



Racial/Ethnic Misrepresentation of and Bias Against Minority Executives

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Abstract

We reassess whether and to what degree the hiring, development, and promotion decisions of S&P 500® companies have led to misrepresentation of and bias against their minority executives. Instead of the US population benchmark that has conventionally been used to measure misrepresentation, and from such misrepresentation attribute the presence and magnitude of racial bias and discrimination, we measure misrepresentation in US executives using the benchmark of the racial/ethnic densities (RAEDs) of their college cohort peers. Our key result is that the differences between US executive RAEDs and the RAEDs of their college peers are far smaller than those found using the US population, typically by an order of magnitude or more. Whereas under the US population benchmark, Black and Hispanic S&P 500® US executives are reliably greatly under-represented by – 9.1% and – 15.5%, and Asians and Whites are reliably over-represented by 1.3% and 24.4%, respectively, we find that Asians and Blacks are statistically at their college-peer benchmark levels, with college-peer-benchmarked misrepresentations of just – 0.4% and 0.1%, respectively. White executives are reliably slightly above their college-peer benchmarks by 1.9%, while Hispanics are reliably slightly below by – 1.2%. Our study highlights the importance of the benchmark used to measure the signs and magnitudes of racial misrepresentations and the sensitivity of inferences as to the presence or absence of racial biases to the choice of benchmark.

Keywords Executives · Race · Ethnicity · Benchmarks · Misrepresentation · Racial bias

JEL Classification A13 · J01 · J15 · J29 · M12

Introduction

The dominant view expressed by academics, activists, business leaders, and commentators about US executive racial/ethnic representation is that Blacks and Hispanics are greatly under-represented and Whites are greatly over-represented, particularly in large US public companies, and that such misrepresentations are evidence of racial/ethnic bias and

discrimination against minorities by the firms in their hiring, development, and promotion decisions (Zimmerman 2010; Green et al. 2018; Chen 2020; Larcker and Tayan 2020; Shah Paikeday and Qosja 2023).¹ These conclusions have been based on using the US population (or the highly similar US workforce) as the benchmark for measuring if and to what degree minorities are under- or over-represented.

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¹ “Racially diverse executives hold only 16% of total C-suite positions. Only 16 have a non-white CEO. 26 of the Fortune 100 have no ethnic diversity at the C+1 level...” (Larcker and Tayan 2020); “[T]he occupants of corner offices are a stunningly homogeneous bunch ... [E]xecutive ranks and upper management remain persistently, stubbornly white” (Green, Holman, and Paskin 2018); “Only 4 of the 37 (nation’s biggest corporations per Bloomberg) had Black people in 10% or more of executive and management roles, even though Black people make up about 13% of the US population” (Green, Porter, Sam, and Cannon, 2021); “As of 2019, Hispanics are the largest minority group in the US ... however, they occupy only 4.3% of executive positions” (Swereznski, Tomaskovic-Devey, and EHoyt 2020).

However, while the US population provides certain insights, it is only weakly informative about the extent to which misrepresentation is due to racial bias in firms' hiring, development, and promotion decisions, as it does not take into account the pool of candidates from which executives are hired or promoted. In this study, we therefore diverge from the US population benchmark by measuring the racial misrepresentations of S&P 500® executives that result from using as benchmarks the racial densities (RAEDs) of S&P executives' college peers, supplemented with the historical cohorts of the 2017 *New York Times* Top 100 colleges/universities and all US colleges, matched to executives' ages.²

We propose that a college-peer benchmark is likely to be more informative than the US population in benchmarking executive RAEDs for several reasons. First, the global nature of the S&P 500® means that not all of their executives are US residents and thus may not have been hired from a talent pool with similar racial densities as the US population. Second, while almost all US executives have a college degree, only a third of the US population does. Therefore, a large percentage of the US population would not be candidates for the qualified labor pool for the entry-level positions that senior executives are hired into at the beginning of their careers. Third, with a median age of 55, S&P 500® executives are a median of 33 years beyond their college graduation. However, the racial densities of US college graduates have systematically and substantially changed over the past 50 years as an increasing number and percentage of racial minorities have earned college degrees and entered the labor market pipeline towards becoming an executive. The result of these factors is that benchmarking executive RAEDs against the US population is likely to yield misplaced measurements of the signs and magnitudes of racial misrepresentation and thus create the risk of arriving at misplaced inferences about racial biases by firms against minorities.

Our college-peer benchmark takes as its starting point the assumption that US executives begin their careers when they are hired as proto-executives by firms out of US colleges. We then measure racial/ethnic misrepresentation as the difference between observed US executive RAEDs and the RAEDs of executives' US college peers, namely all those who graduated with a BA/BS in the same year and from the same US colleges as the executives. Based on and using our college-peer benchmark, we define direct racial/ethnic bias against minority executives as the racial/ethnic misrepresentation that occurs after firms determine the US colleges and universities from which to hire their proto-executives.

Further, however, because prior research has found that firms' hiring practices tend to result in lower corporate access for minorities (Kline et al. 2022), we also provide measures of firms' indirect racial/ethnic biases against minority executives. We do so by defining indirect racial/ethnic bias against minority executives as the difference between our college-peer benchmark RAEDs and the RAEDs of two candidate sets of colleges that we normatively propose firms could have chosen to recruit from if they were seeking to do so in a racially unbiased manner—namely all US colleges and the 2017 *New York Times* Top 100 US colleges. The RAEDs of graduates from these two sets of colleges, matched to executives' ages, allow us to estimate the signs and magnitudes of any indirect biases against minorities due to firms choosing not to hire graduates from certain colleges into their proto-executive pipelines.

Using the frameworks outlined above, we empirically estimate the misrepresentations, and the direct and indirect racial/ethnic biases against minority executives, using data collected in real time on the 4541 US executives who were in S&P 500® companies as of mid-2020. We arrive at three key results.

First, the differences between US executive RAEDs and the RAEDs of executives' college peers are far smaller than the differences found using the RAEDs of the US population benchmark, typically by an order of magnitude or more. Second, while White executives are statistically reliably above their college-peer benchmark by 1.9% and Hispanics are reliably below by −1.2%, Asian and Black executives are statistically at their college-peer benchmarks, having college-peer misrepresentations of −0.4% and 0.1%, respectively. Conditional on the validity of our college-peer benchmark, these results mean that the direct biases against US minorities by S&P 500® firms in their executive hiring, development, and promotion decisions are much smaller than presumed by academics, activists, business leaders, and commentators. They particularly run counter to the claims made by such parties (Shah Paikeday and Qosja 2023; Murray 2024) that S&P 500® firms have historically engaged in and exhibited direct bias against Asians and Blacks in their executive development and promotion decisions.

Our last main result is that whereas Hispanics are under-represented and Whites over-represented using both the All-US-Colleges and the 2017 *New York Times* Top 100 US colleges benchmarks, Asians are over-represented (under-represented) and Blacks are under-represented (over-represented) using the All-US-Colleges (the *New York Times* Top 100 US colleges) benchmark. This implies that if in order to be unbiased in racial hiring, S&P 500® firms should have hired into their proto-executive pipelines from all US colleges (the *New York Times* Top 100 colleges),

² Solely for the sake of textual compactness, throughout the remainder of our paper, we use college to refer to the institution that grants the BA/BS degree, and race to refer to race and/or ethnicity.

then S&P 500® firms' actual college hiring has been indirectly biased against Hispanics and biased in favor of Whites, and indirectly biased against Blacks and in favor of Asians (biased in favor of Blacks and against Asians).

Separate from its specific findings, we suggest that our study has several general implications, the first of which is that the choice of the benchmark that is used when measuring the signs and sizes of racial misrepresentations—and therefore in the evaluation and attribution of direct and/or indirect biases to US public companies in the actions they take towards their executives—typically matters a great deal.

Second, the US population is not an informative benchmark when it comes to measuring the signs and/or sizes of racial biases by firms in their hiring, development, and promotion decisions because the US population does not account for the most likely labor pool available to firms in their entry-level hiring. As such, claims of racial bias based on using the US population benchmark are likely to be misplaced.

