude the personal rating altogether. So it's a way to
7 understand how important is the personal rating to my
8 conclusions and what are the differences when I have that
9 model -- it's not that I'm endorsing that model; it's that
10 I'm trying to understand how one gets from my model to
11 Professor Arcidiacono's model.

12 **Q.** So how would you compare that analysis to the one that we
13 just discussed and is in your rebuttal report in which you
14 use the adjusted ratings?

15 **A.** Well, I don't think they're really the same thing. I
16 think that what we've just discussed, if one believed that
17 the ratings variables were affected by race, then I think
18 what we've just discussed is by far the appropriate thing.

19 The analysis where I throw out the personal rating
20 is not really that type of exercise. It's an exercise to
21 understand the extreme bound of throwing out the personal
22 rating altogether.

23 **Q.** Now, Dr. Card, your model doesn't consider the
24 preliminary overall rating; is that right?

25 **A.** That's right, yes.

1 **Q.** And why did you not include the overall -- the
2 preliminary overall rating but did include the personal
3 rating?

4 **A.** Well, my understanding from a variety of testimony in the
5 case is that the personal -- excuse me, the preliminary
6 overall rating, the POR, is assigned by the first reader, or
7 the second reader, but is assigned as kind of an estimate by
8 that reader of the likelihood of admission given what
9 materials they have at that time, which may, of course, not
10 be the complete set of materials, and is meant to incorporate
11 sort of their overall assessment and may well include
12 information about the race and ethnicity.

13 So, for instance, if a student was a URM, an
14 underrepresented minority, and was highly competitive in
15 other dimensions, the preliminary overall rating could easily
16 include the potential that that would be another one of their
17 many strengths for that kind of student. So it would be, in
18 some sense, affected directly by race per se for that set of
19 candidates.

20 And so I didn't want to include a variable like
21 that that's affected by race per se.

22 **Q.** Let me ask you just a few final questions on the personal
23 rating.

24 Mr. Lee, may we have Plaintiff's Demonstrative 38,
25 slide 19.

1 Do you recall when Dr. Arcidiacono showed this
2 slide?

3 | **A.** Yes, I did.

4 **Q.** And do you recall his testimony that the slide showed
5 that the personal rating was affected by race?

6 | **A.** Yes.

7 | **Q.** Was he correct?

8 **A.** I don't think so at all. I think what -- remember, these
9 are -- each of these panels is an academic decile, 7, 8, 9,
10 the top four deciles now, and as I've pointed out with regard
11 to the personal rating, once you're comparing decile 7,
12 decile 8, decile 9, decile 10, there's virtually no
13 difference because going across these deciles doesn't really
14 inform the personal rating.

15 So it's not very surprising that the gaps across
16 the different race groups look the same as we go from decile
17 10 to decile 9 to decile 8 because, as I've shown, the
18 personal rating really doesn't depend on the academic index.

19 So I find this completely uninformative about any
20 issue with the personal rating.

21 Q. Mr. Lee, can we project the trial transcript from October
22 25 at page 205, line 14 through page 206, line 6.

23 Were you here when Mr. -- when Dr. Arcidiacono gave
24 the following testimony:

25 "Question: You don't claim that Harvard

1 discriminated against Asian-American applicants who are
2 recruited athletes, correct?

3 "Correct.

4 "You don't claim that Harvard discriminates against
5 Asian-American applicants who are legacies, correct?

6 "Correct.

7 "You do not claim that Harvard discriminates
8 against Asian-American applicants on the dean's or director's
9 list, correct?

10 "Correct.

11 "You do not claim that Harvard discriminates
12 against Asian-American applicants who are the children of
13 faculty, correct?

14 "Correct.

15 "You do not claim that Harvard discriminates
16 against Asian-Americans who are the children of staff,
17 correct?

18 "Correct."

19 You heard that testimony, correct?

20 **A.** I did, yes.

21 **Q.** So Dr. Arcidiacono claims that Harvard discriminates
22 against some Asian-American applicants but not Asian-American
23 ALDC applicants.

24 Is that what you understand?

25 **A.** That's my understanding, yes.

1 **Q.** And do you recall Her Honor asking Dr. Arcidiacono about
2 the personal ratings of ALDC applicants?

3 **A.** I do, yes.

4 **Q.** How do the personal ratings of Asian-American ALDC
5 applicants compare to the personal ratings of white ALDC
6 applicants?

7 **A.** Well, in fact, they, on average, have a lower personal
8 rating than white ALDCs. And the gap between Asian-American
9 ALDCs and white ALDCs and the fraction with a personal rating
10 of 1 or 2 is slightly bigger than the gap between
11 Asian-American and whites who are non-ALDC.

12 **Q.** So what does that tell you?

13 **A.** I find that extremely hard or impossible to reconcile
14 with Professor Arcidiacono's claim that the personal rating
15 is the mechanism by which discrimination against Asians is
16 operating, and that there's no discrimination against ALDCs.
17 Because on the one hand if there's no discrimination against
18 ALDCs, then the personal rating should be fine. On the other
19 hand if there's -- if there's -- it just doesn't make any
20 sense.

21 **Q.** So just to put a fine point on it, if Dr. Arcidiacono is
22 right, that there's no discrimination against Asian-American
23 ALDC applicants, what would that tell us about the personal
24 rating?

25 **A.** Well, as far as I can understand what that would mean is

1 their personal rating is not tainted by bias.

2 **Q.** In light of everything that you've seen and everything
3 that you've done in this case, is the personal rating an
4 instrument of discrimination against Asian-American
5 applicants?

6 **A.** Well, as this exercise with the comparison between the
7 ALDCs and non-ALDCs show, I just don't think that makes any
8 sense. So I don't believe that that's the correct
9 interpretation of the data at all.

10 **Q.** Let's turn briefly to the issue of interactions.

11 Did you hear Dr. Arcidiacono testify that you
12 should have included an interaction term between race and
13 disadvantaged status?

14 **A.** Yes.

15 **Q.** And, again what is an interaction term?

16 **A.** So an interaction term is a term that allows the effect
17 of one variable to depend on another variable in the model.

18 **Q.** And did you run your model including Dr. Arcidiacono's
19 interaction terms, including the one between race and
20 disadvantaged status?

21 **A.** Yes, I did.

22 **Q.** Please turn to Tab 23 in your binder and tell me when
23 you've found Exhibit 697.

24 **A.** Tab -- excuse me.

25 **Q.** 23.

1 **A.** 23. Oh, excuse me. Okay.

2 Yes.

3 **Q.** Is this showing the results of the model that you just
4 described?

5 **A.** This is showing the results of a model where I don't
6 include all the interactions that Professor Arcidiacono has
7 in his model but just the interactions with race.

8 MR. WAXMAN: We offer Defense Exhibit 799.

9 MR. MORTARA: No objection.

10 THE COURT: It's admitted.

11 (Defendant Exhibit 799 admitted into evidence.)

12 **Q.** And what does this show?

13 **A.** This shows that the average marginal effect of
14 Asian-American ethnicity in a model that includes that set of
15 interactions, not his full set but that set of his
16 interactions, is minus 0.14. Not statistically significant
17 across all the years, so very comparable to my overall model.
18 And, again, none of the individual estimates from year to
19 year are different.

20 **Q.** So let's look in sum at Defense Demonstrative 10.84.

21 And will you remind us again what this shows?

22 **A.** Yes. So this is kind of a summary of the set of
23 exclusions that Professor Arcidiacono has made from my model,
24 in my view the right model of the overall admissions process,
25 to get to his model.

1 So we start with the -- it's showing or summarizing
2 the average marginal effect, the estimated marginal effect
3 for Asian-Americans relative to whites in each case.

4 So I start with my model, which I believe is the
5 best representation of the overall admissions process, so
6 I've included all the groups, and I've included the variables
7 that are relevant, and I have a minus 0.05 average marginal
8 effect. Not statistically significant across all the years.
9 I've estimated the models separately over the years as well.

10 If I include the interaction variables that
11 Professor Arcidiacono includes in his specifications, so this
12 would be disadvantaged status times race, but in addition
13 disadvantaged -- or excuse me, gender times race and so on,
14 if I include that set of variables, the average marginal
15 effect across all years is minus 0.08, which in my view is
16 not fundamentally or even incrementally different than my
17 overall model.

18 So that, I don't think that's a substantively
19 important issue in comparison of his model and my model
20 looking at that full set of interactions.

21 If I include -- or if I now then, starting from
22 that base, for example, if I was to make the exclusions he
23 makes, so excluding the intended career and staff interview,
24 and excluding parental occupation, which I don't believe is
25 the right thing to do and I think is inconsistent with the

1 way the application admissions procedure works, inconsistent
2 with the use of those variables, what I'm exhibiting here is
3 that one could get to a minus 0.38 by that set of exclusions,
4 which, in my view, represents an effect of omitted variable
5 bias.

6 If in addition one was to exclude the personal
7 rating, which I don't think makes sense, which I don't think
8 is legitimate for the model, but if one was to do that, then
9 one would get to an average marginal effect of minus 0.79,
10 which includes an -- which shows an additional omitted
11 variable bias.

12 If one was to take that model and estimate the
13 model in a pooled framework, which Professor Arcidiacono
14 does, essentially it doesn't make any difference, so one is
15 still there.

16 But if one was to make one final exclusion, which
17 is to exclude the ALDCs, which, again, I think doesn't make
18 any sense, given the admissions process, given that they're
19 part of the overall process, that they're almost 30 percent
20 of all admitted students, that they're particularly strong in
21 these combinations of skills and so on, but if one was to do
22 that, one could get to minus 1.02, which is his preferred
23 model.

24 THE COURT: You're basically saying that the
25 difference between -- what accounts for the fact that you

1 conclude one thing and he concludes another thing is the
2 inclusion of the personal rating and the ALDCs.

3 THE WITNESS: Inclusion of the personal rating,
4 yes, Your Honor. Inclusion of the -- actually, inclusion of
5 the other variables: The parental occupation and staff
6 interview, intended career variables.

7 THE COURT: But that doesn't have much of an
8 effect, right?

9 THE WITNESS: Well, that gets him to minus 0.38.
10 What is statistically significant --

11 THE COURT: But the things that really are driving
12 your different conclusions are the personal rating and the
13 ALDCs? Or no?

14 THE WITNESS: Well, it's a combination of the three
15 things, actually, Your Honor.

16 THE COURT: Parental occupation, personal rating,
17 ALDCs.

18 THE WITNESS: Yeah, parental occupation and the
19 intended career and staff interview, together, the three.

20 My recollection is if I just exclude the ALDCs,
21 that the average marginal effect is not statistically
22 significant, but I may be incorrect on that.

23 Q. Just to clarify, when Her Honor was asking you the
24 question yesterday whether the order matters and whether you
25 can sort of estimate what the model will show about average

1 marginal effect irrespective of what order they're in, do you
2 recall that in his testimony Dr. Arcidiacono used to explain
3 his view of this point a table that is from your report?

4 **A.** Yes.

5 **Q.** So focusing on the disputed modeling choices here, did
6 Dr. Arcidiacono make any modeling choice that makes his
7 estimate of Asian-American effect less negative?

8 **A.** No.

9 **Q.** And what does that tell you about his model?

10 **A.** Well, it suggests that these exclusions are very
11 one-sided.

12 **Q.** Can we have Defense Demonstrative 85, please.

13 And just very briefly summarize the differences
14 between your model and Dr. Arcidiacono's modeling choices
15 with respect to the actual process that Harvard uses.

16 **A.** Right. So in my view, the actual admissions process
17 includes all the applicants in the process, so that includes
18 the ALDCs. It's a separate process across years for a
19 variety of reasons that I mentioned before. And these sets
20 of factors, including the personal rating and then the other
21 set of factors, parental occupation, intended career, and
22 staff interview, are all important ingredients of the
23 admissions process.

24 So in my view, that's the actual process, and
25 that's what I've tried to do in my model.

1 Professor Arcidiacono, on the other hand, has
2 excluded the ALDCs, fit a model -- single model and excluded
3 these factors.

4 **Q.** Did you examine which model, that is, yours or his,
5 better explains the actual admissions decisions?

6 **A.** Yes, I did.

7 **Q.** Please turn to Tab 24 in your binder and tell me when
8 you've found Defense Exhibit 702.

9 **A.** Yes.

10 **Q.** What is this document?

11 **A.** The first document shows the standard error of his model
12 and my model in different years for his model, and then
13 pooled and then my model pooled, talking about this issue of
14 power that we talked about yesterday.

15 And the second shows the R-squared for his model
16 and my model.

17 MR. WAXMAN: Your Honor, we'd offer Defense Exhibit
18 702 in evidence.

19 MR. MORTARA: No objection, Your Honor.

20 THE COURT: It's admitted.

21 (Defendant Exhibit 702 admitted into evidence.)

22 **Q.** Mr. Lee, may we have slide 86, please.

23 What does this demonstrative show?

24 **A.** So this is showing the difference in explanatory power of
25 my preferred model and Professor Arcidiacono's preferred

1 model in terms of how they're explaining the variation.

2 So my model has about 64 percent of the overall
3 variation from student to student and whether they're
4 admitted or not, explained by the factors in the model. So
5 importantly still 36 percent is omitted, and that is a higher
6 fraction, a notably higher fraction than Professor
7 Arcidiacono's model, which is only 56 percent.

8 **Q.** So in your view, is this a significantly different -- is
9 this a significant difference in the explanatory power of
10 your model versus Dr. Arcidiacono's model?

11 **A.** In my view, this is a very important difference. And
12 quite notable.

13 **Q.** Let me now turn to one other topic before we leave the
14 personal rating.

15 Did you hear Dr. Arcidiacono testify about the
16 phrase "standard strong" as applied to certain applicants?

17 **A.** I did, yes.

18 **Q.** And Mr. Lee, may we please have Plaintiff's Demonstrative
19 38.41.

20 Do you recall Dr. Arcidiacono showing this chart to
21 suggest that Asian-Americans with comments indicating
22 standard strong are stronger than white applicants who
23 receive that evaluation?

24 **A.** I do, yes.

25 **Q.** Is it true?

1 **A.** Not in my view, no. The problem is that Professor
2 Arcidiacono is looking, most importantly, here, in terms of
3 math, SAT math, SAT verbal, academic index, academic rating
4 of 2 or better. So he's, again, kind of focusing on the
5 academic dimension.

6 And as I've tried to emphasize, it's a
7 multidimensional admissions process. And what's really
8 important in understanding different students is that overall
9 strength on these multiple dimensions. So this chart doesn't
10 even show the fraction rated athletic 2 or better, which I've
11 shown is a very important additional component.

12 **Q.** Please turn to Tab 31 of your binder and tell me when you
13 find Defense Exhibit 709.

14 **A.** I found it, yes.

15 **Q.** What is this document?

16 **A.** It's the average sum of profile ratings for
17 Asian-American and white students who are described as
18 standard strong.

19 **Q.** So does this include all four of the profile ratings as
20 opposed to Dr. Arcidiacono's demonstrative?

21 **A.** Yes.

22 **Q.** And what does it show?

23 **A.** Well, evaluating students in terms of their combinations
24 of these four strengths, it shows that amongst the students
25 who are labeled as standard strong, the sum of the ratings

1 for Asian-American and white students is essentially the
2 same. It's very, very far from statistically significant
3 difference and very, very small in magnitude.

4 So my understanding of this, my interpretation of
5 this is that effectively on -- in terms of their overall
6 evaluation on the multiple dimensions that Harvard values,
7 they're identical.

8 MR. WAXMAN: Your Honor, we offer Defense Exhibit
9 709 in evidence.

10 MR. MORTARA: No objection.

11 (Defendant Exhibit 709 admitted into evidence.)

12 Q. Mr. Lee, can you please project Defense Demonstrative 89?

13 THE COURT: Can I ask one more question?

14 MR. WAXMAN: Oh, I'm sorry.

15 THE COURT: Did you look at the admissions data for
16 the standard strongs?

17 THE WITNESS: Thank you, Your Honor.

18 No, I couldn't really do that because there was
19 just a set of files that had standard strong. There was a
20 relatively small number of such files, but I don't believe
21 that we had a measure of whether, like, any, you know, in the
22 overall 150,000, we didn't have a variable that indicated
23 whether standard strong appeared. Just like we didn't have
24 any of the other marginal comments or anything like that.

25 Q. Do you recall whether the Office of Civil Rights, when it

1 did its two-year study, did do something like that?

2 **A.** They mention that in their report, yes.

3 **Q.** So looking at -- can we have Defense Demonstrative 89,
4 please.

5 And what does this show?

6 **A.** Well, this shows what we just reviewed.

7 So this is a simplified summary of the previous --
8 the exhibit. And it shows the sum of the four ratings among
9 students who are labeled standard strong and the set of files
10 that were pulled out that had standard strong mentioned.