Third, our findings suggest that social policy actions aimed at affecting the racial compositions of executives are most likely to yield results if they focus on executive RAEDs 20–40 years from now, not executive RAEDs today. This is because the racial densities of those already in the executive pipeline are largely set due to proto-executive hiring decisions that firms made 20–40 years ago, and because our college-peer benchmark results find that it is only Hispanics who are reliably misrepresented in minority executives today, not Asians or Blacks. At the same time, however, focusing on the beginning of the executive pipeline means that the effects of such policy actions will take 20–40 years to come to fruition, requiring social policy makers to be patient and willing to take a long-term view.

Fourth, the very different racial densities in today's US vs. non-US BA/BS graduates, especially the sixfold higher density of Asians and the twofold lower density of Blacks in non-US BA/BS graduates, per our data, combined with the far larger numbers in the worldwide supply of non-US executive-qualified Asians as compared to Blacks, suggest that it is unlikely in the future that every race/ethnicity will be represented in the executives of US firms at the same density as they are in the US population.

Finally, the benchmarking approaches that we propose and empirically explore could also be applied to boards of directors, below-executive-level employees, and gender; be extended beyond BA/BS degrees to include and/or condition on masters and PhD degrees; and applied to evaluate claims of racial bias and discrimination in non-business areas. We encourage such analyses to be done by researchers.

Executives in S&P 500® Firms

In mid-2020, we gathered executive race, ethnicity, and other data on the firms in the S&P 500® Index at 12/31/2019. We followed the website-disclosure approach of Hunt, Layton, and Prince (2015) by defining an executive as anyone who is disclosed by a firm to be on its leadership team, most often per the firm's website at mid-2020.³ In the rare cases in which no executives are available on the firm's website, we define a firm's executives as the employees listed on the firm's Bloomberg or Yahoo! Finance profile page, else the firm's Annual Report, else (albeit rarely) from its comparably.com page.⁴ We capture in a screenshot the facial photo of each executive, together with her or his first and last name(s).⁵

In Table 1, we present our data availability waterfall. Based on our definition of an executive and the availability of key data items, we arrived at a final set of 497 S&P 500® firms for which we were able to identify at least one named executive with a facial photo. In Table 2, we present descriptive statistics on the industry composition and selected financial characteristics at 12/31/19 or for the fiscal year ending on or before 12/31/19. Panel A reveals that in terms of Fama–French 12-industry classifications, S&P 500® firms are most (least) dense in finance and business equipment (consumer durables and telephone & television transmission). Panel B shows that S&P 500® firms are profitable in terms of the commonly used gross margin %, ROE, ROA, and ROS measures of firm financial performance.

Table 3 reports descriptive statistics for key executive characteristics using all the available data on each executive.⁶ Panel A indicates that S&P 500® firms have an average of 14.6 executives, with the mean salary + bonus pay where data were available in the most recent prior fiscal year being \$2.4 million. Panel B reports that 76% (24%) of executives are

³ Our approach differs from research that uses a broader set of firms but with a more limited set of executives (e.g., Guest 2017; Guo, Gupta, Jackson, and Mortal 2021). While a focus on only the most highly paid executives is important, we believe that often representation of executives is meant to refer to a broad set of executives.

⁴ Yahoo! Finance's profile page lists up to five executives. Bloomberg's profile page typically lists 3–10 executives. Comparably.com lists up to 50+ people who work for the firm, only some of whom we judged to be executives.

⁵ The bulk of the capturing of executive names and photos took place June 10–August 5, 2020. For documentation and authentication purposes, we saved all executive screenshots in a separate Word + PDF file for each firm.

⁶ A full description of the executive characteristics that we coded is provided in Appendix A. Salary data are only available for firms' top five executives, which is a much narrower group than the full set of executives defined via firms' websites. We do not have data on the US residency status of executives.

Table 1 Criteria applied in arriving at the set of S&P 500® firms at 12/31/19 included in the study and for which at least one named executive was found on the firm's website, the firm's Yahoo! Finance profile page, the firm's Bloomberg profile page, the firm's Annual

Report, or comparably.com. Executives are defined as employees whose names are disclosed on the firm's website as part of the firm's executive, leadership, or management team(s), or in its set of officers

	Step	Criteria	# firms
	1	Firms in S&P 500® Index at 12/31/2019	500
<i>less:</i>	2	Firms with no website or no executive/s on firm's website	– 9
<i>plus:</i>	3	Firms of the $n=9$ in step 2 where ≥ 1 executive was found on Yahoo! Finance, Bloomberg, Annual Report, or comparably.com	6
	=	Firms with ≥ 1 named executive	497
<i>less:</i>	4	Firms for which no executive photo could be found	0
	=	S&P 500® firms with ≥ 1 executive who had a face photo	497

Table 2 Descriptive statistics on the industry composition and key financial characteristics at 12/31/19 or for FYE on or before 12/31/19 for the S&P 500® firms in the study

Panel A: industry composition (494 firms)		Panel B: selected firm financial characteristics at 12/31/19 or for fiscal year 2019 n(494 firms)			
	# firms		10%	Median	90%
Fama–French 12-industry		Market cap	\$9258	\$22,422	\$125,125
Business equipment	89	Total assets	\$5050	\$20,497	\$138,850
Chemicals and allied products	20	Total liabilities	\$2598	\$13,368	1037 = 646
Consumer durables	9	Total equity	\$1132	\$6291	\$33,728
Consumer nondurables	31	Revenue	\$2688	\$10,188	\$63,293
Finance	97	R&D	\$0	\$0	\$1239
Healthcare, medical equipment, and drugs	39	EBIT	\$594	\$1583	\$8016
Manufacturing	39	Net income	\$212	\$996	\$5543
Oil, gas, and coal extraction and products	22	CFOPS	\$528	\$1680	\$8636
Other	61	CAPEX	\$45	\$393	\$3471
Telephone and television transmission	12	Gross margin	19%	42%	78%
Utilities	30	ROE	0%	14%	45%
Wholesale, retail, and some services	45	ROA	1%	6%	15%
		ROS	2%	11%	29%
		TATO	0.13	0.53	1.26
		LEVG	1.47	2.87	9.18

judged to be male (female). Panel C shows the frequencies of different Chief- and Officer-level positions. Not surprisingly, the most common executive positions are CEO and CFO. However, GC/CLOs are also frequently present, as are Presidents, Corporate Secretaries (who are often the same person as the GC), and CHROs. At mid-2020, the number of Chief Diversity/Equity/Inclusion Officers across all S&P 500® firms was 19. In terms of seniority, the most senior levels, Senior EVPs/EVPs, slightly outnumber SVPs, who in turn outnumber VPs. Panel D reports that executives are symmetrically distributed around a mean (median) of 54.5 (54) years.

Executive Race/Ethnicity

In judging an executive's race/ethnicity, we follow Hunt, Layton, and Prince (2015) by visually studying each executive's photo and first and last names, and then

classifying the executives into nine granular categories. With our lowercase tag for each category shown in parentheses, the categories are African ancestry (aa), European ancestry (eur), Near Eastern (ne), East Asian (ea), South Asian (sa), Latino (lat), Native American (na), and Other (o). We only diverge from Hunt, Layton, and Prince (2015) by redefining their Other category into either Pacific Islander (pi) or Alaska Native (an). To ensure as much consistency as possible, all race/ethnicity judgments were made by one coauthor.

The data we use in seeking to benchmark executive RAEDs come from the National Center for Educational Statistics' Integrated Postsecondary Education Data System (IPEDS), which used five racial categories during the time period pertinent to our study (outside of Nonresident aliens, whom we set aside). We therefore collapse our initial nine race/ethnicity categories into IPEDS' five categories. With

Table 3 Descriptive statistics on key personal characteristics, excluding judged race/ethnicity, of the named executives with a facial photo in the S&P 500.® firms in the study as of mid-2020

Panel A:	Executives	Min			Mean	Max	# execs
	# executives per firm	\$2.0			\$14.6	\$79.0	7246
	Salary + bonus pay MRFY (\$ mil)	\$ -			\$2.4	\$47.1	2108
Panel B:	Gender	Male			Female		# execs
	#	5533			1713		7246
	%	76%			24%		
Panel C:	Chief or Officer position (outright or Co-)				C-Label		# execs
	CEO				CEO		501
	President				Pres		351
	Chief Financial Officer				CFO		491
	General Counsel or Chief Legal Officer				GC,CLO		452
	Chief Operating Officer				COO		170
	Corporate Secretary				CS		242
	Chief Human Resources (or People) Officer				CHRO		228
	Chief Information Officer				CIO		143
	Chief Technology Officer				CTO		113
	Chief Marketing Officer				CMO		87
	Chief Accounting Officer				CACCO		84
	Executive Chairman				Exec-CH		39
	Chief Diversity/Equity/Inclusion Officer				CDEIO		19
	Senior Executive Vice-President				SEVP		65
	Executive Vice-President				EVP		1686
	Senior Vice-President				SVP		1676
	Vice-President				VP		1162
Panel D:	Age in years	Min	Median	Mean	Max	Std. dev	# execs
		30	54.0	54.5	92.0	6.0	5470

our lowercase tag for each broader category in parentheses, the IPEDS categories are American Indian/Alaska Native (aian), Asian/Pacific Islander (api), Black (b), Hispanic (h), and White (w), where aian = ai + an, api = ea + sa + pi, b = aa, h = lat, and w = eur + ne. IPEDS' categories closely match those used for US executives in Hunt, Prince, Dixon-Fyle, and Yee (2018); Hunt, Dixon-Fyle, Prince, and Dolan (2020); and Dixon-Fyle, Hunt, Huber, del Mar Martinez Marquez, Prince, and Thomas (2023).

The strength of our way of classifying an executive's race/ethnicity based on their photo and first and last name(s) is that we obtain race/ethnicity estimates for 7246 executives. However, because we do not employ in-depth biographical analysis, our approach is likely to undercount non-Whites, mainly because Hispanic and European faces and names can be quite similar. We seek to de-bias the numbers and densities of our prima facie judged races of executives. We do so by first estimating visual identification adjustment factors, denoted VIAFs, for Asian, Black, and Hispanic executives. Then, after setting the VIAF for American Indians/Alaska Natives at 1.0, we take the adjusted number of Whites to be the plug. The executive-level data we use to calculate the inflation factors were provided by Crist | Kolder Associates from their 2020

Volatility Report. Crist | Kolder's data consist of the first and last names of all the CEOs and CFOs that they recorded as being in the union of firms in the S&P 500® and Fortune 500, the name of the firm for which the CEO or CFO works, and Crist | Kolder's classification of the CEO's or CFO's race or ethnicity. Our approach to calculating VIAFs uses only the subset of Crist | Kolder's firms that are also in our database of S&P 500® firms and only those CEOs and CFOs that both we and Crist | Kolder identify. We take Crist | Kolder's racial identifications to be correct, as in their identification they go beyond our approach of relying only on executives' facial photos and names.

We define an executive's ethnicity or race coding as being correct and not needing adjustment if both we and Crist | Kolder agree. Where our coding of an executive's race or ethnicity differed from that of Crist | Kolder, we researched biographical and other sources to cross-check on Crist | Kolder's coding. Then, to use Asian/Pacific Islander (api) as an example, we calculated the adjusted api as the ratio of the number of CEOs + CFOs that Crist | Kolder correctly coded as api to the number of CEOs + CFOs that we correctly coded as api, multiplied by the ratio of the difference between the number of CEOs + CFOs that Crist | Kolder correctly coded as api versus incorrectly coded

as api, and the number of CEOs + CFOs that Crist | Kolder correctly coded as api. Similar calculations were performed for Black and Hispanic executives. The resulting VIAFs are $aian = 1.00$, $api = 1.073$, $b = 1.100$, and $h = 1.345$.⁷ The adjustment factor for h is larger than for api and b because Hispanic and European faces and names not infrequently are similar, leading us in our race/ethnicity coding to undercount Hispanic and overcount White executives. Based on the assumption that our adjustment factors are independent of executive level and title, we then apply the factors to all executive RAEDs.⁸ From this point, the RAEDs we refer to and use in our empirical analyses are VRAEDs, that is, raw RAEDs that have been multiplied by their VIAFs.

In Table 4, we present a detailed view of the raw and adjusted numbers and densities of executives. For the 6931 executives in our S&P 500® firms, panel A of Table 4 presents the proportions of executives classified using the more granular nine categories of Hunt, Layton, and Prince (2015). Collapsing these categories into the five less granular categories used by IPEDS, panel B reveals that VRAEDs for executives as a whole are American Indian/Alaska Native 0.01%, Asian 7.6%, Black 3.9%, Hispanic 2.9%, and White 85.5%. VRAEDs also vary substantially across Chief positions, in that Asians are most (least) dense in CTOs (Chief Accounting Officers), Blacks are most (least) dense in CDEIOs (CTOs), Hispanics are most/least dense in CDEIOs (CIOs), and Whites are most (least) dense in the CFO (CDEIO) positions. In contrast, much less variation in VRAEDs is seen across the ranks of SEVP/EVP, SVP, and VP.

Measuring Racial Misrepresentation and Bias in US Executives via Different Benchmarks

The benchmark is important when making claims about misrepresentation, whether under- or over-representation, for two reasons. First, it provides a measure of the expected level of representation due to exogenous factors.

For example, in measuring and evaluating financial investment performance, the benchmark identifies that part of performance exogenously driven by conditions outside the investment manager's control, therefore serving to isolate the endogenous performance that was causally due to the manager (Bailey 1992). Similarly, in measuring and evaluating executive racial representation, the benchmark can help isolate misrepresentation that arises endogenously from corporate actions versus misrepresentation that stems exogenously from factors outside the firm's control, such as the choices made by colleges with regard to race in their college admission decisions. Among the actions that are under corporate control and that have been focused on by academics, activists, business leaders, and commentators are firms' hiring, development, and promotion decisions (Zimmerman 2010; Green et al. 2018; Chen 2020; Larcker and Tayan 2020; Guynn and Schrottenboer 2021; Shah Paikeday and Qosja 2023). These actions have been seen as being biased by firms against minority executives because benchmarking executive RAEDs against the RAEDs of the US population leads to the measurement of large amounts of under-representation in the racial densities of minority executives.

Second, the benchmark can surface counterfactual observations that help in the evaluation of causal effects (Morgan and Winship 2015). In evaluating executive racial representation, the benchmark can provide a counterfactual set of data as to what racial representations would have been if a firm had hired from a different set of colleges than the ones from which its executives came, thereby providing insight into the extent to which misrepresentation and bias are due to firms' choices as to the colleges to form which to hire, as compared to their subsequent direct hiring, development, and promotion decisions.

With these aspects of benchmarks in mind, in the "Alternative Benchmarks to the US Population," "Executive College-Peer Benchmark," and "Other Benchmarks" sections, we put forward three alternatives to the US population benchmark with regard to the measurement of misrepresentation in the racial densities of executives and the attribution of bias against minorities. Each benchmark represents a college population from which a company either did hire or could have hired its proto-executives, and we propose that each improves our ability to assess whether, to what degree, how, and why firms play one or more causal roles in executive racial representation, misrepresentation, and bias.

US Population Benchmark

The conventional approach used in academia and practice to measure racial misrepresentation and make inferences about racial bias against minority US executives is to compare executives' racial densities to those of the extant US population. We therefore set our empirical stage by measuring,

⁷ A full description of the calculations behind each VIAF is provided in Appendix B.