11 **Q.** And what do you conclude from this with respect to
12 Dr. Arcidiacono's demonstrative?

13 **A.** Well, I think it's an incomplete representation of the
14 actual relative strengths of Asians and whites who are
15 labeled standard strong.

16 If you look closely at their overall combination of
17 strengths, they're virtually identical.

18 **Q.** Bottom line, does Harvard admissions office treat Asian
19 applicants any different than white applicants?

20 **A.** In my view, no. In my view, the statistical evidence
21 strongly supports the conclusion that there's no difference
22 between them. There's no statistically significant
23 difference. The magnitude of the average marginal effect in
24 the admissions model taken as a whole across all the years is
25 very small in size, very far from statistically significant.

1 None of the individual years is statistically significant.
2 They bounce around, some positive, some negative. So it's
3 exactly the kind of pattern of findings that one would expect
4 if there was truly a zero difference between the two. And
5 that's what I conclude.

6 **Q.** Have you seen any evidence to suggest that Harvard
7 discriminates against Asian-American applicants?

8 **A.** I don't believe any statistical evidence support that
9 claim, and I'm not aware of any evidence from testimony or
10 evidence of actual process of discrimination.

11 **Q.** Let's turn to Defense Demonstrative 10.92.

12 It's been a while since we've had this up. We have
13 to retrieve it from archives, I think.

14 And let's focus on the second question that you
15 were asked to address in this case. How did you go about
16 analyzing the extent to which race plays a role in Harvard's
17 admissions process?

18 **A.** Well, the main things I did were two. First, I looked at
19 the individual effect or the specific effect of race
20 variables alone in the admissions procedure and compared that
21 to the effects of other single sets of variables, for
22 example, variables like parental occupation or variables like
23 the ratings of teachers and the alumni interviewers.

24 And then I used my model, my admissions model, to
25 look at the magnitude of the tip that is offered to different

1 race groups across different groups of students.

2 **Q.** Well, let's start with the first analysis. How did you
3 analyze the extent to which race alone can predict admission
4 outcomes?

5 **A.** What I did was along the same lines of some of the
6 exercises we've seen before. I looked at the overall
7 explanatory power of race alone in explaining
8 student-to-student admissions decisions relative to the
9 overall explanatory power of other types of factors in
10 explaining student-to-student admissions outcomes.

11 **Q.** And would you turn to your -- in your binder to Tab 34.

12 **A.** Yes.

13 **Q.** What is Defense Exhibit 715?

14 **A.** It's pseudo R-squared values of various admissions
15 models -- of admission models containing various controls.

16 MR. WAXMAN: We offer Defense Exhibit 715 into
17 evidence.

18 MR. MORTARA: No objection.

19 THE COURT: Admitted.

20 (Defendant Exhibit 715 admitted into evidence.)

21 **Q.** Please turn, Professor Card, to Tab 35.

22 **A.** Yes.

23 **Q.** Do you find Defense Exhibit 716?

24 **A.** I do, yes.

25 **Q.** And what is that?

1 **A.** It's changes in explanatory power of my model of
2 admissions when the effects of different variables are
3 removed.

4 MR. WAXMAN: Your Honor, we offer Defense Exhibit
5 716 into evidence.

6 MR. MORTARA: No objection.

7 THE COURT: Admitted.

8 (Defendant Exhibit 716 admitted into evidence.)

9 **Q.** Mr. Lee, let's please display 10.93 on the screen.

10 And Professor Card, what does this show?

11 **A.** So this is the graphical illustration of this first
12 exercise I did to assess the magnitude or importance of race
13 in the admissions decision.

14 So each of these is the R-squared -- each of these
15 bars represents the R-squared or the fraction of explained
16 variability from student to student in the yes-no decision of
17 whether a student is admitted.

18 So starting on the left, I show what fraction of
19 that would be explained if one only used the four profile
20 ratings, nothing else. So none of the other contextual
21 variables, no race information, nothing else. And one can
22 see that those four variables alone would explain about 38
23 percent of the overall differences from student to student in
24 probability of admission.

25 The next bar shows the teacher and guidance

1 counselor ratings alone. So these are just the three school
2 support ratings variables, and those variables alone, you can
3 see, have a fairly high explanatory power. So those three
4 variables alone explain about 19 percent of the outcome.

5 The alumni interviewer ratings, the next bar,
6 explain about 13 percent.

7 The next bar shows explanatory power of a set of
8 contextual factors from the college board data on
9 characteristics of high schools and neighborhoods. Those
10 variables explain about 6 percent.

11 And this is individually, I emphasize. So in each
12 case I'm using these variables alone in my model, nothing
13 else.

14 So when I get -- docket explains about 2 percent,
15 so there's these domestic dockets we've talked about.

16 Intended career one of the variables we talked
17 about explains about 1 percent, that in itself. Intended
18 major explains about 1 percent. And by comparison, race by
19 itself explains 0.2 percent. So relative to all these other
20 factors, race per se is a very, very small component of
21 explanatory power.

22 **Q.** So does that mean that race has no effect on admissions?

23 **A.** No, none at all.

24 **Q.** How so?

25 **A.** Well, this is an example of the fact that any individual

1 factor in the admissions process can be important but only
2 for students who are highly competitive, exactly the kind of
3 point I was making in my hypothetical example where I looked
4 at the S-curve relationship for retirement and pointed out,
5 for example, that presence of a spouse at home, for instance,
6 would not necessarily have much effect on retirement except
7 for people who are in kind of the bubble range. And for that
8 group of people, there can be an effect, even though on
9 average the effect across everyone is relatively small, or
10 that variable doesn't explain very much of the outcome.

11 **Q.** And the bubble range for purposes of this case is what?

12 **A.** For purposes of this case, the bubble range is going to
13 be for students who have at least, I would argue, one
14 strength and possibly two strengths, are in the upper group
15 of the entire admissions pool in terms of their combination
16 of strengths.

17 **Q.** So when we talk about the upper range, are we talking
18 about applicants who are highly competitive on many
19 dimensions?

20 **A.** We are, yes.

21 **Q.** So turning to the second analysis that you mentioned,
22 comparing race to other factors for competitive applicants,
23 how did you determine which applicants were the most
24 competitive?

25 **A.** So I used my admissions model and I constructed -- or I

1 thought about it in terms of exactly the same kind of
2 framework as we're thinking about in this hypothetical with
3 retirement.

4 So I used my admissions model, and I looked at the
5 overall strength of an applicant, taking account of all of
6 their different features. So there's the school support,
7 their profile ratings, the contextual factors and all of that
8 additional information, and then I tried to -- but in the
9 case of race, what I would do is I would ignore or turn off
10 any impact of race in that evaluation. So I'd rank all the
11 students by that characteristic and then proceed.

12 **Q.** Okay. Can you turn to Tab 2 of Volume 2?

13 **A.** Yes.

14 **Q.** Do you find Defense Exhibit 670?

15 **A.** Yes.

16 **Q.** What is this?

17 **A.** So this is four -- this is the cumulative distribution of
18 applicants' predicted probability of admission.

19 MR. WAXMAN: Your Honor, we offer Defense Exhibit
20 670 into evidence.

21 MR. MORTARA: No objection.

22 THE COURT: It's admitted.

23 (Defendant Exhibit 670 admitted into evidence.)

24 **Q.** Turning now, Mr. Lee, to Defense Demonstrative 94.

25 What is this showing?

1 **A.** So this is showing, based on the -- exactly the previous
2 document that just went into evidence, this is showing the
3 predicted probability of admission for students when I use
4 the procedure I was describing of ranking students by their
5 strength.

6 And one can see that it's got the same kind of
7 S-curve relationship or logistical curve relationship as we
8 saw in my simple hypothetical.

9 So for something like the bottom two-thirds of the
10 admissions pool, their predicted probability of admissions is
11 essentially zero. So that group of students is out of the
12 money. There's no combination -- there's no single variable
13 that can have any effect on their admissions probability. So
14 that's the first group.

15 The next group of students -- we can see that
16 contrary to my retirement example, there really aren't any
17 students who have extraordinarily high probabilities.
18 There's like a couple of students who are in the 90s.

19 **Q.** We're now talking about the right hand?

20 **A.** The right hand, yes. So we can say there's a group of
21 students who I would say are on the bubble, and that's
22 starting around the 75th percentile of academic strength. So
23 when I take all the applicants and order them by their
24 strength, I get to the 75th percentile.

25 And the point that's important to take away from

1 this graph is, while it's the case that for students with low
2 probabilities of admission, some feature like one more
3 strength or going to a single type of strength or being from
4 a sparse country or being of a particular racial group, for
5 those students with low probabilities of admission, we have
6 essentially a negligible effect.

7 But when we get to the bubble range, now when I
8 take a student, for example, at around, say, the 90th
9 percentile -- remember, only seven percent of all students
10 are going to get in. So the 90 percentile group on average
11 is not too good. They're only the tenth percent -- they're
12 out of the money.

13 But for that group students at the 90th percentile,
14 if I could give them one more factor that would push them up
15 from the 90th percentile to the 93rd or 94th percentile, one
16 can see that could have a very large effect on the
17 probability of admission.

18 And so this is an extremely important point: That
19 once a student has some combination of strengths, then one
20 more can really make a big marginal difference. So that one
21 additional strength can have a very large effect relative to
22 the set of previous strengths that they had.

23 Now, importantly, which of those strengths -- so
24 suppose a student has -- I talked about this before. But
25 suppose a student has three strengths and I move them to

1 four. Which of the ones is the one that caused them to have
2 the high probability is entirely unclear because it's one of
3 many.

4 So this kind of illustrates this concept of when
5 students are highly competitive and in the bubble range, it's
6 really due to a combination of strengths, and it's -- the
7 isolating effect of any one of many has to be put in that
8 context.

9 **Q.** Would you please turn to Tab 36 in your binder.

10 **A.** Yes.

11 **Q.** What is Defense Exhibit 718?

12 **A.** So it's average marginal effects of various factors by
13 admissions index decile.

14 **Q.** Is this a summary of the analysis you just described?

15 **A.** In part.

16 MR. WAXMAN: Your Honor, we offer Defense Exhibit
17 718 into evidence.

18 MR. MORTARA: No objection.

19 THE COURT: It's admitted.

20 (Defendant Exhibit 718 admitted into evidence.)

21 **Q.** Turn, please, Mr. Lee, to Demonstrative 97.

22 What is this showing?

23 **A.** So now what I'm going to do is I'm going to focus on the
24 marginal effect of African-American or Hispanic or other
25 ethnicity. And I apologize, I'm going to say Hispanic

1 sometimes when I mean Hispanic or other. So in my analysis
2 and Professor Arcidiacono's analysis, the Hispanic group
3 includes some other people of other ethnicities, Hawaiian,
4 Alaskan-American and stuff like that. So that's the group
5 we're talking about.

6 And so what I've done on the axis, as before, I've
7 ranked all the students in the application pool, all the
8 students, not just African-American students, but all the
9 students in the application pool, including the
10 African-American students, by their strength of admission and
11 from 1 to 10 deciles but not using any tip for race.

12 So when we get to the sixth or seventh decile,
13 we're into a range wherein students are getting to be having
14 some combination of strengths already. And one can see when
15 one gets -- first of all, when one is in the bottom half of
16 the distribution, when a student is in the bottom half of the
17 distribution, there really is no effect of race on the
18 additional probability of admission.

19 But when one gets to, say, like the eighth decile,
20 now one is well into the bubble range, independent of any tip
21 associated with race. So now a student would probably have,
22 say, two or even three strengths.

23 And now one of those in that case, having that base
24 of strength, being in addition an African-American applicant
25 would increase the probability of admission by an additional

1 25 percent. Being a Hispanic would increase their
2 probability of admission by 8 or 9 percent.

3 And similarly, if one goes now to the ninth decile,
4 now one is into the very steep part of the S-curve.

5 **Q.** Just to be clear, the ninth decile is from -- is the 80th
6 to the 89th percent highest group of applicants?

7 **A.** Yes. 89.999 percent, yes.

8 **Q.** Sorry. We lawyers are not good with decimal points, but
9 I take your point.

10 **A.** Yes. But it goes all the way up but does not touch.

11 **Q.** So the tenth decile is the decile between 90 and 100?

12 **A.** Yes, yes.

13 **Q.** Okay.

14 **A.** So if we focus on students -- now we're ranking all the
15 students -- I want to emphasize very clearly that I'm ranking
16 all the students by all of their strengths except race. So
17 there's some 200 factors in this model. So all 200 are in
18 there except any effect of race.

19 I'm putting these into these different groups. And
20 now in the ninth decile, this is the group of students who
21 are at the very steepest part of the S-curve. For that group
22 of students, if at that point I turn on the effect of being
23 African-American, then I'm going to increase their
24 probability of admission by about 50 percentage points. And
25 if I take an Hispanic student, for those students in the

1 ninth decile with these very strong combination of skills,
2 then I'm going to increase their probability of admission by
3 around 21 or 22 percentage points.

4 **Q.** And is this result that we're seeing here consistent with
5 what you would expect?

6 **A.** Yes, it's driven by this important feature of the S-curve
7 that I talked about yesterday in regard to the retirement
8 hypothetical.

9 So it's driven by the fact that, first of all,
10 very, very many students are out of the money. And when one
11 gets to the upper deciles, in particular the upper two or
12 three deciles, those are the students that have a combination
13 of strengths. And then with that base of, say, good
14 academics and a good extracurricular, then one additional
15 factor could make a substantial difference.

16 And that's exactly I believe how the admissions
17 process works.

18 **Q.** And these -- what we're showing here are marginal
19 effects, correct, not coefficients?

20 **A.** Yes. Again, these are average marginal effects across
21 all the students in that decile.

22 **Q.** And can you just remind us again of the difference
23 between the two?

24 **A.** Yes. So I want to emphasize that the average effect does
25 not mean that this is an effect for any given individual.

1 So, for example, in the ninth decile or eighth decile,
2 there's going to be students who get in and students who
3 don't get in. So the individual is always much different
4 than the average.

5 **Q.** What's termed --

6 THE COURT: I'm sorry, Mr. Waxman. Did you do this
7 analysis for Asians?

8 THE WITNESS: No, Your Honor, because there's no
9 tip for Asians in my model. It's minus .05, yeah.

10 THE COURT: Okay.

11 BY MR. WAXMAN:

12 **Q.** Mr. Lee, can we please have Demonstrative 98.

13 What is this showing?

14 **A.** This is a set of graphs very similar in setup meant to
15 contextualize or help interpret the bumps or boosts that we
16 see for African-American and Hispanic students in different
17 deciles compared to other important attributes of students.

18 So, for example, focusing on the lineage case in
19 the middle upper panel, what I've done is taken all the
20 students in the admissions pool from my admissions model and
21 I've turned off lineage. I said, I'm going to ignore lineage
22 and rank them by all other strengths.

23 Then for students in the eighth or ninth decile, by
24 that overall measure of combination of strengths, I'm going
25 to look at what would be the increase in admissions

1 probability if, say, starting in the ninth decile in this
2 very sharp S-curve part of the relationship, what would be
3 the effect of being a lineage student and, similarly, what
4 would be the effect of different ratings combinations.

5 Now, in the case of the ratings combinations, what
6 I've done is I've taken a student, for example, with an
7 academic rating of 1. I've taken all of those students and
8 I've turned them down to a 3, which is kind of the base group
9 for academics. Similarly for extracurricular or similarly
10 for personal.

11 So taking all the students but turning down the
12 academic 1s to an academic 3, re-rank them into the groups,
13 and now turn on their academic 1. And so this is the result
14 showing the average marginal effect, for instance, if a
15 student with -- who would otherwise be an academic 1, but
16 I've put them into, say, the eighth decile by turning off
17 their academic 1, and then I turn on their academic 1, it's
18 going to increase their probability of admission if they're
19 in the eighth decile with all these other strengths up to
20 around 65 percent or so.

21 **Q.** And, again, why do any of these factors have such a large
22 marginal effect for competitive applicants when the process
23 considers so many, many different factors?

24 **A.** Well, as I tried to emphasize, once one gets into the
25 bubble range, those are going to be students that have a

1 combination of strengths. So they're going to have two,
2 three, four strengths.

3 So when you're in that range, first of all, there's
4 a base of strength -- thank you -- and so you're starting,
5 let's say, around the 90th percentile. So one more factor
6 that pushes you up a relatively small amount in terms of
7 going, say, from the 90th to the 93rd percentile can have
8 quite a large effect on your probability of admission. So
9 that's a characteristic.

10 It's a combination of the fact that it's a multiple
11 dimensional admissions procedure. So there's multiple
12 factors, any one of which, if it was considered the marginal
13 one, could have a big positive effect.