⁸ As a potential validation check on our adjusted RAEDs, we also obtained race/ethnicity estimates at the executive level from List Service Direct. List Service Direct uses a person's names to estimate their race/ethnicity. However, similar to other studies that have used List Service Direct (Brochet, Miller, Naranjo, and Yu 2019; Flam, Lee, Green, and Sharp, 2020), we find that while our RAEDs for $aian$, api , and h are close to the RAEDs obtained from List Service Direct, List Service Direct's RAED for b (0.8%) is far smaller than is our adjusted RAED for b (3.5%). This is because many Black and White names are not distinguishable, leading List Service Direct to underidentify (overidentify) the number of Blacks (Whites).

Table 4 Racial categories and VIAF-based numbers and densities of executives in S&P 500® firms. The definition and coding of each racial category are provided in Appendix A. The visual identification adjustment factors (VIAFs) for aian, api, b, and h are calculated as described in Appendix B

Panel A:	Classifications using the ethnic and racial categories in Hunt, Layton, and Prince's (2015) McKinsey study								
Racial/ethnic category	Native American	Other	East Asian	South Asian	African ancestry	Latino	European ancestry	Near Eastern	
McKinsey's racial/ethnic descriptor	na	≡ pi + an	ea	sa	aa	lat	eur	ne	Total
All executives #	0	1	191	302	246	149	5944	98	6931
Non-VIAF-based raw RAED %	0.0%	0.01%	2.8%	4.4%	3.5%	2.1%	85.8%	1.4%	100%
Panel B:	Classifications per National Center for Education Statistics' Integrated Post-Secondary Education System (NCES IPEDS)								
Racial/ethnic category	American Indian/Alaska Native		Asian/Pacific Islander		Black non-Hispanic	Hispanic	White non-Hispanic		
	aian = na + an		api = ea + sa + pi		b = aa	h = lat	w = eur + ne		Total
All executives #	1		493		246	149	6042		6931
Non-VIAF-based raw RAED %	0.01%		7.1%		3.5%	2.1%	87.2%		100%
VIAF applied to RAEDs	1.00		1.07		1.10	1.35	Residual < 1.00		
VIAF-based VRAEDs									
All executives #	1		529		271	201	5929		6,931
VRAED %	0.0%		7.6%		3.9%	2.9%	85.5%		100%
CEO #	0		25		7	12	458		501
%	0.0%		4.9%		1.3%	2.4%	91.3%		100%
President #	0		25		4	9	311		350
%	0.0%		7.1%		1.3%	2.7%	89.0%		100%
CFO #	0		24		7	8	443		481
%	0.0%		4.9%		1.4%	1.7%	92.0%		100%
GC or CLO #	0		19		36	9	372		437
%	0.0%		4.4%		8.3%	2.2%	85.1%		100%
COO #	0		9		4	5	148		166
%	0.0%		5.2%		2.7%	3.3%	88.9%		100%
Corporate Secretary #	0		13		15	4	197		229
%	0.0%		5.6%		6.7%	1.8%	85.9%		100%
CHRO #	0		13		28	7	200		247
%	0.0%		5.2%		11.1%	2.7%	80.9%		100%
CIO #	0		23		3	1	145		172
%	0.0%		13.1%		1.9%	0.8%	84.2%		100%
CTO #	0		27		1	3	86		117
%	0.0%		22.9%		0.9%	2.3%	73.8%		100%
CMO #	0		11		3	3	115		132
%	0.0%		8.1%		2.5%	2.0%	87.3%		100%
Chief Accounting Officer #	0		3		3	1	89		97
%	0.0%		3.3%		3.4%	1.4%	91.9%		100%
CDO/CIO/CDIO/DIO #	0		1		9	1	10		21
%	0.0%		5.1%		41.9%	6.4%	46.6%		100%
SEVP or EVP #	0		107		80	42	1,493		1,722

Table 4 (continued)

%	0.0%	6.2%	4.7%	2.4%	86.7%	100%
SVP #	0	128	62	85	1,322	1,596
%	0.0%	8.0%	3.9%	5.3%	82.8%	100%
VP #	0	70	36	23	904	1,033
%	0.0%	6.8%	3.5%	2.2%	87.5%	100%

benchmarking, and critiquing the RAEDs of S&P 500® executives in mid-2020 against the 2019 US population. As outlined in Appendix C, to construct the US population benchmark, we gather data on the racial makeup of the US resident population on July 1, 2019, from NCES IPED, approximately 1 year before mid-2020, when in real time we gathered our data on S&P 500® executives. By racial group in alphabetical order, the racial composition of the US resident population in mid-2019 is American Indian + Alaska Native (aian, 1.0%), Asian + Native Hawaiian + Other Pacific Islander (api, 6.4%), Black or African American (b, 13.0%), Hispanic or Latino (h, 18.5%), and White (w, 61.2%).

Using this benchmark, panel A of Table 5 reports that Blacks and Hispanics are statistically reliably under-represented among all executives in our dataset by -9.1% and -15.5% , respectively, while Whites are over-represented by 24.4% .⁹ These results support the dominant views held by activists, business leaders, and commentators that Blacks and Hispanics are greatly under-represented, and Whites are greatly over-represented, among executives in large US public firms.¹⁰ This is then inferentially taken as evidence of racial bias against minorities by firms in their hiring, executive development, and promotion decisions (Zimmerman 2010; Green et al. 2018; Chen 2020; Larcker and Tayan 2020).¹¹

⁹ We use the terms *under-represented* and *over-represented* to denote representations that are statistically significantly greater than and less than the benchmark that is being applied, respectively. We also note that the requirement that racial densities adds to 100% leads to the z-statistics and inferences based on them not being wholly independent of one another.

¹⁰ In Table 5 and all subsequent tables, we set aside the reporting and analysis of the misrepresentations of American Indian + Alaska Natives, only because such individuals are always underrepresented in S&P 500 executives, no matter the benchmark is that is used. We highly stress that our approach is in no way meant to disrespect such individuals.

¹¹ We note that comparing executive RAEDs with the US population is unlikely to reflect corporate bias because the comparison does not reflect actions that firms could have taken in hiring, developing, or promoting executives. However, it does yield data points that may provide other information, such as that executive RAEDs differ from those of the US population and that the process that led to US population RAEDs being what they are may be different from the process that led to the executive RAEDs. Such insights may be informative to corporate, governmental, or social policy makers.

At the same time, panel A indicates that Asians are over-represented, not under-represented, by a small but reliably positive 1.3% in S&P 500® executives. As this runs counter to the dominant view when that view is defined as covering all minorities, we use the apparent over-representation of Asians as the first piece of evidence bearing on our concern that the extant US population is a problematic benchmark to use in measuring and evaluating racial misrepresentation of and bias against executives in US firms.

Next, in panel B of Table 5, we report and compare the RAEDs of US executives with those of non-US executives, where the former (latter) are defined as executives who did (did not) obtain their BA/BS degree from a US college. We make this distinction because S&P 500® firms are multinational and operate in countries all around the world. One result of the global nature of the S&P 500® and indeed most public US companies is that the overall racial composition of their executives leans towards being global rather than reflecting solely the racial composition of the US population. This global tilt may also be magnified by variation in racial compositions across the working vs. non-working segments of the populations of many countries.¹² Moreover, whereas almost all executives have a BA/BS degree, just one-third of the US population does. Combined, these factors make it unlikely that the characteristics of the individuals whom US firms hire from US universities into their proto-executive pipelines, including but not limited to their race, will match in an apples-to-apples way with those of the US population.

We obtain the education background and age of 5470 of the 6931 S&P 500® executives shown in Table 4 from BoardEx, which provides data on executives' educational backgrounds, demographics, employment history, compensation, and networks. Educational background includes college and graduate education, as well as certificates and executive education. Since we are interested in their BA/BS degree and whether it came from a US university, for each executive, we use the dataset *BoardEx Individual Education Profile* to identify the institutions they attended and the qualifications earned at each institution. We match executives to BoardEx by their first/last names and by the name of the S&P 500® firm for which they

¹² For example, 33% of people in India are age 18 or under as compared to 22% of people in the USA.