14 **Q.** Can we go back to the previous demonstrative, 98, and
15 let's focus, and use, for example, the lineage applicants.
16 Let's consider a lineage applicant in decile 9. This would
17 be the applicants in the decile between 80 percent
18 probability of admission and 89 if I have you right, .999
19 percent?

20 **A.** Yes.

21 **Q.** What is roughly the average marginal effect of lineage
22 status for that applicant?

23 **A.** Reading off the graph, it's around 31 or 32 percentage
24 points.

25 **Q.** Does that mean that the applicant is likely to be

1 admitted?

2 **A.** It means that I don't, off the top of my head, know the
3 average -- the underlying average probability of admission.
4 It would mean that the probability of admission is far below
5 1. So any given individual, even in that group and even with
6 the lineage turned on, would not be assured admission.

7 **Q.** And so is lineage -- would this mean, this increase in
8 their probability of admission mean that lineage status is
9 decisive for that applicant?

10 **A.** No, not at all because you recall to get to the ninth
11 decile they would have to have a combination of these other
12 strengths. So if I took a student who, say, is an academic
13 2, an extracurricular 2 and an athletic 2, got them into the
14 ninth decile and then turned on their lineage, then I would
15 see an effect like a 30 percent point.

16 But if I gave them the lineage and the academic 2
17 and the extracurricular 2 and turn on the athletic 2, I would
18 see a similar boost. So any one of those four factors would
19 have this large marginal effect because I'm starting with a
20 base of three other factors that are strong.

21 **Q.** Consider an African-American applicant in decile 9. What
22 is, roughly, the average marginal effect of race for that
23 applicant?

24 **A.** It's just over 50 percentage points.

25 **Q.** And does that mean that race is decisive for that

1 applicant?

2 **A.** No, not at all. Because there are other factors that are
3 contributing to getting them to the ninth decile and at that
4 point, on average, it's true that there's an increase in
5 probability, big increase in the probability of admission for
6 that group, but that's on top of this other base.

7 And even accounting for that increase in
8 probability, there is still uncertainty as to whether they're
9 going to get in or not.

10 **Q.** Is it possible to think of these graphs as showing the
11 magnitude of the various, quote, tips for highly competitive
12 applicants?

13 **A.** Yes. This is showing that the magnitude of any specific
14 tip taken individually, one at a time, can appear to be quite
15 large in a process which values many dimensions of strength
16 when one gets into the bubble range.

17 THE COURT: Why are the tips in the ninth
18 percentile worth more than in the tenth percentile?

19 THE WITNESS: Good question, Your Honor.

20 The reason why is by reference to the S-curve.
21 When you're up to the high end, if you're really high, like,
22 let's say, someone who gets an academic rating of one 1 --
23 thank you Mr. Lee -- if you're at an academic -- if you're in
24 the tenth decile without your academic 1, an academic 1 is
25 going to put you to 100 percent. So the marginal boost --

1 they're so strong already that it doesn't have far to go.

2 THE COURT: Sorry. Flagging.

3 MR. WAXMAN: Did that answer Your Honor's question?

4 THE COURT: Yes. Doesn't make any difference for
5 them because they're already getting in, basically.

6 THE WITNESS: They're at the upper part of the
7 S-curve, so the gap that they can possibly go up is smaller,
8 yes.

9 BY MR. WAXMAN:

10 Q. If somebody doesn't have one of these tips, say the
11 legacy tip, does that person suffer a penalty?

12 A. Well, again, that's not my interpretation of the process.
13 My interpretation is that there's kind of a baseline group,
14 and then from that base, anybody who has a valuable attribute
15 like an extracurricular rating of 1 gets a tip. Or, you
16 know, more specifically thinking of somebody who has a very
17 specific skill like a very high level of academic
18 achievement, those individuals can get a tip.

19 But that doesn't mean that the other people are
20 being disadvantaged by the presence of those highly talented
21 people, in my view.

22 Q. Do these graphs show, for example, that Harvard
23 discriminates against non-legacy applicants?

24 A. That would not be my interpretation, no.

25 Q. Did you hear Dr. Arcidiacono concede that under his

1 analysis there is a white penalty?

2 **A.** I heard him say that, yes.

3 **Q.** Do you agree that there is a white penalty?

4 **A.** That would -- no. No, that's not the way I would pose
5 it, no.

6 **Q.** Can you please summarize your conclusions regarding the
7 effect of race in the admissions process?

8 **A.** Yes. So I have two rather straightforward summary
9 points.

10 The first is that if one looks just at race per se
11 as a variable, it has a very, very small, almost negligible
12 effect on the overall probability of admission.

13 So race in isolation has almost no contribution to
14 the overall explanatory power, is very, very small, and much
15 below many, many other factors, including variables like
16 contextual factors and certainly including variables like the
17 profile ratings. So that's the first conclusion.

18 The second conclusion is that when you get to
19 highly competitive applicants in the upper ranges of skill of
20 the applicant pool who have characteristics that already put
21 them in the bubble and already put them in a range where
22 they're competitive, then the presence of being an
23 African-American or being an Hispanic can be one more factor
24 that increases their probability of admission in some cases
25 by a notable amount.

1 **Q.** Thank you.

2 Before we turn to the racial balancing claim that
3 is Count 3 of the complaint, I just want to return you back
4 to the personal rating because my even older partner,
5 Mr. Lee, thinks that I have not asked questions that
6 clarified something sufficiently.

7 So that he's clarified, let me just beg your
8 indulgence on a couple of questions.

9 Professor Arcidiacono claims that the way Harvard
10 discriminates against Asian-Americans is by the personal
11 rating. Do you understand that?

12 **A.** Yes, I believe he has asserted that that's one of the
13 primary or the primary mechanism by which they do it, yes.

14 **Q.** Now, let me focus you on the gap between whites and
15 Asian-Americans on the personal rating. Do you have that in
16 mind?

17 **A.** Yes.

18 **Q.** For both the ALDC and the non-ALDC applicants, the
19 Asian-American personal ratings were lower than for whites.
20 Correct?

21 **A.** Yes, that's correct.

22 **Q.** Was the difference greater for the ALDCs or the
23 non-ALDCs?

24 **A.** Well, the difference is actually greater. In other
25 words, the Asian-American ALDCs are further behind the white

1 ALDCs than is the case for the non-ALDCs, yes.

2 **Q.** But you understand that Professor Arcidiacono has
3 conceded that there is no discrimination against
4 Asian-American applicants who are in the ALDC group?

5 **A.** Yes, that's my understanding, yes, clearly.

6 **Q.** And the gap is smaller between Asian-Americans and whites
7 for the non-ALDC group; is that correct?

8 **A.** The gap in the personal rating is smaller for the
9 non-ALDC group, yes.

10 **Q.** But in that instance, his contention is there is
11 discrimination against Asian-Americans, correct?

12 **A.** Yes.

13 MR. WAXMAN: Is that quite clear to you, Mr. Lee?

14 MR. LEE: It is now. It happens with age.

15 **Q.** Let's turn now to the racial balancing claim, Count 3 of
16 the complaint. And can we have Demonstrative 99 and the
17 third question you examined: Whether statistics support
18 SFFA's claim of racial balancing.

19 Did you hear or review testimony earlier in this
20 trial on the use of one-pagers?

21 **A.** I did, yes.

22 **Q.** And you heard -- did you hear Mr. Mortara argue in his
23 opening statement that Harvard uses the one-pagers, what are
24 referred to as the one-pagers to, quote, match up the racial
25 composition of the class to the prior year?

1 Did you hear that?

2 **A.** I recall that, yes.

3 **Q.** Did you do any statistical analysis that sheds light on
4 whether Harvard actually acted in that way?

5 **A.** I did, yes.

6 **Q.** And what did you find?

7 **A.** Well, what I found is that, in my view, there's no
8 evidence that that's going on.

9 **Q.** Can you please turn to Tab 32 in your binder and tell me
10 when you've found Defense Exhibit 711.

11 **A.** Yes.

12 **Q.** And what is this document?

13 **A.** So this is the annual percentage change in various race
14 groups in the proportion of admitted students and annual
15 percentage change in various race groups in the proportion of
16 matriculating students.

17 MR. WAXMAN: Your Honor, we offer Defense Exhibit
18 711 into evidence.

19 MR. MORTARA: No objection.

20 THE COURT: Admitted.

21 (Defendant Exhibit 711 admitted into evidence.)

22 **Q.** Mr. Lee, let's display demonstrative 100.

23 And what is this showing?

24 **A.** So this is meant to directly address the question of
25 whether there's somehow year-to-year balancing in the

1 composition of the admitted pool of students, racial
2 composition of the admitted pool of students at Harvard.

3 So what I've done for each of these four racial
4 groups is I've -- and I'm using here data that is not -- it's
5 a combination of other data because I'm able to go back all
6 the way to 2001 for using some aggregated data that Harvard
7 has made available.

8 So I'm showing, for example, the percentage change
9 in the share of one of these racial groups from the previous
10 year to the current year.

11 **Q.** So can you illustrate that by showing us a few -- pick
12 out a few years?

13 **A.** Yes. So let's start with the African-American admitted
14 students 2001, minus 4 percent. It would say that relative
15 to the previous year, the share of African-American students
16 in the admitted pool of students, all the students who are
17 admitted, their share fell by 4 percent.

18 In 2002, between -- that's relative to 2001.

19 From 2001 to 2002 it then rose by 14 percent. If
20 one looks, for example, at the Asian-American graph, one can
21 see from 2000 to 2001, their share, the Asian-American share
22 in the admitted pool, rose by 5 percent between 2000 and
23 2001. It rose by another 5 percent between 2001 and 2002.
24 Then it fell by 8 percent between 2002 and 2003.

25 And one can see if one looks at this graph a

1 pattern of often fairly large changes in the year-to-year
2 shares of each race group in the admitted pool.

3 **Q.** And if Harvard were trying to match the racial
4 composition of the prior class, what do these charts suggest?

5 **A.** Well, they're not doing a very good job, I guess, would
6 be one way of putting it. Another way to say it would be it
7 doesn't seem like that that could possibly be going on
8 because these changes -- these are big percentage changes in
9 year to year.

10 **Q.** So in addition to analyzing the year-to-year changes in
11 the pool of students who get acceptance letters, did you also
12 analyze the change in the share of the matriculating class,
13 that is, the students who actually attend?

14 **A.** I did, yes.

15 **Q.** And please display 101.

16 And what is this showing?

17 **A.** So this is an exactly parallel analysis now focusing on
18 the shares of matriculating students. So the students who
19 are offered admission and decide to take it up and come to
20 Harvard, agree to come, from year to year for each of the
21 four racial groups.

22 So, for example, focusing on the Asian-American in
23 the upper left from 2000 to 2001, the Asian-American share of
24 the matriculating students rose by 5 percent; 2002, rose by
25 7; '3, fell by 7 and so on.

1 **Q.** So what do you conclude based on the data that we've just
2 discussed?

3 **A.** Well, again, it seems there's not any evidence of trying
4 to stabilize the year-to-year racial shares of the
5 matriculating class.

6 **Q.** Did you look at any other data on these issues?

7 **A.** Yes, I looked at a broader perspective on the actual
8 levels of the shares of each of the race groups over time.

9 **Q.** Can you please turn to Tab 33 in your book and tell me
10 when you've found Defense Exhibit 713.

11 **A.** Yes.

12 **Q.** What does that show?

13 **A.** It's two exhibits, the Asian-American, African-American
14 and Hispanic shares of applicants to the class of 2018 [sic]
15 to 2019, and the shares admitted to the class of 2018 [sic]
16 to 2019.

17 **Q.** When you said it's two exhibits, I think what you meant
18 to say is it's two pages to the exhibit.

19 **A.** Two pages, sorry.

20 MR. WAXMAN: Your Honor, we offer Defense 713
21 into evidence.

22 MR. MORTARA: No objection.

23 THE COURT: Admitted.

24 (Defendant Exhibit 713 admitted into evidence.)

25 **Q.** Let's turn to slide 102, please, Mr. Lee. What is this

1 showing?

2 **A.** Okay. So this is showing the share -- the applicant
3 pool. So this is the share of all the students who apply to
4 Harvard who are in different racial groups between 1970 and
5 2019. And this is the share overall, including in the
6 denominator, international students. So slightly different
7 than some of the shares that we've talked about before or
8 things we've talked about before.

9 **Q.** Let's turn now to Defense Demonstrative 10.103.

10 And what is this showing?

11 **A.** This is showing the share of admitted -- the share -- the
12 different race groups in the admitted class from 1980 to
13 2019.

14 **Q.** Now, Mr. Lee, if you can display slide 104. I think
15 we'll see the two graphs together on one page.

16 Looking particularly at the years in question in
17 this case, which chart shows more year-to-year variation?

18 **A.** To me it seems clear that, for instance, looking at
19 Hispanic and African-American, you can see wide swings from
20 year to year, particularly in the Hispanic share, but also
21 the African-American share of admitted students, whereas the
22 shares of applicants are a little bit more stable. So this
23 is the opposite pattern than one would expect to see if
24 Harvard was trying to stabilize the admitted students
25 relative to the students who apply.

1 So if they were really trying to stabilize the
2 shares of admitted students, then they would take kind of a
3 noisy share of applicants and create a smooth or constant
4 share of admitted students. And the pattern is actually
5 completely contrary to that.

6 **Q.** Let's turn to Demonstrative 105, please.

7 And let's look now at the last question you
8 addressed in this case.

9 MR. WAXMAN: Your Honor, it's 12:30 and we are at
10 great stopping point.

11 THE COURT: We will recess until 1:00. Thank you,
12 all.

13 (Recess taken 12:33 p.m.)
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1 **** AFTERNOON SESSION ****

2 THE CLERK: All rise. Court is in session. Please
3 be seated.

4 THE COURT: Did you get lunch?

5 MR. WAXMAN: I did, thank you.

6 THE COURT: Did you get lunch, Dr. Card?

7 THE WITNESS: Yes, I did.

8 THE COURT: All right. Excellent. When you're
9 ready.

10 MR. WAXMAN: Thank you.

11 BY MR. WAXMAN:

12 **Q.** Looking at demonstrative 105 and the last question you
13 were asked to address in this case, the effect that
14 eliminating race on the admissions process would have on the
15 composition of Harvard's class.

16 Before we discuss your analysis, Professor Card,
17 are you expressing any view on what characteristics Harvard
18 should value in an admitted class?

19 **A.** No.

20 **Q.** Did you review the report produced by the committee to
21 study race-neutral alternatives in Harvard College admission?

22 **A.** Yes, I did.

23 **Q.** And what was your understanding of the division of labor
24 between you and the committee?

25 **A.** My understanding was that I was to try and do essentially

1 the calculations involved in evaluating alternative
2 race-neutral alternatives, first to find some of them, to
3 look at the ones that Mr. Kahlenberg had done, and then
4 provide the numbers that the committee could then use.

5 **Q.** Was it your job or the committee's job to decide whether
6 classes with those characteristics would or would not satisfy
7 Harvard's educational objectives?

8 **A.** That was entirely the committee's job.

9 **Q.** Let's look at demonstrative 106, please. Can you please
10 walk us through the steps of your analysis.

11 **A.** Yes. So there's three basic steps. The first step is to
12 consider the composition of the class if Harvard were to
13 remove consideration of race entirely in the admissions
14 process.

15 The second step would be to evaluate how the
16 composition of the class would change if it employed various
17 race-neutral alternatives.

18 And the third step was to evaluate how the
19 composition of the class would change if it used the approach
20 preferred by Mr. Kahlenberg.

21 **Q.** So let's start with the effect of eliminating race.

22 Did you hear Dean Fitzsimmons and others testify
23 about Harvard's existing race-neutral efforts to promote
24 diversity?

25 **A.** I did, yes.

1 **Q.** If Harvard were to continue with all of those efforts but
2 then eliminate all consideration of race, would the racial
3 composition of its class change?

4 **A.** Yes, I think so.

5 **Q.** How did you calculate that?

6 **A.** So what I did was I -- for today's purposes, I'm going to
7 focus on the class of 2019, which is the last of the six
8 years in the data set that we've analyzed.

9 **Q.** May I interrupt you? Is that also the class that
10 Mr. Kahlenberg identified and focused on?

11 **A.** Yes.

12 **Q.** Okay.

13 **A.** So what I did is I took my model for that class, and I
14 used the exact model that I developed earlier and we've
15 talked about extensively, and I took that model and
16 effectively turned off all of the preference or whatever
17 effects associated with race and then, using that analysis,
18 recalculated the probabilities of admission for each student
19 without any race tips or whatever. And then considered
20 through simulation methods the characteristics of the class
21 that would result in that case.

22 **Q.** All right. If we could have Slide 107, please.

23 What is this showing?

24 **A.** So this is showing two charts. The left chart is the
25 racial composition of the actual admitted class for the class

1 of 2019. And I'm showing the five racial categories that
2 we've been using throughout the analysis and is employed in
3 all of my statistical models and so on. So that class was
4 40 percent white, 24 percent Asian-American, 14 Hispanic or
5 other, 14 percent African-American, and 8 percent of those
6 students had race missing.

7 And the second bar --

8 **Q.** Thank you.

9 **A.** -- is my estimate. I should say this is an estimate
10 under the assumptions that the set of students who actually
11 apply to Harvard stayed the same in 2019, but the procedures
12 and admissions were changed to remove consideration of race.
13 So that class would be 48 percent white, 27 percent Asian,
14 9 percent Hispanic, 6 percent African-American, and
15 10 percent missing race.

16 **Q.** Now, what data did you use for this analysis? This is
17 again the class of 2019.

18 **A.** Yes. I'm using the NEVO database for the actual
19 characteristics of the students who applied to the class,
20 merged with the College Board data on information on the
21 characteristics of schools and neighborhoods.

22 **Q.** Did you do a similar analysis for the class years in this
23 case other than 2019?

24 **A.** Yes, I did. I did an analysis for all of the other
25 years.

1 **Q.** And were the results similar?

2 **A.** Yes. Broadly similar, yes.

3 **Q.** Let's turn to Slide 108 and look at the second step. Can
4 you remind us what the second step of your analysis was?

5 **A.** Right. So the second step of my analysis is to try and
6 evaluate how the composition of the class would change if
7 Harvard employed various race-neutral alternatives.

8 **Q.** And how did you decide which alternatives to examine?

9 **A.** Well, some of them were the kind of race-neutral
10 alternatives that have been proposed or discussed in the
11 existing literature.

12 There is an existing literature in this area. Most
13 often the existing literature is evaluating proposals that
14 have been implemented or have been considered being
15 implemented in different settings, typically not a
16 Harvard-type setting.

17 And then I also used -- looked at the kind of
18 proposals that were in Mr. Kahlenberg's report.

19 **Q.** Were there proposals that you considered from the
20 literature that were not in Mr. Kahlenberg's report?

21 **A.** Yes. In fact, I do consider one of those.

22 **Q.** Which is that?

23 **A.** I considered the possibility of eliminating the use of
24 the SAT in evaluating students, which is -- a number of even
25 fairly elite schools are doing that or have considered doing

1 that and a number of other schools as well.

2 **Q.** Mr. Kahlenberg and SFFA have not proposed that; is that
3 correct?

4 **A.** That's correct, yes.

5 **Q.** Now, let's look at demonstrative 109, please. And could
6 you identify the first -- can you identify the categories of
7 race-neutral alternatives that you explored?

8 **A.** Right. First I'm going to show what happens if in
9 addition to eliminating the effect of race in the admissions
10 process Harvard were also to eliminate policies that -- in
11 particular that Mr. Kahlenberg has alleged to benefit white
12 applicants.

13 Then I'm going to evaluate what would happen if
14 Harvard tried to change the admissions process and put more
15 weight on candidates with lower levels of socioeconomic
16 status as measured by the variables that are available in the
17 NEVO database.

18 Then I'm going to look at a couple of policies that
19 Mr. Kahlenberg points to that may -- that he argues could
20 promote diversity.

21 And then I'm going to look -- at the end, the
22 fourth thing I'm going to do is look at place-based-type
23 admissions policies.

24 **Q.** Let's look at the first. Can you identify the category
25 of practices that you analyzed under policies that allegedly

1 benefit white applicants?

2 **A.** Well, the main thing I'm doing here is I'm turning off
3 any tip associated with ALDC groups. So I'm taking --
4 eliminating ALDC. I'm going to look at the effect of ending
5 early action, which Harvard did and then restored, and I'm
6 going to consider eliminating consideration of standardized
7 test scores.

8 **Q.** So looking at demonstrative 112, please. Let's start
9 with eliminating ALDC consideration. First of all, can you
10 please turn to Tab 37 of your binder --

11 **A.** Yes.

12 **Q.** -- and tell me when you've found Defense Exhibit 720.

13 **A.** 720 is the simulated racial composition of the admitted
14 class after removing consideration of race, lineage, athletic
15 recruit status, whether an applicant's parents are Harvard
16 faculty and staff, or on the dean's or director's interest
17 list.

18 MR. WAXMAN: Your Honor, we offer Defense
19 Exhibit 720.

20 MR. MORTARA: No objection.

21 THE COURT: Admitted.

22 (Defendant Exhibit No. 720 admitted.)

23 MR. WAXMAN: Mr. Lee, may we have Slide 112 again?

24 BY MR. WAXMAN:

25 **Q.** What is this showing? First of all let me just ask you,

1 are the left-hand bar and the middle bar the same as the two
2 bars that we had previously; that is, the actual admitted
3 class and then what happens if you remove consideration of
4 race, what the model would predict would happen to the ethnic
5 and racial composition of the class if you remove
6 consideration of race? Is that right?

7 **A.** Yes.

8 **Q.** And is that right for all of these slides we're going to
9 be seeing for the next few minutes?

10 **A.** Yes. So as a benchmark, all of the slides will always
11 have the actual admitted -- the racial composition of the
12 actual admitted class and then the racial composition if one
13 was to remove consideration of race. And then from there,
14 I'm going to proceed.

15 **Q.** Okay. So what does the third column here add.

16 **A.** That shows the racial composition if, in addition to
17 removing consideration of race, one were to turn off the tips
18 associated with ALDC.

19 And one can see a couple of important features.
20 First in terms of the race-missing group, no large effect.
21 African-American fraction would fall slightly from 6 percent
22 to 5 percent. Hispanic and other fraction would be about
23 constant. Asian fraction would rise by about 4 percentage
24 points and the white fraction would fall about 4 percentage
25 points.

1 **Q.** Are you aware of the claim in this case that the children
2 of donors or potential donors may be on the dean's or
3 director's interest list?

4 **A.** Yes.

5 **Q.** And to be clear, when you simulated eliminating the
6 consideration of the ALDC attributes, one of the things you
7 included was eliminating consideration of the interest list.
8 Am I right?

9 **A.** Yes. Because that's included in the D of the ALDC group.

10 **Q.** Do you recall that Mr. Kahlenberg also suggested that
11 Harvard eliminate what it calls the Z list or the offer of
12 deferred admission for certain applicants?

13 **A.** Yes.

14 **Q.** Did you simulate that?

15 **A.** Well, actually, yes. It's simulated here directly, in
16 the sense that I'm simulating the actual set of people who
17 were admitted in 2019, including anybody who was admitted for
18 deferred admission. So I'm essentially assuming there's one
19 admissions decision.

20 **Q.** Let's turn to early action. How did you assess the
21 effect of eliminating early action?

22 **A.** Well, as I think has been clear from some of the earlier
23 testimony, in the case of early action, there's direct and
24 empirical evidence available from the record because Harvard
25 had early action for quite a long time and then eliminated it

1 for a number of years and then restored it. So one can use
2 comparisons of characteristics of the class when early action
3 is in place and when it's been eliminated.

4 **Q.** And did you look at whether the racial composition of the
5 applicant and admit pools changed when early action was
6 eliminated?

7 **A.** Excuse me for a second. Yes, I did.

8 **Q.** And what did you find?

9 **A.** I found that there doesn't seem to be any discernible
10 shift in either of those.

11 **Q.** Did anything change?

12 **A.** Yes.

13 **Q.** What was that?

14 **A.** What changed very consistently -- and this was, in fact,
15 noting by an evaluation done by Harvard itself -- was that
16 the matriculation rate of certain students fell.

17 **Q.** Would you please turn to Tab 45 of your binder.

18 **A.** Yes.

19 **Q.** What is Defense Exhibit 728?

20 **A.** 728 is share of applicants by race before and after
21 changes to early admission and share of admitted students by
22 race before and after changes to early admission.

23 MR. WAXMAN: Your Honor, we offer Defense
24 Exhibit 728 in evidence.

25 MR. MORTARA: No objection, Your Honor.

1 THE COURT: Admitted.

2 (Defendant Exhibit No. 728 admitted.)

3 BY MR. WAXMAN:

4 Q. Mr. Lee, turning to demonstrative 113, what does this
5 show?

6 A. So this is a before, during, and after comparison of the
7 period when Harvard had early action available, 2000 to 2011,
8 during the period when it had abolished that and then during
9 the period when it restored it.

10 I'm focusing on the matriculation rate, which is
11 the fraction of students who were offered admission who come
12 to Harvard. And so I'm showing it for these four groups:
13 whites, Asian-Americans, African-American, Hispanic or other,
14 and unknown.

15 Q. And what do you find?

16 A. One can see that there's potentially no change in, for
17 example, the Asian-American matriculation rate. But there's
18 a pretty large and discernible drop in the fraction of
19 African-American and Hispanics or other students who
20 matriculate. They're already the lowest of the groups. So
21 their matriculation rate compared to the earlier period and
22 compared to the later period falls by 5 to 6 percentage
23 points, which is something like nearly a 10 percent drop in
24 the matriculation rate.

25 Q. Did you review documents in this case about why Harvard

1 actually decided to reinstate early action?

2 **A.** Yes.

3 **Q.** And did you hear or review testimony on that issue
4 earlier in this trial?

5 **A.** Yes, I did.

6 **Q.** Is your analysis of the data consistent with those
7 historical documents and the testimony in this court?

8 **A.** Yes. I think all of us find that all of that analysis is
9 totally consistent with this analysis and suggests that
10 elimination of early action would -- if it had any effect,
11 the main effect it would be would be to reduce the fraction
12 of African-American and Hispanic students who are in the
13 Harvard class.

14 **Q.** So did you draw any conclusion from these data about the
15 likely effect if Harvard were to eliminate early action
16 again, as Mr. Kahlenberg thinks it should?

17 **A.** My conclusion is that that would work contrary to the
18 goal of trying to increase the representation of these
19 underrepresented groups. So my conclusion is it works in the
20 wrong direction.

21 MR. WAXMAN: Mr. Lee, can we have demonstrative
22 115, please.

23 **Q.** Let's turn now to your analysis of increasing
24 socioeconomic preferences. How did you conduct that
25 analysis?

1 **A.** Well, this is a highly -- at least somewhat artificial
2 exercise. It's comparable to exercises that have been done
3 in the literature. I'm going to take information that's
4 available in the database about a number of indicators of low
5 socioeconomic status. I'm going to, for short, call it "SES"
6 because I am going to stumble over socioeconomic.

7 So I'm going to look at a set of factors that are
8 associated with low-SES status. And I'm going to imagine
9 simulations where I change the Harvard admissions procedure
10 and consider what would happen if in addition to what they're
11 currently doing for evaluating low-SES students, which as far
12 as I can tell already in my model that they're already giving
13 them some boost, I'm going to increase the boost that this
14 group of students get.

15 MR. WAXMAN: Mr. Lee, may we see Slide 116?

16 **Q.** Can you walk us through this slide?

17 **A.** Yes. What I'm going to do is I'm going to consider four
18 factors. Each of these is a simple yes/no about individuals.

19 Are you identified as disadvantaged? In other
20 words, was that a flag in the admissions file which we've
21 been using in my admissions model?

22 Are you a first-generation college student? So did
23 neither of your parents go to college.

24 Did you apply for a fee waiver, which is an
25 indicator of relatively low-SES status.

1 And finally from the College Board data, are you
2 coming from a neighborhood where family income is 65,000 or
3 below, which is the -- in 2019 was -- for the class of 2019
4 was the reference point. Anybody whose family income was
5 \$65,000 or below essentially got to go to Harvard for free
6 with no parental contribution.

7 And I'm going to combine these four and I'm going
8 to sum. A student that has all four of these, I will
9 consider them to have a 1X, one times boost. A student who
10 has two of these will get a .5X. The student who has just
11 one will be a quarter of an X.

12 And then what I'm going to do is I'm going to
13 gradually go from 1X to 2X to 3X and multiply up this
14 combined set of factors.

15 MR. WAXMAN: May we have Slide 117, please.

16 **Q.** What is this showing?

17 **A.** This is helping to understand what does it mean to impose
18 a 1X boost. So with my actual model but on average across
19 all domestic students, the average application rate --
20 average acceptance rate is 7 percent.

21 And for a student that had a 1X boost -- in other
22 words, all four of these components were turned on, and I was
23 in a 1X simulation -- their probability of admission would
24 rise to 36 percent. So as we've been talking about before,
25 the average marginal effect of a 1X boost for someone who has

1 all four categories of low-SES status would be 29 percentage
2 points.

3 I'm going to show some simulations that also
4 increase that boost up to ranges of 4 and far beyond that.
5 So at a 4X boost, in other words, four times the boost that
6 I'm calling a standard boost.

7 **Q.** That is the boost that Harvard is currently giving it?

8 **A.** Harvard is currently giving a 0X boost.

9 THE COURT: I'm sorry. Where does the 29 come
10 from?

11 THE WITNESS: The difference between 7 and 36, Your
12 Honor.

13 THE COURT: I see it. Thank you.

14 THE WITNESS: I'm speaking a little too quickly in
15 anticipation of --

16 BY MR. WAXMAN:

17 **Q.** -- of finishing. Sorry. Finishing with me. He's so
18 eagerly anticipating his dialog with you, Mr. Mortara, as are
19 we all.

20 **A.** On the right panel, I'm showing when I increased the
21 boost for this combined set of factors to a 4 times or 4X
22 level, so again as a benchmark, the average probability of
23 admissions is 7 percent for domestic students.

24 And in my current model there's a no boost. Now,
25 that doesn't mean that disadvantaged students aren't getting

1 some benefit, but this means there's no extra boost. So this
2 is the extra boost.

3 With 7X -- excuse me -- with 4X boost, somebody who
4 would be kind of at a 7 percent probability of admission
5 would rise to 100 percent. At a 4X boost, these four factors
6 essentially allow to you get in with certainty.

7 **Q.** So in other words, an applicant who had simply an average
8 probability of admission of all applicants, 7 percent, now
9 slightly less, if the applicant were given what you're
10 calling a 4X boost over the current boost that Harvard gives
11 would be admitted, period?

12 **A.** Yes.

13 **Q.** Just by virtue of that?

14 **A.** Yes.

15 **Q.** Did you analyze -- when you were analyzing the low-SES
16 boost, were you analyzing it in isolation or combined with
17 other race-neutral alternatives?

18 **A.** No. So I'm going to start by turning off all of the race
19 tips and then eliminating the preference for ALDC groups.

20 **Q.** Please turn to Tab 38 of your volume, please, and tell me
21 when you've found Defense Exhibit 721.

22 **A.** Yes.

23 **Q.** Does this show the results of the various simulations you
24 just described?

25 **A.** Yes, it does.

1 MR. WAXMAN: Your Honor, we offer Defense
2 Exhibit 721 into evidence.

3 MR. MORTARA: No objection.

4 THE COURT: Admitted.

5 (Defendant Exhibit No. 721 admitted.)

6 MR. WAXMAN: Mr. Lee, would you please display --
7 yes, thank you -- Slide 118.

8 BY MR. WAXMAN:

9 Q. There's a lot of columns here. What does Slide 1118
10 show?

11 A. Yes. As before, the first two columns are ones we've
12 seen before, so actual composition of the class, just
13 removing of the effect of race.

14 And then as we go across from there, I'm
15 simultaneously removing ALDC consideration and offering a 1X,
16 2X, 3X, and so on boost for low-SES students. I'm seeing
17 what that kind of simulated admission model, what the racial
18 composition of the class would be under that simulation, each
19 of those simulations.

20 Q. And so what SES boost would you calculate would be
21 required after eliminating consideration of race, removing
22 any ALDC consideration in order to have a class with a
23 combined level of African-American and Hispanic
24 representation comparable to the class of 2019?

25 A. Yes. So the class of 2019 is about 28 percent combined

1 African-American, Hispanic, or other. And so looking across
2 the columns, one can see if I get to something like a 4X
3 boost, it's about 27 percent, the combined fraction.

4 So I'll use that as an illustrative benchmark in
5 the next slide.

6 **Q.** And if I recall your testimony, that is the boost that
7 essentially automatically puts in any applicant among the
8 entire applicant pool with an average probability of
9 admission?

10 **A.** Yes.

11 **Q.** And what boost would be required, according to your
12 model, what your model predicts, to simulate a class that
13 would have a share of the admitted class represent the share
14 of the African-American share of the 2019 class?

15 **A.** Yes. So the 2019 class is about 14 percent
16 African-American. And according to these simulations, one
17 would have to go out to something like a 10X boost to get
18 that share.

19 **Q.** Now, under these simulations, would other characteristics
20 of the class change if you applied a large low-SES boost?

21 **A.** Yes.

22 MR. WAXMAN: Please turn, Mr. Lee, to Slide 118.
23 I'm sorry, 119. Yes.

24 **Q.** What does Defense Demonstrative 10 .119 show?