Table 5 Benchmarking the VIAF-based racial densities (VRAEDs) of all executives and all US executives in S&P 500® companies at mid-2020 against the RAEDs of the 2019 US population (USPopRAED) and the subset of the 2021 US population with a BA/BS (USPopRAEDBABS). US executives are defined as those

who received their BA/BS degree from a US college, based on data obtained mainly from Boardex. *z*- and *t*-statistics in bold red are < -1.96 (bold green > 1.96). *api* Asian + Pacific Islander, *b* Black, *h* Hispanic, *w* White

Panel A: All execs

<i>Benchmark = USPopRAED</i>	api	b	h	w
VRAED all execs ($n = 6,931$)	7.6%	3.9%	2.9%	85.5%
USPopRAED	6.4%	13.0%	18.5%	61.2%
VRAED all execs – USPopRAED	1.3%	-9.1%	-15.5%	24.4%
<i>t</i> -stat (VRAED all execs – USPopRAED)	4.3	-22.4	-33.3	41.7

Panel B: VRAEDs of execs with non-US BA/BS [non-US execs] vs. execs with US BA/BS [US execs]

<i>No benchmarking</i>	api	b	h	w
# non-US execs (VIAF-adjusted $n = 743$)	208	13	58	463
# US execs (VIAF-adjusted $n = 4,541$)	181	213	80	4,066
VRAED non-US execs	28.0%	1.8%	7.8%	62.4%
VRAED US execs	4.0%	4.7%	1.8%	89.5%
VRAED non-US execs – VRAED US execs	24.0%	-2.9%	6.1%	-27.2%
<i>z</i> -stat (VRAED non-US execs – VRAED US execs)	9.1	-0.5	2.2	-15.8

Panel C: VRAEDs of execs with a US BA/BS [US execs] vs. USPopRAED

<i>Benchmark = USPopRAED</i>	api	b	h	w
VRAED US execs ($n = 4,541$)	4.0%	4.7%	1.8%	89.5%
USPopRAED	6.4%	13.0%	18.5%	61.2%
VRAED US execs – USPopRAED	-2.4%	-8.3%	-16.7%	28.4%
<i>t</i> -stat (VRAED US execs – USPopRAED)	-6.6	-16.6	-29.0	39.3

Panel D: VRAEDs of execs with a US BA/BS [US execs] vs. USPopRAED with a BA/BS

<i>Benchmark = USPopRAEDBABS</i>	api	b	h	w
VRAED US execs ($n = 4,541$)	4.0%	4.7%	1.8%	89.5%
USPopRAEDBABS	10.4%	9.4%	8.8%	71.4%
VRAED US execs – USPopRAEDBABS	-6.4%	-4.7%	-7.0%	18.1%
<i>t</i> -stat (VRAED US execs – USPopRAEDBABS)	-14.1	-10.9	-16.8	27.0

worked at mid-2020. BoardEx contains several variables that can be used to link to other databases, including International Security Identification Number and Central Index Key. For firms that lack these identifiers, we match the firms using a combination of company name, company web address, telephone number, and fax number. If we do not find an exact match by executive name and firm, we seek to match executives and firms where possible one-by-one by hand.

Panel B of Table 5 shows that the RAEDs of US executives are reliably different from those of non-US executives for Asians, Hispanics, and Whites, but not for Blacks. In the

case of Asians and Whites, the differences are large, in that the 28.0% density of Asians in non-US executives is seven times their 4.0% density in US executives, while the 62.4% density of Whites in non-US executives is 27.1% lower than their 89.5% density in US executives. In the case of Blacks, although their densities in US and non-US executives are not statistically reliably different, we note that just 1.8% of the 743 non-US executives are Black. We therefore see the large differences in the densities of Asians and Whites across US vs. non-US executives as further evidence that the US population is a misplaced benchmark to apply in measuring

the signs and magnitudes of misrepresentation in the racial densities of executives in US companies.

In panel C of Table 5, we show the results of then restricting the benchmarking of S&P 500® executives at mid-2020 against the 2019 US population to only US executives. Similar to the misrepresentations seen in panel A, we find that Blacks and Hispanics are reliably under-represented by -8.3% and -16.7% , respectively, and Whites are over-represented by 28.4% . In contrast, however, Asians change from being reliably over-represented by 1.3% in all executives in panel A to being reliably under-represented by -2.4% in only US executives in panel C. Thus, while panel C confirms the conventional view that all minorities are under-represented in executives, this substantiation only emerges when the benchmark of the US population is applied to only US executives.

Lastly, in panel D of Table 5, we present the results of further restricting the US population benchmark to only those individuals with a BA/BS. While doing so does not change which races are under-represented, it does substantially change the measured magnitudes of under-representation. For example, restricting the US population benchmark to only those with a BA/BS degree nearly triples the size of Asian under-representation from -2.4% in panel C to -6.4% in panel D, whereas it roughly halves the under-representations of Blacks and Hispanics, with that of Blacks declining from -8.3 to -4.7% , and that of Hispanics falling from -16.7 to -7.0% . We interpret these large changes in the magnitudes of measured misrepresentations as indicating that the US population benchmark is also misplaced with regard to the extent to which it does vs. does not take into account the academic qualifications of executives compared to those of all US individuals. We now move in the “Alternative Benchmarks to the US Population” section below to develop and empirically evaluate what we propose is a more informative benchmark.

Alternative Benchmarks to the US Population

In addition to highlighting the problems in using the current US population as a benchmark to measure racial misrepresentation and infer racial bias in the executives of US companies, we put forward and evaluate three alternative benchmarks. For each benchmark, we draw on the schematic laid out in Fig. 1 that presents the timeline of an executive’s career between time $t = \text{mid-2020}$, when he/she was an executive, and time $t-33$ years, when, based on the average 55 years of age of S&P 500® executives, he/she would have graduated with a BA/BS degree and been hired into the firm’s proto-executive pipeline. After detailing each benchmark in the “Executive College-Peer Benchmark” and “Other Benchmarks” sections, in the “Executive Racial Misrepresentation Results Within and Across Benchmarks”

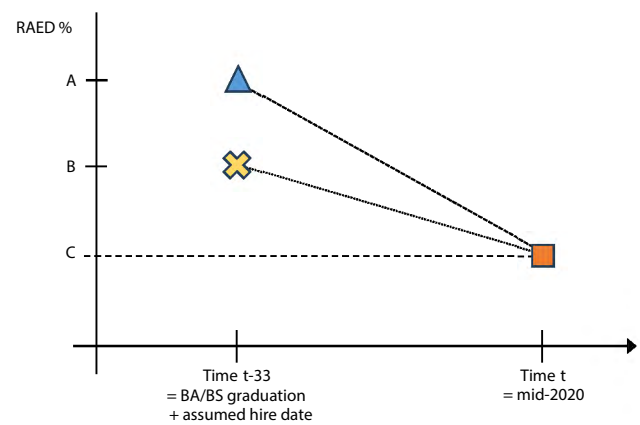


Fig. 1 Stylized example of racial densities (RAEDs) for executives of a given race/ethnicity in S&P 500® firms. Time $t = \text{mid-2020}$ and time $t-33 = 33$ years prior to $t =$ the date the typical S&P executive is assumed to have graduated with their BA/BS degree and entered the firm’s proto-executive pipeline

section, we then present the empirical results from implementing those benchmarks.