25 **A.** So this is summarizing characteristics of the class in

1 terms of these four key profile ratings.

2 If compared to the current class, so the actual
3 classes fractions of the four types of strengths is shown in
4 blue. So for instance, 75 percent or so of the actual
5 admitted class had an academic 1 or 2. And this would show
6 what would happen to those fractions of 1 or 2 rating on
7 academic, extracurricular, personal, and athletic under that
8 simulated admissions system with a 4X boost for low-SES
9 students.

10 **Q.** So if I'm understanding this correct with respect to, for
11 example, the academic rating, the predicted class with a 4X
12 boost, that is the boost that you estimated would be required
13 in order to achieve a share of the admitted class comprising
14 African-Americans, Hispanics, and other that are represented
15 in the class of 2019, would produce -- is predicted to
16 produce a class with 13 percent fewer academic 1s and 2s,
17 correct?

18 **A.** Yes. 9 percent fewer extracurricular 1 or 2s, 11 percent
19 fewer with the personal rating at 1 or 2, and 33 percent
20 lower with the athletic rating 1 or 2.

21 **Q.** Do you know what would happen with a 10X boost?

22 **A.** It would be in the same direction but bigger drops in
23 these components.

24 **Q.** Let's turn to the alternative of eliminating
25 consideration of standardized test scores. That is a

1 simulation, if I understand your testimony, that
2 Mr. Kahlenberg didn't propose but has been proposed and done
3 in some institutions, correct?

4 **A.** Yes. My understanding is a number of schools have
5 already done it and are talking about it, yes.

6 **Q.** And did you simulate eliminating test score --
7 standardized test score consideration?

8 **A.** Yes, I did.

9 **Q.** And did you do so on its own or combined with alternative
10 practices?

11 **A.** So I did it building on the previous simulations. So I
12 did all of the things I'd done in the previous simulations
13 and now in addition remove any consideration of SAT.

14 **Q.** Would you please turn to Tab 39.

15 **A.** Yes.

16 **Q.** Does this show the results of the simulations you just
17 described?

18 **A.** Yes.

19 MR. WAXMAN: You were, we offer Defense
20 Exhibit 722.

21 MR. MORTARA: No objection.

22 THE COURT: You've broken Mr. Mortara's spirit.

23 MR. MORTARA: For the record, Your Honor, I think
24 you'll see he hasn't.

25 MR. WAXMAN: It's not even a goal of mine. May it

1 be admitted, Your Honor?

2 THE COURT: Yes, it may.

3 (Defendant Exhibit No. 722 admitted.)

4 BY MR. WAXMAN:

5 Q. Please turn to demonstrative 120 and tell us what this
6 shows.

7 A. So this is a set of simulations very similar to the
8 previous one. So the first is the actual class, the second
9 is just removing the consideration of race, and then from
10 then on I'm eliminating any ALDC preferences. I'm
11 eliminating the use of standardized test components in the
12 admissions model, and I'm imposing a 1X to 10X low-SES boost
13 as before.

14 Q. What level of boost would be required in order to
15 simulate a class that had a share -- an admitted class that
16 had a share of African-American, Hispanic, or other students
17 comparable to the actual admitted class of 2019?

18 A. Again, the admitted class was about 28 percent, those
19 combined groups. And so looking across the columns here, one
20 with need to go to something like a 3X boost to get to around
21 that level.

22 Q. And what boost does the model predict would be required
23 in order to produce an African-American share of the admitted
24 class similar to the class of 2019?

25 A. That would be like a 5 or 6 percent X boost.

1 **Q.** And would other characteristics of the class change if
2 you did that?

3 **A.** Yes. As before.

4 **Q.** Let's look at Slide 120, please. And what is this
5 showing?

6 **A.** This shows that relative to the actual class in terms of
7 their fractions with an academic 1, 2, or extracurricular 1,
8 2, and so on, the simulated class, if I was to do this
9 combination of policies, the fraction with an academic rating
10 of 1 or 2 would fall by 17 percent; extracurricular rating
11 would fall by 7 percent; personal rating would fall by
12 7 percent; athletic rating by 27 percent.

13 MR. WAXMAN: Mr. Lee, please put up 122.

14 **Q.** Now, let's turn back to category C. You said earlier
15 that you also assessed policies that Mr. Kahlenberg has
16 suggested might promote diversity. Correct?

17 **A.** Yes.

18 **Q.** What policies did you assess?

19 **A.** They're the three shown below there.

20 I looked at the possible, potential impact of
21 increasing the number of transfer students who are admitted
22 to Harvard, of trying to increase recruiting of disadvantaged
23 students, and increasing financial aid.

24 **Q.** Let's turn to -- well, how did you assess the effect of
25 increasing transfer admissions?

1 **A.** So here we've got some empirical evidence because we have
2 a number of students who applied over the sample period who
3 were actually applying from other colleges and universities.
4 And so I take a look at their characteristics relative to the
5 existing class.

6 **Q.** In order to show what?

7 **A.** In order to show first how they compare in terms of race
8 and ethnicity differences; and second, how they compare in
9 terms of characteristics like academic 1, 2, and so on.

10 **Q.** Please turn to Tab 47 in your binder.

11 **A.** Yes.

12 **Q.** What does Defense Exhibit 730 show?

13 **A.** It shows academic and demographic characteristics of
14 transfer applicants and other applicants.

15 MR. WAXMAN: Your Honor, we off Defense
16 Exhibit 730.

17 MR. MORTARA: No objection.

18 THE COURT: Admitted.

19 (Defendant Exhibit No. 730 admitted.)

20 MR. WAXMAN: Mr. Lee, please display demonstrative
21 124.

22 BY MR. WAXMAN:

23 **Q.** Professor Card, what is this showing?

24 **A.** This is a side-by-side comparison of the racial
25 composition of students who in the sample had applied as

1 transfer applicants, in yellow, and the actual composition of
2 other students who are non-transfers. So they would be -- I
3 guess you would call them first-time freshmen, prospective
4 first-time freshmen.

5 When looking across these categories, one can see
6 in terms of the white share it's about the same. In terms of
7 other groups, African-American and Hispanic or others, it's
8 about the same. The one difference is more of the transfers
9 have race missing and fewer are Asian-American.

10 **Q.** When you say fewer are Asian-American, in other words,
11 fewer applicants in the transfer pool are Asian-Americans
12 than applicants in the regular pool?

13 **A.** Correct, yes.

14 **Q.** Turning to demonstrative 5125, what is this showing?

15 **A.** So this is a side-by-side comparison of the fractions of
16 transfer and non-transfer applicants with academic rating of
17 1 or 2, personal rating 1 or 2, extracurricular rating 1 or
18 2, athletic rating 1 or 2.

19 **Q.** And what do you conclude from those data?

20 **A.** That shows that the transfer students are relatively
21 weaker on all four of these dimensions. So they would be
22 substantially less strong than the existing class in terms of
23 those dimensions if more of them were admitted, yes.

24 **Q.** Now let's turn to recruiting.

25 **A.** Could I just say one thing?

1 **Q.** Of course.

2 **A.** Because on the one hand these students are weaker, on the
3 other hand they have about the same fraction of
4 African-American and Hispanic students. Increasing the
5 number of transfers would have very little effect on the
6 racial diversity of the campus in terms of the
7 underrepresented racial groups, but it would lower the
8 quality of the student pool.

9 So again, I think that would be kind of in the
10 wrong direction for the kind of thing that Mr. Kahlenberg
11 would like to promote.

12 **Q.** Thank you.

13 THE COURT: This assumes that the caliber of your
14 transfer applicants will be the same as the caliber of the
15 applicants in your regular pool, right?

16 THE WITNESS: Thanks for clarifying, Your Honor.

17 It assumes that the caliber of the transfer
18 applicants will be the same as they have been in the past.
19 There have been transfer applicants in the past, and so this
20 is their average characteristics. This is not a simulation.
21 This is historical data.

22 THE COURT: Okay. Thanks.

23 BY MR. WAXMAN:

24 **Q.** Just to be clear, on demonstrative 125, if you look at
25 the academic ratings of non-transfer applicants, am I

1 understanding that 39.4 percent of non-transfer applicants
2 have an academic rating of 1 or 2? Correct?

3 **A.** Yes. We've talked a lot about that, that there's a large
4 abundance of highly qualified students in the overall
5 application pool.

6 **Q.** And if you look at the profile, the academic profile
7 rating of non-transfer applicants, only 18.2 percent have an
8 academic rating of 1 or 2?

9 **A.** Yes. You have slightly misspoke. This is the transfer
10 applicants.

11 **Q.** I'm sorry.

12 **A.** They have half as likely to be an academic 1 or 2, yes.

13 **Q.** Now let's turn to recruiting.

14 First, did you develop an understanding of
15 Harvard's current recruiting efforts?

16 **A.** I developed some understanding of it, yes.

17 **Q.** And how did you do that?

18 **A.** Well, some of it is actually well known. They're
19 constantly stealing good students from California.

20 But some of it is known from other information that
21 was provided in terms of evidence of what they actually do.
22 And then there's testimony of the dean and director of
23 admissions.

24 **Q.** Did Mr. Kahlenberg adopt a particular approach to
25 simulating the effects of increased recruitment?

1 **A.** Yes, he did.

2 **Q.** What did he do?

3 **A.** So what he did was he assumed that by some form of
4 outreach, without specifying specifically what that was, but
5 by some form of expanded effort and outreach, Harvard could
6 double the number of students in its application pool who
7 would be disadvantaged while maintaining exactly the same
8 characteristics of those disadvantaged students.

9 And so the way that's done in the simulation is I
10 take every single person in the existing application pool for
11 the class of 2019 who is disadvantaged, and I clone them or I
12 create a double of them.

13 And then I imagine the admission pool has now this
14 extra boost of people who are all disadvantaged that look
15 exactly like the other disadvantaged people that were already
16 there.

17 **Q.** Do you think it's reasonable to think that Harvard could
18 double the number of disadvantaged students without loss of
19 applicant quality?

20 **A.** I think that's an extreme bound. I think that would be
21 like the most optimistic bound that one could have. Normally
22 I think most economists and others would think if you reached
23 further, especially given in light of -- for example, all the
24 mailing and contact that Harvard does with highly qualified
25 students, you would reach down the pool and their

1 characteristics would decline. But this provides kind of an
2 upper bound on the effect.

3 **Q.** And I think, if I understand your testimony, that you did
4 nonetheless simulate Mr. Kahlenberg's proposal that by some
5 mechanism Harvard could double the number of equally
6 qualified disadvantaged students?

7 **A.** Yes.

8 **Q.** And did you do that alone or in combination with other
9 race-neutral alternatives?

10 **A.** So again I basically built on the previous simulation.
11 So I took all of the things that were in the previous
12 simulation. So turning off ALDCs, eliminating consideration
13 of race, not using standardized test scores, and now on top
14 of that I'm going to add in this extra group of disadvantaged
15 students.

16 **Q.** Please turn to Tab 40 in your book and tell me when
17 you've found Defense Exhibit 723.

18 **A.** Yes.

19 **Q.** I'm not going to ask you to read the title. Does this
20 show the results of the various simulations that you just
21 described?

22 **A.** Yes.

23 **Q.** We offer 723, Your Honor.

24 MR. MORTARA: No objection, Your Honor.

25 THE COURT: Admitted.

1 (Defendant Exhibit No. 723 admitted.)

2 MR. WAXMAN: Mr. Lee, may we have demonstrative
3 126.

4 BY MR. WAXMAN:

5 Q. What is this showing?

6 A. So again, exactly as all the previous charts of this
7 type, we begin with the actual admitted class's racial
8 composition. We then show what would happen if there was
9 elimination of consideration of race. And then from then on,
10 I show what would happen if they, in addition to eliminating
11 ALDC, eliminated the use of tips, eliminated the use of
12 standardized testing, doubled the number of disadvantaged
13 students effectively by cloning each one that's in the
14 existing data set, and imposing various low-SES boosts.

15 Q. And what does this show about the level of boosts that
16 would be required to get a combined level of African-American
17 and Hispanic other representation comparable to the class of
18 2019?

19 A. Well, again, in the overall, in the class of 2019, about
20 28 percent were Hispanic or African-American. So looking
21 across the columns, one would get to something like a 2X
22 boost to get back the 28 percent as a benchmark.

23 Q. And what boost would be required to get to a comparable
24 level of African-American representation?

25 A. Looking across the columns to get to 14 percent, one

1 would have to get to something around the range of a 5X
2 boost.

3 **Q.** And would that change other characteristics of the class?

4 **A.** Yes.

5 MR. WAXMAN: Please turn, Mr. Lee, to Defense
6 Demonstrative 127.

7 **Q.** And what is this showing?

8 **A.** Well, this is showing that with that combined set of
9 features in the simulation -- so eliminating ALDC,
10 eliminating standardized test scores, doubling the
11 disadvantaged applicants, and applying a 2X low-SES boost --
12 the fraction of students with an academic rating of 1 or 2
13 would fall about 17 percent relative to the existing class.
14 The fraction with an extracurricular rating of 1 or 2 would
15 fall just a little bit, about 1 percent. The fraction with a
16 personal rating of 1 or 2 would rise a little bit, by about
17 3 percent. The fraction with an athletic rating of 1 or 2
18 would fall by 27 percent.

19 **Q.** Do you know what would happen if you did the same -- if
20 you showed the same slide for the 5X boost that would be
21 required to replicate the African-American share of the 2019
22 class?

23 **A.** Yes. The most important thing that could happen is the
24 fraction with the academic rating with 1 or 2 would fall
25 further.

1 **Q.** Let's move to the effect of increasing financial aid.
2 How did you assess that effect?

3 **A.** Well, in a way similar to what I was able to do
4 considering the effect of early action. Because Harvard has
5 changed its financial aid program in the past, I was able to
6 analyze how those previous changes in the past had
7 empirically affected characteristics of the students and use
8 that to try and consider what additional effort would do.

9 **Q.** What past expansions in financial aid are you referring
10 to?

11 MR. WAXMAN: And perhaps, Mr. Lee, we could have
12 Slide 128 to help Professor Card.

13 **A.** Yes. The first major change in this is an effort that
14 was started for the class of 2008. At that point, Harvard --
15 I believe this was a very, very important thing in American
16 higher education -- introduced the HFAI program.

17 So students with family income less than \$40,000
18 didn't pay anything at Harvard. And for students with up to
19 \$60,000 in family income would pay, at most, 10 percent of
20 their family income.

21 **Q.** And what is the next change that you looked at?

22 **A.** For the class of 2010, the \$40,000 was raised to \$60,000,
23 and the \$60,000 was raised to \$80,000. So this was
24 increasing the range of students who would receive these
25 benefits.

1 **Q.** What's the third change?

2 **A.** The third change is another major change in the program.
3 They introduce what they call the affordability initiative.

4 They didn't change the zero family contribution
5 limit. That stayed constant at \$60,000, but they expanded
6 substantially the range of family incomes who were eligible
7 for very low parental contribution.

8 So now into the new program if families had income
9 under 180,000, so between 60 and 180,000, they would pay no
10 more than 10 percent of their average income or their income
11 as tuition.

12 **Q.** What is the last change that you examined?

13 **A.** Excuse me. And I meant to mention they also eliminated
14 loans for those groups, which is an important consideration
15 these days.

16 **Q.** It was an important consideration in my day, but it
17 didn't exist. Sorry.

18 What is the last change?

19 **A.** Finally, there was another change for the class of 2016.

20 They raised the lower limit and somewhat lowered
21 the 10 percent or lower family contribution limit. So the
22 zero 0 PC limit went from 60 to 65 importantly.

23 **Q.** Now let's turn to -- did you look at the effects of those
24 changes on the applicant pool?

25 **A.** Yes. What I tried to do was look at historical data on

1 the racial composition of the applicant pool, along the lines
2 of data we've looked at before, and how that may or may not
3 have changed as these various initiatives were introduced.

4 **Q.** Can you turn to Tab 44 in your binder, please.

5 **A.** Yes.

6 **Q.** Do you find Defense Exhibit 727?

7 **A.** I do, yes.

8 **Q.** And what is this?

9 **A.** It's a series of charts with information on shares of
10 race before and after various financial policies and shares
11 of admitted students and so on.

12 MR. WAXMAN: Your Honor, we offer Defense
13 Exhibit 727.

14 MR. MORTARA: No objection.

15 THE COURT: Admitted.

16 (Defendant Exhibit No. 727 admitted.)

17 MR. WAXMAN: Mr. Lee, would you please display
18 slide 132.

19 BY MR. WAXMAN:

20 **Q.** Professor Card, what is this showing?

21 **A.** This is showing the timeline is up to 2012. So this is
22 incorporating the first of the three changes in the financial
23 aid program that were introduced by Harvard.

24 **Q.** The first or the first two?

25 **A.** Sorry. It's only showing the first two. Sorry. Thank

1 you.

2 **Q.** Yeah.

3 **A.** And I'm showing how those changes to the 2008 and then
4 the 2010 changes are related to the fraction of students in
5 the applicant pool who are Asian-American, which is
6 unfortunately mislabeled on this graph. Asian-Americans is
7 the red one at the top.

8 **Q.** Okay. We'll substitute the right one.

9 **A.** The green one is the share of African-American,
10 Hispanic -- no, that's not right. My mistake. I'm getting
11 confused.

12 So the green one is the share of Asian-American,
13 Hispanic or other, the blue one is the share of
14 Asian-Americans, and the red one is the share of whites.

15 Sorry. My apologies.

16 **Q.** What is this showing?

17 **A.** This is showing first when Harvard introduced its first
18 HFAI program with the zero for parental contribution limit,
19 we can see just prior to that the fraction of, for example,
20 African-American and Hispanic students was around
21 19-20 percent. And thereafter it starts to rise. And when
22 they additionally raise the zero parental contribution limit
23 from 40,000 to 670,000, it looks like that rise continued for
24 the fraction of African-American or Hispanic students.

25 So it looks like there was a notable increase in

1 the share of those two groups applying to Harvard, from
2 around a base of 19 or 20 percent to something like
3 27 percent as a result of these two changes in the policy.

4 For Asian-Americans, it doesn't look like there was
5 that kind of an effect.

6 **Q.** Can we turn to the next slide, which is defense 133.

7 What are we now seeing?

8 **A.** So now we're seeing -- now we're looking at the
9 affordability initiative, which was in some sense a middle
10 class or upper middle class program, looking at the effect of
11 that and looking at the effect of the most recent adjustment
12 to the HFAI parameters to raise the zero parental
13 contribution limit to \$65,000.

14 One can see just before that a set of changes, the
15 fraction of the applicant pool that was African-American or
16 Hispanic was around 27 percent, and that more or less stays
17 constant through these two subsequent changes.

18 So my conclusion from that is that the first two
19 initiatives had some effect; in fact, a notable effect on the
20 fraction of African-American and Hispanic students in the
21 application pool. But subsequent adjustments, including the
22 affordability initiative, did not have that kind of effect at
23 all.

24 **Q.** Do you draw any conclusion from those data about how
25 further expansions of financial aid would be likely to affect

1 the diversity of the applicant pool?

2 **A.** Yes. My conclusion would be, for example, if one was to
3 further raise the zero parental contribution limit another
4 \$5,000 or so that it probably would have the kind of effect
5 it had in 2016. In other words, no effect on the fraction of
6 underrepresented minorities who apply.

7 **Q.** So currently no parental contribution is required for
8 applicants with families \$65,000 or below, correct?

9 **A.** Yes.

10 **Q.** Would raising that threshold to \$75,000 be likely to
11 increase the number of African-American and Hispanic
12 applicants?

13 **A.** No. As I said, no for two reasons, in my view, or
14 unlikely at least.

15 And one is that the previous increase of that zero
16 parental contribution from 60 to 65 didn't seem to do much.
17 And also I went and looked at the family income distribution
18 data using information from the American Community Survey,
19 which is a U.S. government survey that's used to estimate
20 these things. And there's a relatively modest fraction of
21 underrepresented minority families in the range between 65
22 and 75,000. So the set of people who could be affected by
23 that change is quite small.

24 **Q.** Did you also look at how past expansions of financial aid
25 have affected matriculation rates?

1 **A.** I did, yes.

2 **Q.** And what did you find?

3 **A.** I did not find any systematic pattern there.

4 **Q.** Let's turn now to Slide 134 and ask about the final
5 race-neutral alternative, the final category of race-neutral
6 alternatives employing place-based admissions.

7 First of all, what is a place-based policy?

8 **A.** So a place-based admissions policy is a policy that
9 offers preferences to students in the admissions process
10 based on where they live or where their school is. And such
11 policies have been adopted by a couple of states. California
12 and Texas both have such programs, or California has had such
13 a program.

14 And so that's an example of how they work.

15 **Q.** And which place-based policies did you assess?

16 **A.** I looked at policies that could be directed at a
17 student's high school, individual high school, at the ZIP
18 Code that they live in, and then finally I looked at based on
19 which particular of the College Board neighborhood clusters
20 that their school was situated in.

21 **Q.** And was each of those three place-based policies a
22 suggestion of Mr. Kahlenberg?

23 **A.** Yes.

24 **Q.** Did you hear Mr. Kahlenberg acknowledge that admitting
25 the top student from each ZIP Code or the top student from

1 each high school would not be feasible at Harvard?

2 **A.** Yes.

3 **Q.** Please turn to Tab 41 in your book.

4 What does Defense Exhibit 724 show?

5 **A.** It shows the number of high schools and the number of ZIP
6 codes relative to the number of actual admitted students at
7 Harvard.

8 MR. WAXMAN: We offer 724 into evidence.

9 MR. MORTARA: No objection.

10 THE COURT: Admitted.

11 (Defendant Exhibit No. 724 admitted.)

12 MR. WAXMAN: Mr. Lee, may we have Slide 135.

13 BY MR. WAXMAN:

14 **Q.** What does this show, Professor Card?

15 **A.** This shows -- by way of benchmark, the yellow line at the
16 bottom is the total number of admitted domestic students for
17 the class of 2019.

18 **Q.** And that's 1,719?

19 **A.** Yes. And then by comparison, there's around 4,100 or so
20 public and private high schools in the United States.

21 **Q.** I think you meant to say 41,000?

22 **A.** 41,000. Excuse me.

23 And there's around 3,300 ZIP Codes in the United
24 States.

25 **Q.** Again, 33,000?

1 **A.** 33,000 ZIP Codes in the United States.

2 And even if one looks inside the Harvard database
3 at high schools that had at least one student apply at some
4 time over the six years in my sample, there's about 7,561 of
5 those high schools. All three of those numbers swamp the
6 number of available slots at Harvard.

7 **Q.** So obviously it's infeasible for a college that is
8 admitting 1,700 students a year to take the "top" student
9 either from all high schools or even the high schools that
10 currently send one or more applicants to Harvard.

11 But can you imagine a policy in which Harvard would
12 say, well, we will look at how many top students we get, one
13 from each high school, and just have some sort of lottery
14 that would pick 1,719 of them? Do you have that hypothetical
15 in mind? Mr. Kahlenberg hasn't suggested it, but I'd like
16 you to consider it.

17 **A.** Yes. I have considered that, yes.

18 **Q.** And thinking of that, did you try to identify the
19 characteristics of the top student from each of the schools
20 that applied to the class of 2019?

21 **A.** I did, yes.

22 **Q.** And how did you do that?

23 **A.** I used some of their profile ratings.

24 **Q.** Please turn to Tab 42 of Volume 2.

25 What does Defense Exhibit 725 show?

1 **A.** So this shows the racial composition of top students from
2 each high school and then characteristics of academic and
3 other characteristics of that group.

4 **Q.** Thank you.

5 MR. WAXMAN: We offer Defense Exhibit 725.

6 MR. MORTARA: No objection.

7 THE COURT: Admitted.

8 (Defendant Exhibit No. 725 admitted.)

9 BY MR. WAXMAN:

10 **Q.** Did you look at what would happen to the characteristics
11 of the admitted class if you admitted from among the top
12 student in each high school?

13 **A.** Yes.

14 **Q.** Can we have Slide 136, please.

15 And what does this show?

16 **A.** So this is a comparison. Taking this kind of
17 probabilistic or lottery-based admissions system, so we
18 somehow got the top student ranked from each high school
19 based on some of their profile ratings and then
20 parablastically admitted that group.

21 It would show what would happen to the fraction of
22 the admitted class that had academic 1 or 2, extracurricular
23 1 or 2, personal 1 or 2, and athletic 1 or 2 ratings.

24 **Q.** What does it show?

25 **A.** It shows on all four dimensions there would be a notable

1 decline in the fractions with these higher profile ratings.

2 **Q.** And if Harvard were taking the top student from a
3 representative sample of high schools, why would that occur?
4 Why would you see such a pronounced decline in the quality of
5 applicants on all four profile measures?

6 **A.** Yes. It's a very unfortunate feature of our American
7 education system that many, many high schools have relatively
8 disadvantaged and not very highly performing students.

9 And so this is just a set of high schools that
10 actually had an applicant that came to Harvard, an applicant
11 who applied to Harvard. And even in that group of schools,
12 the top student from those schools is typically not really
13 competitive at Harvard in many cases.

14 **Q.** So under this policy, do you understand that Harvard
15 would be precluded from accepting the second-top or third-top
16 or fourth-top high school students from any school regardless
17 how well the school was preparing students for college or
18 regardless how qualified the applicants from that school
19 would be?

20 **A.** If Harvard were to -- yes. If Harvard were to base their
21 admissions decision entirely on this type of method, then
22 that would preclude that, yes.

23 **Q.** And you said you also assessed a policy also suggested by
24 Mr. Kahlenberg under which Harvard would admit students in
25 equal shares from the neighborhood clusters maintained by the

1 College Board; is that correct?

2 **A.** Yes.

3 **Q.** What are these clusters?

4 **A.** So clusters -- what the College Board does is it actually
5 does an analysis of data of students who are applying for
6 college and other characteristics of students based on other
7 data. And it classifies those neighborhoods along various
8 dimensions, including income and race most importantly.

9 And so a cluster would be defined by some degree of
10 similarity in the income and race of students from that
11 cluster, and it would include neighborhoods from all around
12 the country that were sort of similar on those key clustering
13 dimensions.

14 **Q.** And did you simulate what the model would predict the
15 admitted class would be if Harvard had a plan to accept from
16 each of the 33 neighborhood clusters the same number of
17 students, which I think would be something like 53 or 54
18 students from each cluster?

19 **A.** Yes.

20 **Q.** Did you do that in isolation or in combination with the
21 other practices we've discussed?

22 **A.** No. What I did was I did it in combination with all the
23 other practices, kind of consistent with what I've been doing
24 so far.

25 **Q.** Please turn to Tab 43 of your binder.

1 **A.** Yes.

2 **Q.** Does this show the results of the simulations that you
3 just described?

4 **A.** Yes.

5 MR. WAXMAN: Your Honor, we offer Defense
6 Exhibit 726.

7 MR. MORTARA: No objection.

8 THE COURT: Admitted.

9 (Defendant Exhibit No. 726 admitted.)

10 MR. WAXMAN: Mr. Lee, please put up Slide 137.

11 BY MR. WAXMAN:

12 **Q.** What does this show, Professor Card?

13 **A.** So this is again -- and I believe this is the last of the
14 slides that I'll be showing -- what the actual racial
15 composition of the class of 2019 as a benchmark, the class
16 removing any consideration of race, and then the simulated or
17 predicted composition at various levels of the low-SES boost
18 after eliminating standardized test scores, eliminating
19 consideration of ALDCs, doubling the number of disadvantaged
20 applicants basically from each cluster, then changing the
21 low-SES preference and admitting something like 51 or 52
22 students per cluster.

23 **Q.** And what does this show? What kind of a boost above the
24 boost that Harvard already gives if it implemented this
25 mother of all race-neutral alternatives would be required in

1 order to replicate the African-American, Hispanic, and other
2 share of the admitted class?

3 **A.** So in this case, one can see that a 1X boost gets to --
4 fairly close to the existing class.

5 **Q.** And if you pursued that set of practices, would the
6 composition of the admitted class change in other ways?

7 **A.** Yes.

8 **Q.** May we have the next demonstrative, 138, please.

9 What is this showing?

10 **A.** So this shows if Harvard were to somehow adopt this
11 admissions procedure, my simulation suggests that the
12 fraction of students who would have an academic 1 or 2 would
13 fall about 17 percent. The fraction with extracurricular
14 rating of 1 or 2 would fall about 3 percent. The fraction
15 with the personal rating 1 or 2 would rise by about
16 3 percent. The fraction of students with an athletic rating
17 1 or 2 would fall about 25 percent.

18 MR. WAXMAN: Mr. Lee, can we please have
19 demonstrative 139.

20 BY MR. WAXMAN:

21 **Q.** What is the third analysis that you conducted?

22 **A.** So the third analysis is I did a very similar analysis
23 but looking at the approach that Mr. Kahlenberg says is his
24 preferred approach.

25 **Q.** And can you turn in your exhibit binder to Tab 46,

1 please.

2 **A.** Yes.

3 **Q.** What is Defense Exhibit 729 showing?

4 **A.** It's a series of tables showing an analysis of
5 Mr. Kahlenberg's Simulations 1 through 7.

6 MR. WAXMAN: Your Honor, we offer Defense
7 Exhibit 729.

8 MR. MORTARA: No objection.

9 THE COURT: Admitted.

10 (Defendant Exhibit No. 729 admitted.)

11 MR. WAXMAN: Mr. Lee, can we have Slide 140,
12 please.

13 BY MR. WAXMAN:

14 **Q.** What's displayed here?

15 **A.** This is a summary of the racial composition arising in
16 the class, first as usual, the first two bars, the actual
17 admitted class and with removing consideration of race. And
18 then under Mr. Kahlenberg's Simulation 6.

19 **Q.** And why did you choose Simulation 6?

20 **A.** Well, my understanding is that that is one of his
21 preferred simulations.

22 **Q.** And what do we see?

23 **A.** We can see that under that simulation the fraction of
24 African-American students is about 10 percent. The fraction
25 of Hispanic and other students is around 20 percent.

1 **Q.** And did you also look at how preferred Simulation 6 would
2 be expected to change the class in other ways?

3 **A.** I did, yes.

4 MR. WAXMAN: Can we have slide 141, Mr. Lee.

5 **Q.** And what is this showing?

6 **A.** This is showing under that simulation the fraction of
7 students with an academic 1 or 2 would fall about 19 percent,
8 the fraction with an extracurricular rating would fall about
9 13 percent, the fraction with a personal 1 or 2 rating would
10 fall about 13 percent, and the fraction with an athletic
11 rating 1 or 2 would fall by about 26 percent.

12 **Q.** So would Simulation 6, Mr. Kahlenberg's preferred
13 simulation, achieve either comparable diversity or comparable
14 quality of the admitted class?

15 **A.** Well, it certainly does not achieve comparable quality to
16 the admitted class.

17 It achieves a level of combined African-American
18 and Hispanic diversity that's comparable to the existing
19 class. It does not achieve the same level in terms of the
20 fraction of African-American students.

21 **Q.** So based on the analyses that we've discussed today, how
22 would eliminating the consideration of race in admissions
23 affect Harvard's class?

24 **A.** So in my opinion, all of the simulations show the same
25 thing, which is one can achieve some level of racial

1 diversity comparable to the existing class by imposing or
2 using these various race-neutral alternatives. But
3 inevitably that involves some decline in particular in the
4 academic quality of the class and in many cases in other
5 dimensions as well.

6 **Q.** And is that conclusion consistent with all of the
7 literature that you've reviewed on this issue?

8 **A.** Yes. My understanding of the existing literature is that
9 for elite colleges, colleges that are focusing on highly
10 qualified students, that's been the empirical conclusion in
11 the past. And there's also theoretical literature which
12 suggests this would also be true.

13 MR. WAXMAN: Mr. Lee, can we please have
14 demonstrative 10.2.

15 **Q.** I'll end where we began and ask again, are these the
16 questions that you addressed in this case?

17 **A.** Yes.

18 **Q.** And at a high level, will you summarize your opinions on
19 these questions for the Court?

20 **A.** Yes. First, I was asked if statistical evidence supports
21 the plaintiff's claim that Harvard discriminated against
22 Asian-American applicants. And my opinion is that the
23 evidence does not support that claim.

24 Second, I was asked to what extent does race affect
25 admissions decisions at Harvard. In my view, the evidence

1 shows that race does have an effect on admissions decisions
2 at Harvard. For students who are highly qualified on other
3 dimensions, race can be one of the many factors that are
4 associated with a higher probability of admission, comparable
5 in size to other favorable tips that Harvard awards in the
6 admissions process.

7 For the third question, is there statistical
8 evidence that Harvard has engaged in racial balancing, my
9 opinion is that there's no statistical evidence of that.

10 And finally, for the fourth question, how would the
11 admitted class change if Harvard eliminated consideration of
12 race and pursued race-neutral alternatives. My opinion is
13 that if Harvard were to do so, it would potentially be
14 possible to achieve some level of diversity comparable to the
15 level of diversity in the current class, but that would
16 necessarily entail a trade-off and a reduction in several
17 dimensions, several important dimensions in the quality of
18 the class.

19 **Q.** And can we have demonstrative 10.30.

20 Would you tell Her Honor why you don't think
21 Harvard admissions process discriminates against
22 Asian-American applicants?