Executive College-Peer Benchmark

Our executive college-peer benchmark, PEERRAED, consists of the RAEDs of the peers of the executives whose racial densities are being measured and evaluated, where peers are defined as the cohorts of all those who graduated with a BA/BS in the same year and from the same US college as the executive, as identified via our Boardex data. PEERRAED seeks to address the drawbacks of the current US population benchmark noted above by recognizing that executives begin their careers as proto-executives when they are hired by firms out of college and that the RAEDs of their cohort peers at that point in time may be quite different from the RAEDs of current US BA/BS students, the current US population, and the current US population with a BA/BS degree. PEERRAED therefore endogenously assumes that the benchmark pool of executives is the same as the labor pool at the time that the executive first entered the workforce, and from the same school from which the executive graduated.¹³

¹³ Some important caveats apply to our proposed benchmarks. First, we cannot observe the potential candidates that firms have available when making executive hiring or promotion decisions; therefore, any benchmark is likely to be incomplete. Second, even if the pool of potential entry-level candidates is represented by the set of colleges and universities companies do hire from, we cannot be certain that the qualified candidates from within the set of colleges and universities are the same as the population of the entire college or university. For example, a firm that hires only mechanical engineering graduates may have a different pool of candidates than a firm hiring only biologists.

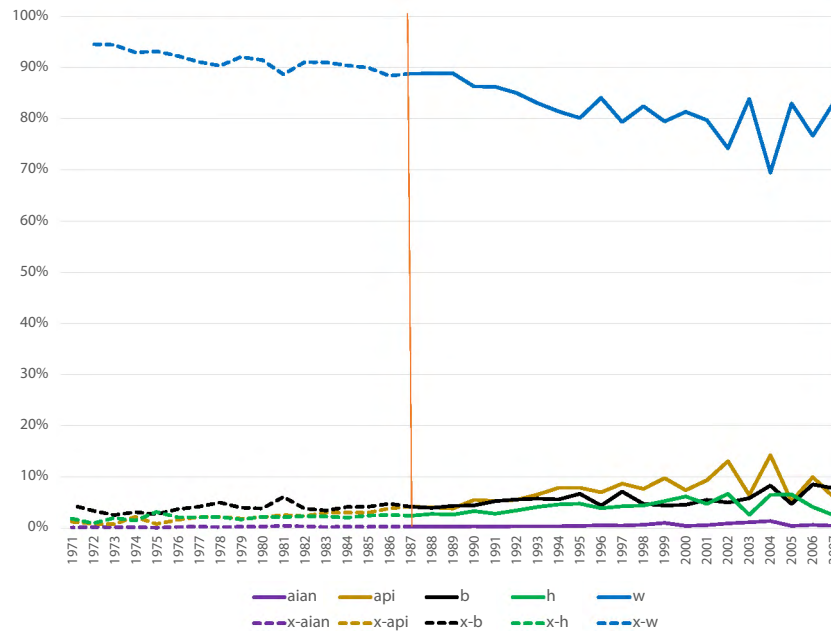


Fig. 2 Racial densities (RAEDs) of mid-2020 S&P 500® executives' BA/BS graduation cohorts, matched to each executive's same year and US college, averaged by academic year; thus 1987 is June 1986–May 1987. Solid RAED lines are based on actual US college data per the National Center for Educational Statistics' Integrated Postsecondary Education Data System (IPEDS). Dashed lines for x-aian, x-api, x-b, and x-h are extrapolations, and x-w is the residual from subtracting the sum of x-aian, x-api, x-b, and x-h from 100%. Extrapolation in year $t=1986 \rightarrow 1971$ for a given executive is the RAED of their 1987 graduating cohort multiplied by the average of (1) ratio_{RAED of *New York Times* Top 100 US colleges in

1987 ÷ RAED of *New York Times* Top US colleges in year t } and (2) ratio_{RAED of All US colleges in 1987 ÷ RAED of All US colleges in year t }. RAEDs of *New York Times* Top 100 US colleges and All US colleges over 1971–2020 are shown in Figs. 3 and 4, respectively. The vertical orange line in 1987 is the boundary of actual vs. extrapolated RAEDs. The vertical blue line in 2007 is the latest BA/BS graduation year of an executive, assuming people only become executives in S&P 500® firms when they are 35 years or older. aian, American Indian + Alaska Native; api, Asian + Pacific Islander; b, Black; h, Hispanic; w, White

This perspective leads us to measure racial/ethnic misrepresentation as the difference between US executive RAEDs and PEERRAEDs. Based on and using our college-peer benchmark, we then define direct racial/ethnic bias against minority executives as the racial/ethnic misrepresentation that occurs after firms determine which US colleges and universities to hire from in their hiring and promotion decisions. For example, in terms of Fig. 1, if 4% of US executives are Asian ($C=4\%$) whereas 7% of US executives' college peers are Asian ($B=7\%$), then firms' direct racial bias is $C - B = -3\%$ biased against Asian executives.

For S&P 500® executives in mid-2020, we present in Fig. 2 the time-series of PEERRAEDs by academic year, where 1987 is June 1986–May 1987. Solid RAED lines are based on actual US college data per IPEDS. Dashed lines for American Indian/Alaska Natives (x-aian), Asian/Pacific Islanders (x-api), Black (x-b), and Hispanic (x-h) are extrapolations, while White (x-w) is the residual from subtracting

the sum of x-aian, x-api, x-b, and x-h from 100%.¹⁴ The vertical orange line in 1987 is the boundary of actual vs. extrapolated RAEDs, while the vertical blue line in 2007 is the latest BA/BS graduation year of an executive, assuming that individuals only become executives in S&P 500® firms when they are 35 years of age or older.

Figure 2 shows that the RAEDs of S&P 500® executives have systematically and materially changed over the past 50 years, in particular as disproportionately more minorities have earned a US college degree and entered S&P firms'

¹⁴ The backward extrapolation in year $t=1986 \rightarrow 1971$ for a given executive is the RAEDs of their 1987 graduating cohort multiplied by the average of (1) ratio_{RAEDs of *New York Times* Top 100 US colleges in 1987 RAEDs of *New York Times* Top US colleges in year t } and (2) ratio_{RAEDs of all US colleges in 1987 RAEDs of all US colleges in year t }, where the RAEDs of all US colleges and the 2017 *New York Times* Top 100 US colleges are shown in Figs. 3 and 4, respectively.

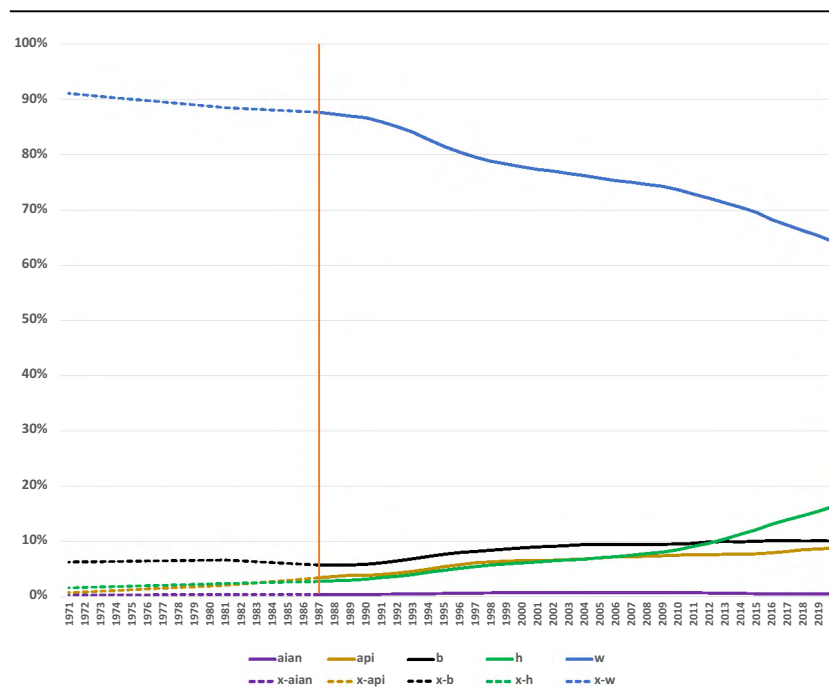


Fig. 3 Racial densities (RAEDs) of students' conferred undergraduate degrees 1971–2020 from all US colleges and universities. Year is the academic year; thus, 1987 is June 1986–May 1987. Solid RAED lines are based on actual data covering all US colleges per the National Center for Educational Statistics' Integrated Postsecondary Education Data System (IPEDS). Dashed lines for x-aian, x-api, x-b, and x-h are linear extrapolations that use 1987–1991 data. x-w is the residual