23 **A.** Yes. So to reiterate an argument, a point I've made
24 before, when I take my admissions model, which I believe is
25 the best representation of the actual admissions process that

1 Harvard uses, taking account of the weight it puts on
2 multidimensionality, taking account of the way it uses
3 information and so on, using all of the data, so including
4 the ALDCs, my model shows that year by year there's no
5 statistically significant difference in the admission rate
6 between Asian-Americans and whites.

7 On average across the six years, three of the
8 estimates are positive, three of them are negative. And then
9 if one looks averaging across the years, the average of these
10 effects is minus 0.05, this average marginal effect, which
11 means that the difference between the admission rates of
12 Asian-Americans and whites, controlling for all the
13 observable factors in my model, is about 5/100 of a
14 percentage point, not statistically significant.

15 So I believe the evidence strongly supports the
16 view that there's no statistical evidence of discrimination.

17 MR. WAXMAN: Thank you, Dr. Card. Pass the
18 witness.

19 THE WITNESS: Could I take a break?

20 MR. MORTARA: No problem for me, Your Honor. We
21 can get set up. Ten minutes?

22 THE COURT: Ten minutes.

23 (Court recessed at 2:11 p.m.)

24 [Sidebar sealed and redacted.]

25 MR. MORTARA: Whenever you're ready, I think I'm

1 ready, Your Honor.

2 THE COURT: I am ready when you are.

3 EXAMINATION

4 BY MR. MORTARA:

5 Q. Good afternoon, Professor Card. My name is Adam Mortara.
6 It's really nice to meet you. I'm hoping that we'll spend a
7 few hours together getting to know each other.

8 I got to get a few questions out of the way I was
9 genuinely surprised Mr. Waxman didn't ask you.

10 You've been in court on and off a lot for the last
11 couple of weeks, right?

12 A. Yes, I have.

13 Q. And you know about the *Bakke* decision, don't you? You
14 actually mentioned it in one of your articles?

15 A. I know a little bit about it. I am in no way an expert
16 on the law.

17 Q. Did you know that the *Bakke* decision, actually just the
18 opinion of one member of the Court, described the Harvard
19 admissions system as an illuminating example in 1978? Did
20 you know that?

21 A. I think I've heard someone use that phrase.

22 Q. More than once, huh?

23 A. Yes.

24 Q. Did you take that into account when preparing your
25 opinions in this case?

1 **A.** No.

2 **Q.** All right. Let's hit a few things out of the gate before
3 delving more deeply into your opinions.

4 You testified on direct that race was a small
5 factor in admissions, and you used this slide that I'm
6 showing on the screen, which is DD 10.93, right?

7 **A.** No. I said that -- no.

8 **Q.** You didn't say race was a small factor in admissions?

9 **A.** No. I believe I said that alone and by itself, race was
10 a small factor in admissions.

11 **Q.** Great. Thanks for that clarification.

12 And you also gave a nice discussion in your direct
13 about the importance of average marginal effect. Do you
14 recall talking about that quite a bit?

15 **A.** Yes.

16 **Q.** But you discussed your computation of the average
17 marginal effect of Asian-American ethnicity across your whole
18 admissions model. That was one of the last things you went
19 through with Mr. Waxman, right?

20 **A.** Yes.

21 **Q.** You didn't actually discuss your computation of the
22 average marginal effect of African-American race or Hispanic
23 ethnicity, did you?

24 **A.** I didn't directly present it, no.

25 **Q.** It's in your report. Your reports are right next to you,

1 sir, for your review. This is in your opening report. I'm
2 going to go to it. It's on page 81 of your opening report,
3 Figure 26.

4 You can look at it on the screen or you can look at
5 it in your report. Your choice. Do you see that?

6 **A.** Yes.

7 **Q.** The average marginal effects are at the bottom. Plus
8 6 percent for African-Americans, plus 3.73 percent for
9 Hispanics. Do you see that?

10 **A.** Yes.

11 **Q.** You know that this represents an over 300 percent
12 increase in the chances of admission on average for an
13 African-American, correct?

14 **A.** No. I don't think that calculation sounds right to me.

15 **Q.** You don't think that's right. What percentage do you
16 think it is, sir? What do you think the base is? The base
17 is about 3 percent, isn't it?

18 **A.** The overall fraction of admission -- it's possible that's
19 right, yes.

20 **Q.** And you know it represents an over 200 percent increase
21 in the chances of admission for a Hispanic applicant,
22 correct?

23 **A.** I don't know that for a fact, but I'll trust you on it.

24 **Q.** You can come back and let me know tomorrow if it was
25 incorrect. You can think about that if you want or we'll go

1 through it some more in a little bit.

2 I want to talk about some, I'm not going to say
3 mistakes, but some inaccuracies on your slides. We'll go
4 back to this one.

5 This is the one I showed you where we talked about
6 race, if it was the only thing not being a big factor. Do
7 you remember that? It was just three minutes ago.

8 **A.** Yes.

9 **Q.** You got this thing over here, R-squared. Do you see
10 that?

11 **A.** Yes.

12 **Q.** That's a mistake, isn't it?

13 **A.** Well, yes, technically. But as I think I explained early
14 on to the Court, I would be using R-squared and pseudo
15 R-squared interchangeably.

16 **Q.** Okay. Well, I'm glad we cleared that up, but there is
17 actually a difference between them, right?

18 **A.** Yes. They're calculated differently, yes.

19 **Q.** And let's just quickly go through all the slides where
20 you said R-squared but you meant pseudo R-squared. So here
21 we are at DD 10.93. You said R-squared, but you meant pseudo
22 R-squared, right?

23 **A.** Yes.

24 **Q.** You did that again on -- you substituted 76 today. But
25 DD 10.76, you did it again. I don't have it in my computer.

1 We'll get to that tomorrow. You did it again on this graph.
2 You showed 79. You've got R-squareds here in a couple of
3 places. Those are actually pseudo R-squareds, right?

4 **A.** Yes. As I said, I think to save space and not jargon up
5 my presentation, I tried to explain that that's what I was
6 going to be doing.

7 **Q.** That's great. We're going to talk about the difference
8 in a second.

9 And you did it over here on DD 10.86. Do you see
10 that?

11 **A.** Yes.

12 **Q.** That's a pseudo R-squared, right?

13 **A.** Yes.

14 **Q.** And you did it again on 93. We already did that one. So
15 you did it in a few places, right?

16 **A.** Yes.

17 **Q.** Now, you know for a discrete choice model you don't use
18 R-squared, you use pseudo R-squared. Don't you know that?

19 **A.** I do know that, yes.

20 **Q.** And you're well aware of the difference between the two,
21 right?

22 **A.** Yes, I believe I am, yes.

23 **Q.** Who is Daniel McFadden?

24 **A.** Daniel McFadden is an emeritus professor at Berkeley,
25 formerly my colleague. He was a very well-known figure in

1 the field in various aspects of economics.

2 **Q.** He was your colleague. He won a Nobel Prize?

3 **A.** He did, yes.

4 **Q.** All right. So in your binder at C121 is an article by
5 your former colleague, Professor McFadden?

6 THE COURT: Do I have a copy of this?

7 MR. MORTARA: No, Your Honor. I'm always terrible
8 with binders for you. There you are.

9 THE COURT: I don't have enough.

10 MR. MORTARA: It's got 90 percent of everything I'm
11 going to use except the awesome stuff that I like to hand up.

12 BY MR. MORTARA:

13 **Q.** If you could, turn to C121, please, Professor.

14 **A.** Yes.

15 **Q.** This is a paper by McFadden. You've seen it before,
16 right?

17 **A.** Yes.

18 **Q.** If you turn to page 34 in the McFadden paper, there's a
19 footnote double star at the bottom. Just tell me when you're
20 there, sir.

21 **A.** Yes.

22 **Q.** And it carries over to the next page, and I've got it on
23 the screen.

24 It says, "While the R-squared is a more familiar
25 concept to planners who are experienced in ordinary

1 regression analysis, it is not as well-behaved a statistic as
2 the" --

3 And that means pseudo R-squared. That's a Greek
4 rho, isn't it?

5 **A.** I'll have to read the whole thing to know what he's
6 referring to precisely. If you give me a second.

7 **Q.** You know that pseudo R-squared is sometimes written as
8 rho squared, right?

9 **A.** No. To tell you the truth, in my profession rho usually
10 refers to the correlation. And so it would be -- and in
11 fact, R-squared is the same as the squared correlation. So
12 I'm finding it a bit confusing.

13 **Q.** Sir, this came up in your expert report, remember? You
14 criticized Professor Arcidiacono's models for having a low
15 pseudo R-squared and he cited the McFadden paper and he said
16 exactly what's going to be said right here, which is that --
17 for example, values of .2 to .4 represent an excellent fit.

18 Do you remember you talked about that in your
19 expert report, right?

20 **A.** I did say that. I do remember that, yes.

21 **Q.** And what you remember is that there was a debate between
22 you and Professor Arcidiacono about whether .2 to .4
23 represents an excellent fit.

24 Do you remember that from the McFadden paper?

25 **A.** Yes. I remember words to that effect.

1 **Q.** So Professor McFadden here, saying, as you remember from
2 your expert reports, .2 to .4 is an excellent fit on the
3 pseudo R-squared, correct?

4 **A.** That's what it -- yes, that's what it says here. In my
5 view -- I mean, this paper was written in 1977, before the
6 era of modern computer.

7 **Q.** Mr. Waxman can ask you questions when I'm done. My
8 question was correct.

9 THE COURT: You sit down. You let him finish his
10 answer.

11 You finish your answer.

12 THE WITNESS: Well, I was going to say this paper
13 was written in 1977, possibly even before that, back in the
14 day before modern computing methods.

15 And at that time, it was very difficult to estimate
16 especially discrete choice for multinomial logit models or
17 logit models with more than several dozen variables on large
18 data sets. And so I think at that time that might have been
19 what he was thinking of in his experience.

20 I don't know whether I would say that that would
21 qualify today with modern data sets and modern methods.

22 BY MR. MORTARA:

23 **Q.** All right. So here's a question for you.

24 How many articles have you written that use
25 discrete choice models and report a pseudo R-squared. Only a

1 handful, right?

2 **A.** I'm not entirely sure, actually.

3 **Q.** Glad you asked. So let's go into my folder here for
4 David Card articles. I've got a lot. Let's just search
5 "pseudo" and see what comes back.

6 Do you see those articles there on the screen, what
7 to editors maximize, the effect of firm level contracts. Do
8 you see that?

9 MR. WAXMAN: Your Honor, I'm not exactly sure what
10 we're doing here. If this is meant to be a demonstrative,
11 it's not disclosed.

12 MR. MORTARA: It's not meant to be a demonstrative.

13 MR. WAXMAN: He's using it as a demonstrative.
14 Maybe it's not meant to be, but it's being used as a
15 demonstrative.

16 MR. MORTARA: I haven't even asked a question yet.

17 THE COURT: You have it up on the screen. That
18 means you are demonstrating it, which makes it a
19 demonstrative.

20 BY MR. MORTARA:

21 **Q.** Do you see that?

22 MR. MORTARA: It's also being done live, which I
23 don't need to disclose. Under the pretrial memorandum, live
24 demonstratives don't need to be disclosed. This is a live
25 demonstrative.

1 MR. WAXMAN: I don't understand how this live
2 demonstrative is any different than the demonstratives that
3 we provided them in advance that he objected to and
4 successfully excluded yesterday.

5 THE COURT: Let me hear what his question is, but I
6 take your point. What is your question?

7 BY MR. MORTARA:

8 **Q.** There's a handful of titles of articles on the screen.
9 Do you see that?

10 **A.** I do see a handful of articles, yes. I don't really
11 understand how this was constructed, what exactly you did to
12 get this list of articles.

13 **Q.** Don't worry. If you think of more than five or six
14 articles that you have a pseudo R-squared, you can come back
15 tomorrow and tell me, and I'll ask you first thing.

16 The question I have is, what's this article you
17 wrote from 2018 on editor gender bias, "Are Referees and
18 Editors in Economics Gender Neutral?"

19 Do you see that?

20 **A.** I'm confused because you've got something here called
21 "Editor Gender Bias."

22 **Q.** I'll clarify your confusion.

23 THE COURT: If you have a copy of the article, why
24 don't you put it in front of him.

25 MR. MORTARA: I intend to. May I approach, Your

1 Honor?

2 THE COURT: Yes, of course.

3 MR. MORTARA: There's one for you, too.

4 BY MR. MORTARA:

5 **Q.** Does this refresh your recollection that last week you
6 published an article called "Are Referees and Editors in
7 Economics Gender Neutral?"

8 **A.** I distributed such an article to a number of my friends
9 and colleagues, yes. I didn't publish it.

10 MR. WAXMAN: May I just inquire whether this was
11 disclosed to us?

12 MR. MORTARA: It's not, Your Honor. It's
13 impeachment of the opinion I just got on pseudo R-squared.

14 THE COURT: He doesn't have to disclose things that
15 he's using to impeach.

16 MR. WAXMAN: It's not impeachment.

17 MR. MORTARA: I was just told that the standards
18 for pseudo R-squareds have changed since the 1970s. I'm
19 about to inquire.

20 THE COURT: I thought he said the precision had
21 changed since the '70s. But go ahead.

22 BY MR. MORTARA:

23 **Q.** Sure. So this is a paper where you found, among other
24 things, possible evidence of discrimination against female
25 economists in the refereeing of articles for journals; is

1 that right?

2 **A.** Could you give me a second to review exactly the wording
3 we used?

4 **Q.** Let me see if I can help you. Turn to page 26. And at
5 the top you'll see. Just want to get a sense of what the
6 article is about.

7 Do you see that at the top what I've got
8 highlighted? "Our findings are consistent with the presence
9 of some discrimination towards female economists"?

10 **A.** Yes. But if you read the context it says, "What accounts
11 for these patterns? While we do not have direct evidence, we
12 envision three main explanations. First, our findings are
13 consistent with the presence of some discrimination towards
14 female economists," and so on.

15 "Second, it could be that female economists submit
16 papers with somewhat different characteristics than those of
17 male authors," and so on.

18 And "A third possibility is that female economists
19 wait longer for submission," and so on.

20 **Q.** Sure. One of the possibilities of your findings in this
21 paper that you published last week is that there's some
22 discrimination towards female economists in reviewing. One
23 of the possibilities. Is that fair?

24 **A.** Well, first I don't claim to have published this paper
25 last week. This paper was distributed to some friends. This

1 is still -- this has not been submitted. This paper is still
2 in active editing stage, to tell the honest truth.

3 **Q.** Great. Well, let's take a look at what's on page 46,
4 Table 7.

5 **A.** Yes.

6 **Q.** You've got a bunch of models, and I just want to focus
7 you on the pseudo R-squareds of the models here. Do you see
8 those?

9 **A.** Yes.

10 **Q.** And every one of them is between .2 and .4, correct?

11 **A.** Well, to tell you the truth, this is a combination of
12 R-squared and pseudo R-squared. So some of these models are
13 actually linear regression models. In fact -- in fact, it's
14 possible that all of these are linear regression models, in
15 fact, reflecting the fact that this is a work in progress.

16 I believe, if I remember correctly, that all of
17 these are actually linear regressions, according to the top
18 heading. So it isn't -- actually, it's a misstatement on me
19 and my coauthors here.

20 **Q.** Let me go back to McFadden.

21 He said, the goodness of fit range for pseudo
22 R-squared was lower than regular R-squared, right? That's
23 the standard in your industry; isn't that right? So if these
24 are R-squareds, they're between .2 and .4, too, aren't they?

25 **A.** No. What he said was he said those unfamiliar with the

1 rho squared index should be forewarned that its values tend
2 to be considerably lower than an R-squared index.

3 **Q.** What's the standard for regular R-squared for goodness of
4 fit, as far as you're concerned?

5 **A.** Well, actually there is no real standard for goodness of
6 fit. For example, one could have a model based on data from
7 year to year for the national economy, and it could have a
8 very high R-squared because those kind of variables tend to
9 correlate together very highly. And yet many, many, many,
10 hundreds and thousands of those kinds of models are estimated
11 all the time and most people kind of think of them as junk or
12 very uninformative.

13 On the other hand, one could have data from an
14 experimental design, for example, where one had randomly
15 assigned some covariate of interest.

16 Like I could assign, for example, some kind of a
17 blinded resume that I send in for jobs. And some of them
18 could be African-American candidates or names and some of
19 them could have non African-American names. And there you
20 could have potentially quite a low R-squared and yet the
21 model could be extremely informative because of the design,
22 because of the randomized design.

23 So there isn't really a connection between
24 R-squared and whether a model is good or bad necessarily.

25 **Q.** I'm just a little confused. You were talking about the

1 explanatory power of several of Professor Arcidiacono's
2 models and you had a chart on the screen showing R-squareds.
3 Do you remember that? You weren't testifying that the lower
4 R-squareds meant they had lower explanatory power?

5 **A.** I was saying that lower pseudo R-squareds meant lower
6 explanatory power, yes.

7 **Q.** So the junk models, you're talking about the national
8 economy where they have super high R-squareds, they have real
9 good explanatory power, but they're still junk, right?

10 **A.** I wouldn't necessarily say that they're always junk, but
11 some models with high explanatory power could be very
12 informative; some models with low could be not very
13 informative.

14 **Q.** And some models with low explanatory power could be very
15 informative; isn't that right?

16 **A.** Yes, I would certainly agree to that.

17 **Q.** All right.

18 You spent a lot of time in your direct testimony
19 trying to explain the difference between white and Asian
20 applicants to Harvard in the personal rating. Do you
21 remember that?

22 **A.** I do, yes.

23 **Q.** I want to be clear about a few things. As of the time
24 you were deposed, you had not constructed your own model of
25 the personal rating, did you?

1 **A.** I believe that's correct, yes.

2 **Q.** And you didn't disclose any model of the personal rating
3 in your expert reports, correct?

4 **A.** I'm not entirely sure because I believe that I had done
5 some extensions of Professor Arcidiacono's model.

6 **Q.** We're going to talk about those in just a little bit.

7 You used Professor Arcidiacono's models and you did
8 some extensions where you added some variables, right?

9 **A.** I did, I believe, report some of those models. Whether
10 those are my models or his models I guess is a matter of some
11 art.

12 **Q.** You referred to, in your report, in "unexplained gap
13 between whites and Asians in the personal rating," right?
14 Your rebuttal report.

15 **A.** Yes.

16 **Q.** And I've got it on the screen, just 35 and 36, your
17 rebuttal report. It says "unexplained gap" four times. If
18 you just want to see it on the screen, I'm just going to
19 stop. I'm not going to use any more of it.

20 **A.** Just a second while I look at the rebuttal report. What
21 page are we on?

22 **Q.** Paragraph 35 and 36. It's on page 19, sir. The question
23 is, have I highlighted and underlined "unexplained gap" four
24 times?

25 **A.** Yes. I used those words there, correct.

1 **Q.** But you can't actually rule out racial bias as the
2 explanation for that gap, can you?

3 **A.** No, not on the basis purely of statistical evidence, no.

4 **Q.** Now, you did a lot of summing of the scores with
5 Mr. Waxman to try to show that whites were better than Asians
6 on the personal rating.

7 Do you remember all those sums you did, some less
8 than 7, some less than 11? Do you remember those?

9 **A.** I remember those scores, yes.

10 **Q.** You did some charts with sort of bar charts, histograms
11 of who got 7 or less. Do you remember those?

12 **A.** Yep.

13 **Q.** You've been here for a while. You've listened to a lot
14 of Harvard witnesses.

15 Have you ever heard one single sentence of
16 testimony in this trial or before in discovery that anyone at
17 Harvard ever sums up profile ratings ever?

18 **A.** I've never heard that. But I've never heard they fit
19 logistic regression models either, the people on the
20 admissions committee for sure.

21 **Q.** To be clear, you weren't fitting a logistic regression
22 model when you showed those histograms of who got a sum less
23 than 7 or 11. You weren't doing a logistic regression model,
24 were you?

25 **A.** No. They're just sums.

1 **Q.** Right. And everybody can add?

2 **A.** Yes. It's surprising how often mistakes can come in, but
3 yes, almost everybody can add, I think.

4 **Q.** And you've seen no evidence in the dozen or so
5 depositions you've read with hundreds of hours of testimony
6 maybe and all the time you've been here listening to Harvard
7 witnesses that anyone ever once summed a profile rating,
8 correct?

9 **A.** No. I didn't hear that or I don't remember hearing it,
10 but I am not sure I was looking for it.

11 **Q.** If you are remember, you can let me know tomorrow.

12 And the effect of the summing that you did is to
13 treat each rating equally and each point on those ratings
14 equally. So having a 1 and a 2 and a 3 on school support is
15 the same as 2, 2, 2, even though 1s are far more rare. Is
16 that right?

17 **A.** It does just add them up, that's true, yes.

18 **Q.** I'm trying to find one of those histograms for you, sir,
19 just so that we can -- this is one of them. I've just got
20 one on the screen so we all know what we're talking about.

21 So it treats 1, 2, 3 the same as a 2, 2, 2, right?

22 **A.** Yes.

23 **Q.** And you didn't construct any model in your reports that
24 are would tell you if, in fact, the ratings should all be
25 treated equally and each point in the ratings should be

1 treated equally, did you?

2 **A.** No, I didn't. But I didn't believe that that was
3 necessary for illustrating the points here.

4 **Q.** You just did a bunch of arithmetic and then you showed
5 these descriptive statistics; is that right?

6 **A.** Well, this is descriptive statistics, and it does involve
7 adding these scores. That's correct, yes.

8 **Q.** I want to show you Defendant's 692, which you also used
9 today, and you were talking about this non-academic
10 admissions index. Do you remember that?

11 **A.** Can I take a look at the whole thing?

12 **Q.** Sure. You have a big binder in front of you, sir.
13 Defendant's 692 is in there.

14 **A.** So that's D 692?

15 **Q.** Correct.

16 THE COURT: I don't think I have 692.

17 MR. MORTARA: You don't, Your Honor? You should.

18 THE WITNESS: I don't think I do either.

19 BY MR. MORTARA:

20 **Q.** So that's okay. Why don't we use your slide. This is
21 it. Do you remember this one?

22 **A.** Yes, I do. Yes.

23 **Q.** Do you see down at the bottom it says Defendant's 692.
24 Do you see that.

25 **A.** Yes.

1 **Q.** And that's where it comes from, right?

2 **A.** Yes.

3 **Q.** And you constructed this non-academic index decile thing,
4 and it shows these higher percentages for whites and lower
5 percentages for Asians.

6 Do you see that?

7 **A.** In each of the deciles, yes.

8 **Q.** And it's your opinion that this explains, in part, or
9 maybe in whole, the unexplained gap in the personal rating
10 between whites and Asians?

11 **A.** No.

12 **Q.** Does it explain any of it?

13 **A.** No. That's not what I was saying that this explained.

14 **Q.** What do you think this explains?

15 **A.** Well, as I tried to explain, a central hypothesis that
16 Professor Arcidiacono is putting forth is that Asian students
17 are stronger than white students on the observed factors that
18 contribute toward the personal rating and then using that to
19 make some argument about the unobserved factors, which are,
20 of course, the things that are represented in the unexplained
21 gap or what's measured by the average marginal effect.

22 So what I'm trying to do in this slide is take a
23 look at the combination of all the non-academic observed
24 factors, weighting them by the way that they enter into the
25 admissions model, and look at how they differ for students in

1 the top several deciles between whites and Asians in terms of
2 the fractions, for example, in the ninth decile here.

3 **Q.** And your basic point is that what we're looking at on the
4 screen, which now has the personal rating and ALDC effects
5 removed, it's DD 10.78, your basic point is that because
6 whites are doing better than Asians on these observable
7 characteristics, the gap between whites and Asians in the
8 personal rating may be explained by that.

9 Is that your basic point?

10 **A.** Yes. So the basic -- following on exactly the same kind
11 of logic that Professor Arcidiacono is using to explain, say,
12 the significant positive Asian-American average marginal
13 effect in the academic rating with a significant positive
14 Asian-American effect in the extracurricular rating.

15 He's asserting that that's due to unobserved
16 characteristics of the Asian-Americans and arguing that
17 that's consistent or -- consistent with this idea that the
18 observed characteristics of Asian-Americans that contribute
19 to each of those two variables are somewhat higher than the
20 observed characteristics for white students.

21 So I'm trying to evaluate that same kind of
22 argument when we look at the personal rating. And so when we
23 look at the personal rating, what's really relevant because I
24 showed that personal rating is hardly at all affected by
25 academic factors, was to look at these non-academic factors.

1 So that's what I'm trying to do here and take a
2 look at whether the non-academic factors when they're
3 weighted by the way that they enter into the admissions
4 process are higher for whites than Asians. And I believe
5 that's what it shows.

6 **Q.** Thank you. Are you done?

7 MR. WAXMAN: Your Honor, it's one thing for counsel
8 to be asking questions. It's another thing for counsel to be
9 making snide remarks like this. Now, I suggest it reflects
10 more on the questioner than the witness, but I object.

11 THE COURT: All right. The speech isn't required.
12 Ask the question. Skip the narrative.

13 MR. MORTARA: Your Honor, I will happily do so.
14 But next time we get three paragraphs after a "yes," I'm
15 going to move to strike and ask you to intervene. That's
16 what I'm trying to move it along.

17 THE COURT: My experience in this trial is that
18 experts often answer questions with three paragraphs instead
19 of one. Yours did the same thing. Okay?

20 MR. MORTARA: Your Honor, respectfully, he didn't.
21 And that's the problem. But we'll come back. I'll keep
22 going. Thank you, Your Honor.

23 MR. WAXMAN: Just for the record, the question that
24 he asked was something like, well, what is this showing or
25 isn't this what you mean? It was a question that required an

1 explanation, and an explanation was provided.

2 MR. MORTARA: Moving on.

3 THE COURT: Yes.

4 BY MR. MORTARA:

5 Q. You showed this graph in your direct testimony with
6 Mr. Waxman, didn't you?

7 A. Yes.

8 Q. And in fact, I think you and I were just talking about it
9 with respect to you said you added some additional variables
10 onto Professor Arcidiacono's models, and you discovered
11 that -- I think you said something like we could almost hit
12 the ceiling eventually, the ceiling would be zero, which is
13 no difference between Asians and whites, right?

14 A. No. I didn't say that at all.

15 Q. You didn't say we might almost hit the ceiling?

16 A. I didn't say with the addition of the variables that I
17 added to his model that we almost hit the ceiling. No, I
18 didn't say that.

19 Q. I understand. I'm not trying to quibble with you.

20 What you said was, if we kept adding variables, we
21 would almost hit the ceiling, right?

22 A. I said something like that, yes.

23 Q. I think you have this in your binder. You have
24 Defendant's Exhibit 688. Take a look to make sure you got
25 it. I'm told that you do.

1 **A.** I found it. Here it is.

2 **Q.** You found it. Great. Something is working.

3 Defendant's 688 has that analysis. It actually has
4 a version of this graph in it, right? Just confirm that for
5 you, sir.

6 **A.** It has the information that is used to construct this
7 graph, yes.

8 **Q.** It's also got the information about the additional
9 variables you added, right? Keep flipping pages. I think
10 it's on a subsequent page. It's got your graph in there, the
11 one I've got on the screen, and it's got the additional
12 numbers, right?

13 **A.** Yes.

14 **Q.** Staying with the graph that's on the screen, just looking
15 at Professor Arcidiacono's Model 5, you spent a lot of time
16 with the histograms about the school support rating, right,
17 looking at the differences between whites and Asians,
18 correct?

19 **A.** I did spend some time going through them. They're not --
20 I don't quite understand what that has to do with Model 5.

21 **Q.** Those involve the school support ratings, correct?

22 **A.** Yes, that's correct. Sorry.

23 **Q.** Some of them involved the alumni ratings, correct?

24 **A.** Yes.

25 **Q.** And the school support and the alumni ratings are all

1 included in Professor Arcidiacono's Model 5?

2 **A.** Right. My understanding is other rating variables are
3 also included in that model, yes.

4 **Q.** But the ones that you talked about with Mr. Waxman in the
5 histogram, school support, alumni ratings, they're included
6 in Arcidiacono's Model 5, correct?

7 **A.** Yes.

8 **Q.** Now, if you look at the fourth page of Defendant's 688,
9 it has those numbers we've been talking about when you added
10 variables, and the average marginal effect went down, right?

11 **A.** Yes. It becomes smaller in magnitude. It actually goes
12 up because it's becoming more positive. It becomes smaller
13 in magnitude.

14 **Q.** Smaller magnitude. Thanks for the correction.

15 And the first set of variables you added where you
16 ran it year by year, which is your preferred way of doing the
17 model, right?

18 **A.** It's my preferred way of doing the admissions model, yes.

19 **Q.** And you added additional card model variables. Do you
20 see that? Do you see that, sir?

21 **A.** Yes.

22 **Q.** And those variables are -- I'm highlighting on the
23 screen -- intended career, indicator for a staff rating,
24 parental occupations, measures of participation in
25 extracurricular activities and indicators for being born in

1 the United States and having lived outside of the United
2 States.

3 Those were the variables you added in the first
4 round, right?

5 **A.** Yes.

6 **Q.** And then you added still more variables. That was the
7 additional extracurricular variables, right?

8 **A.** Yes.

9 **Q.** And so you got these two numbers there, right?

10 Now, just a quick question. Are those
11 statistically significant still?

12 **A.** Which numbers are you referring to? There's three
13 numbers there. Which numbers?

14 **Q.** All of them. Any of them.

15 **A.** Yes, I believe they are.

16 **Q.** They all are. But that's not here on your
17 Defendant's 688. Okay. Now let's go back to your
18 demonstrative. You could have graphed those two additional
19 points that you have on your demonstrative, couldn't you?

20 **A.** Yes.

21 **Q.** Let's do that. See I've got the version of your graph
22 right here on the screen, sir?

23 **A.** Yes.

24 **Q.** All right. I'm going to call the number 2 one you did
25 card 2, and that was minus 3.23, right?

1 **A.** Yes.

2 **Q.** And the other one is going to be called card 3. That was
3 minus 3.01; right? Do you see that I've entered that on the
4 Excel spreadsheet on my computer?

5 **A.** Yes.

6 **Q.** Let's see what that looks like now. Do you see that I've
7 added your two additional layering on of variables, and we
8 look at what the graph looks like now? Do you see that?

9 **A.** Yes.

10 **Q.** And you see that I've created an axis of zero. That's
11 where the ceiling is, right? That's no effect, correct?

12 **A.** Yes.

13 **Q.** And when you added on as many variables as you had,
14 basically every variable you had available to you, what
15 happened here is that the average marginal effect of the
16 difference between Asians and whites on the personal rating,
17 it didn't head to the ceiling, did it?

18 **A.** No. Well, first of all, I would say two things about
19 this graph.

20 First of all, if one were to include all of those
21 variables and go directly from Model 5 to card 3, the graph
22 would look different, first of all.

23 Secondly, I wasn't actually asserting that adding
24 additional observed variables would make it go to the
25 ceiling.

1 MR. MORTARA: Your Honor, we're going to mark this
2 as Plaintiff's Demonstrative 40. We'll submit it and offer
3 it into evidence.

4 MR. WAXMAN: Well, I'm going to -- he's obviously
5 made it as a demonstrative. We object to it being in
6 evidence because the witness just said if he were calculating
7 his -- I can't remember what it's being called here, card
8 Model 3, the graph would not look like that. So I don't
9 think there's a foundation for offering it into evidence.

10 MR. MORTARA: Your Honor, the foundation is I just
11 made it, and we just agreed that demonstratives go back into
12 evidence. I thought we had a rule about demonstratives now.

13 MR. WAXMAN: We had a rule about disclosed
14 demonstratives. This is a demonstrative again created on the
15 fly, and there's no agreement.

16 THE COURT: This is what I'm going to do. We'll
17 sort this out tomorrow morning. I'm tired. I'm sure
18 Dr. Card is tired. It's 3:00. It's been a long day.

19 We will resume tomorrow. What time would you all
20 like to start? Karen, do we have anything before this?

21 What time would you guys like to start tomorrow?

22 MR. MORTARA: As early as the Court could
23 accommodate us.

24 MR. LEE: 9:30, if you could, Your Honor.

25 THE COURT: Let's start at 9:30. All right. And

1 we will take this up. I think there is an agreement about
2 demonstratives, but he's called into question the accuracy of
3 this demonstrative. The witness hasn't adopted it. We can
4 sort out some way to deal with that, but it's not going to
5 come in as a demonstrative that's been accepted as having
6 accuracy.

7 MR. MORTARA: Sure.

8 THE COURT: So we'll figure out some other way like
9 demonstrative marked for identification rather than --

10 MR. MORTARA: That's fine.

11 THE COURT: We'll get back to all those angels on
12 the head of a pin. We'll see everyone tomorrow. Okay?

13 MR. MORTARA: Thank you, Your Honor.

14 MR. LEE: Thank you, Your Honor.

15 (Court recessed at 3:04 p.m.)
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CERTIFICATION

I certify that the foregoing is a correct
transcript of the record of proceedings in the above-entitled
matter to the best of my skill and ability.

/s/ Joan M. Daly

October 31, 2018

Joan M. Daly, RMR, CRR
Official Court Reporter

Date

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