from subtracting the sum of x-aian, x-api, x-b, and x-h from 100%. The vertical orange line in 1987 is the boundary of actual vs. extrapolated RAEDs. The vertical blue line in 2007 is the latest BA/BS graduation year of an executive, assuming individuals only become executives in S&P 500® firms when they are 35 years or older). api, Asian + Pacific Islander; b, Black; h, Hispanic; w, White

proto-executive pipelines. This is seen in the almost monotonic increase of the densities of American Indian/Alaska Natives, Asian/Pacific Islanders, Blacks, and Hispanics from 1971 to 1987 to 2007, as compared to the monotonically decreasing densities of Whites. Example data points for the All-US-Colleges benchmark with respect to the RAEDs for aian, api, b, h, and w in 1971, 1987, 2007, and 2020 are presented in the grid at the bottom of Fig. 2 and numerically confirm the visual patterns and trends seen in the solid and dashed RAED lines in Fig. 2. Figure 2 therefore highlights the problem in a contemporaneous benchmark such as the US population, namely that the RAEDs of current proto-executive talent cannot be informatively compared to the RAEDs of current executives because of the intertemporal mismatch created by the median of 32 years in S&P 500 firms that it takes for fresh-out-of-college proto-executives to develop and be promoted into full executives.

Other Benchmarks

Prior research has found that firms' hiring practices tend to result in lower corporate access for minorities (Kline et al. 2022). However, PEERRAED deliberately takes firms' decisions as to which colleges to hire proto-executives from as

given—it is silent as to the set of US colleges that firms could have gone to when hiring BA/BS graduates into their proto-executive pipelines in a racially unbiased manner, but chose not to.

In this section, we therefore put forward two candidates for the sets of colleges that firms could have chosen to recruit from if they were seeking to do so in a racially unbiased manner: all US colleges ("All-US-Colleges Benchmark" section) and the 2017 *New York Times* Top 100 US 4-year colleges and universities (hereafter, NYT Top 100 colleges; "New York Times Top 100 US Colleges Benchmark" section). We see the set of all US colleges as a plausible benchmark if firms seek to hire proto-executives in an unconditionally racially unbiased manner, and the NYT Top 100 colleges as a plausible benchmark if firms first condition their proto-executive labor pool on BA/BS students who are of a very high academic quality, and then within that pool, seek to hire proto-executives in a racially unbiased manner.¹⁵

¹⁵ We note, however, that a limitation of the NYT Top 100 colleges and universities list is that it is largely made up of selective high-status colleges which have a history of racial bias in their admissions (Rosinger, Sarita Ford, and Choi 2021) which led to the affirmative action admissions policies of the 1960s (Stulberg and Chen 2014).

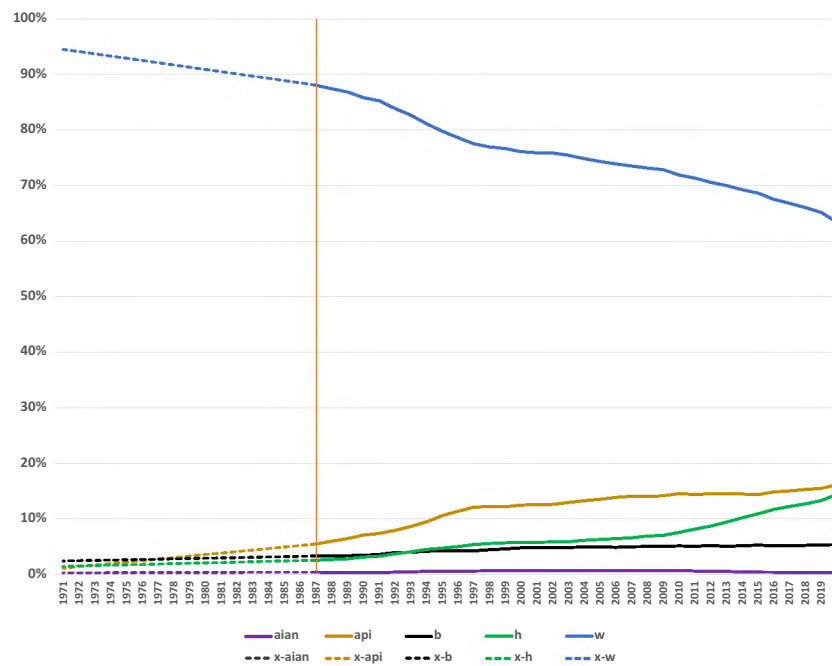


Fig. 4 Racial densities (RAEDs) of conferred undergraduate degrees 1971–2020 from the Top 100 US colleges and universities per Ashkenas, Park, and Pearce (*New York Times*, 2017). Year is the academic year; thus, 1987 is June 1986–May 1987. Solid RAED lines are based on actual data for the 2017 NYT Top 100 US colleges and universities per the National Center for Educational Statistics' Integrated Postsecondary Education Data System (IPEDS). Dashed lines for x-aian, x-api, x-b, and x-h are linear extrapolations that use 1987–

1991 data. x-w is the residual from subtracting the sum of x-aian, x-api, x-b, and x-h from 100%. The vertical orange line in 1987 is the boundary between actual vs. extrapolated RAEDs. The vertical blue line in 2007 is the latest BA/BS graduation year of an executive, assuming individuals only become executives in S&P 500® firms when they are 35 years or older). api, Asian + Pacific Islander; b, Black; h, Hispanic; w, White

Our goal in measuring executive racial misrepresentation using the All-US-Colleges and the NYT Top 100 colleges benchmarks is to improve our ability to infer whether, to what degree, how, and why firms play one or more causal roles in executive racial representation, misrepresentation, and bias, particularly by shedding light on the extent of indirect hiring bias due to firms' choices as to which colleges to hire or not to hire BA/BS graduates from, as compared to direct biases arising from firms' development and promotion decisions once proto-executives are hired. As an example of the calculation of indirect hiring bias, following on from the stylized example per Fig. 1 and the "Executive College-Peer Benchmark" section, if the NYT Top 100 colleges had historically had 9% Asian graduates matched to executive age (i.e., the RAED of Asians was 9%), but the college-peer cohort PEERRAED was 7% Asian, then we would estimate firms' indirect bias from not hiring anyone outside the NYT Top 100 for racially biased reasons to be measured as -2% biased against Asians.

We emphasize that we as researchers are unable to normatively determine which set of colleges firms should have hired from—whether the endogenously determined colleges that executives actually did come from (viz., those used in computing PEERRAEDs), or the exogenously specified

possibilities of all US colleges or the NYT Top 100 colleges, or some other set of colleges. What we can do is to take a positive economics approach and present the results of applying multiple benchmarks in order to both allow a richer conceptual understanding of the sources of racial bias in executive RAEDs and highlight the different empirical results and related inferences about the signs and magnitudes of any racial biases that come from using alternative benchmarks.¹⁶

All-US-Colleges Benchmark

Arguably the most plausible baseline set of colleges that firms could have chosen to recruit from if they were seeking to do so in an unconditionally racially unbiased manner is the full set of all US colleges. We therefore obtained the actual numbers and races of the graduating cohorts of all US colleges from IPEDS, which enabled us to compute the

¹⁶ In Appendix D, we provide descriptive statistics on the degrees of overlap in vs. separation between the colleges in the executives' college peers, All-US-Colleges, and NYT Top 100 Colleges benchmarks.

actual RAEDs of all US colleges for each year 1987–2020 as shown in the solid lines of Fig. 3. However, because the median executive graduated from college in 1988 and IPEDS data are unavailable prior to 1987, we estimated the annual RAEDs for 1971–1986 using straight-line backward extrapolation of 1987–1991 for American Indian/Alaska Natives, Asians/Pacific Islanders, Blacks, and Hispanics, with White RAEDs being the residual. The resulting estimated annual RAEDs for 1971–1986 are shown in the dashed lines of Fig. 3.

For the All-US-Colleges benchmark with respect to the RAEDs for aian, api, b, h, and w in 1971, 1987, 2007, and 2020, example data are presented in the grid at the bottom of Fig. 3. These data are consistent with the proposition that the racial makeup of US college graduates has markedly changed over the past 50 years as proportionally many more non-Whites have graduated from US colleges with a BA/BS, particularly Asians and to a lesser extent Hispanics, as compared to Whites. The fraction of all US college graduates who are Black has risen over time, although the largest part of that increase occurred before 2000. Opposite in direction to the increases seen in the RAEDs of Asians, Blacks, and Hispanics, White RAEDs have declined by almost one-third between 1971 and 2020, falling from 94.5 to 63.4%.

New York Times Top 100 US Colleges Benchmark

The NYT Top 100 colleges benchmark uses the population of graduates from the colleges in the *New York Times* Top 100 US colleges as defined by Ashkenas, Park, and Pearce in their 2017 *New York Times* article “Even with affirmative action, Blacks and Hispanics are more under-represented at top colleges than 35 years ago” (August 24, 2017). The NYT Top 100 colleges consist of a broad set of 58 large public flagship schools (one per state, plus an additional eight from California), plus 42 private schools. The 58 public schools account for 82% of the 218,716 graduating seniors in the NYT Top 100 list in 1987 and 84% of the 300,308 in 2008, with these degrees making up 22.8% (19.8%) of all bachelor’s degrees conferred by postsecondary US institutions in 1987 (2008), excluding degrees conferred to nonresident aliens. A full description of the *New York Times*’ Top 100 US 4-year colleges and universities, together with example numbers of BA/BS degrees conferred by each school in 1987 and in 2008, is provided in Appendix E.

We obtained the numbers and races of the graduating cohorts in each university in the NYT Top 100 list for 1987–2020 from IPEDS, thereby enabling us to compute the RAEDs for the NYT Top 100 colleges in each year 1987–2020 as shown in the solid lines of Fig. 4. However, because the median executive graduated from college in 1988 and IPEDS data are unavailable prior to 1987, as was the case for Fig. 3 with the All-US-Colleges benchmark, we

estimated the annual RAEDs of graduating seniors in the NYT Top 100 in 1971–1986 using straight-line backward extrapolation of 1987–1991 for each of American Indian/Alaska Natives, Asians/Pacific Islanders, Blacks, and Hispanics, with White RAEDs being the residual. The resulting estimated annual RAEDs for 1971–1986 are shown in the dashed lines of Fig. 4.

Example numeric data for the All-US-Colleges benchmark with respect to the RAEDs for aian, api, b, h, and w in 1971, 1987, 2007, and 2020 are presented in the grid at the bottom of Fig. 4. These data are consistent with the proposition that the racial makeup of undergraduates at the 2017 NYT Top 100 colleges has markedly changed over the past 50 years as many more non-Whites have graduated from US universities with a BA/BS, particularly Asians and Hispanics. However, as compared to the RAEDs shown in Fig. 3 for all US colleges, we note that as of 2020, the RAEDs of Asians in the NYT Top 100 colleges have risen to twice the level that they are in all US colleges, while the RAEDs of Blacks in the NYT Top 100 colleges have fallen to half the level they are in all US colleges. In contrast, as of 2020, the RAEDs of Hispanics are very similar in both all US colleges and the NYT Top 100 colleges, as are the RAEDs of Whites. Similar to the pattern seen in Fig. 3 for all US colleges, and opposite in direction to the increases seen in the RAEDs of Asians, Blacks, and Hispanics at the NYT Top 100 colleges, White RAEDs have declined by almost one-third between 1971 and 2020, falling from 91.1 to 64.2%.

Executive Racial Misrepresentation Results Within and Across Benchmarks

In Table 6, we report the results of applying the benchmarks laid out in the “Measuring Racial Misrepresentation and Bias in US Executives via Different Benchmarks” section to the US executives who were in S&P 500® firms as of mid-2020. We start by repeating in panel A of Table 6 the results in panel C of Table 5 from benchmarking US executive RAEDs against those of the 2019 US population. Panel A reiterates that compared to the US population, Asians are slightly under-represented by –2.4%, Blacks are materially under-represented by –8.3%, Hispanics are greatly under-represented by –16.7%, and Whites are very greatly over-represented by 28.4%. No race is statistically reliably at the same density as in the US population.

Panels B through D-2 of Table 6, however, present different pictures of whether and the degree to which Asian, Black, Hispanic, and White executives are under- or over-represented compared to those in panel A. The main takeaway from panels B through D-2 is that executive racial misrepresentations, defined as RAEDs relative to the benchmark used in the given panel, are typically an order of magnitude

Table 6 VIAF-based racial densities (VRAEDs) of US executives in S&P 500® firms at mid-2020 benchmarked against the RAEDs of (1) 2019 US population USPopRAED, panel A; (2) executives' college peers PEERRAED, panel B; (3) PEERRAED but only for executives age ≤ 55 (panel C-1) or age ≥ 56 (panel C-2), (4) NYT 2017 Top 100 US Colleges matched to executives' BA/BS graduation years NYTTop100RAED, panel D-1; and (5) all US colleges matched to executives' BA/BS graduation years ALLCOLLRAED, panel E-1. Panel C-3 compares VRAED US executives age ≥ 56 to VRAED US executives age ≤ 55, while panels D-2 and E-2 compare NYTTop100RAED and ALLCOLLRAED, respectively, to PEERRAED. *z*- and *t*-statistics in bold red are < −1.96 (bold green > 1.96). *api* Asian + Pacific Islander, *b* Black, *h* Hispanic, *w* White

Panel A: VRAEDs of execs with a US BA/BS [US execs] vs. USPopRAED

Benchmark = USPopRAEDBABS	api	b	h	w
VRAED US execs (<i>n</i> = 4,541)	4.0%	4.7%	1.8%	89.5%
USPopRAED	6.4%	13.0%	18.5%	61.2%
VRAED US execs – USPopRAED	-2.4%	-8.3%	-16.7%	28.4%
<i>t</i> -stat (VRAED US execs – USPopRAED)	-6.6	-16.6	-29.0	39.3

Panel B: VRAEDs of US execs vs. PEERRAED = RAEDs of all who graduated with their BA/BS in the same year and from the same US college as the exec

Benchmark = PEERRAED	api	b	h	w
VRAED US execs (<i>n</i> = 4,486)	4.0%	4.7%	1.7%	89.5%
PEERRAED	4.4%	4.7%	2.9%	87.6%
VRAED US execs – PEERRAED	-0.4%	0.1%	-1.2%	1.9%
<i>z</i> -stat (VRAED US execs – PEERRAED)	-1.2	0.2	-6.0	3.8

Panel C-1: VRAEDs of US execs vs. PEERRAED = RAEDs of US exec college-peers, only for execs age ≤ 55 in 2020

Benchmark = PEERRAED	api	b	h	w
# US execs	123	122	37	2,210
VRAED US execs age ≤ 55 in 2020	5.3%	5.4%	2.0%	87.3%
PEERRAED	5.7%	5.0%	3.5%	85.4%
VRAED US execs age ≤ 55 – PEERRAED	-0.4%	0.4%	-1.5%	1.9%
<i>z</i> -stat (VRAED US execs age ≤ 55 – PEERRAED)	-0.9	0.8	-5.0	2.7

Panel C-2: VRAEDs of US execs vs. PEERRAED = RAEDs of US exec college-peers, only for execs age ≥ 56 in 2020

Benchmark = PEERRAED	api	b	h	w
# US execs	46	71	20	1,857
VRAED US execs age ≥ 56 in 2020	2.5%	3.9%	1.4%	92.2%
PEERRAED	2.7%	4.3%	2.3%	90.4%
VRAED US execs age ≥ 56 – PEERRAED	-0.3%	-0.3%	-0.9%	1.8%
<i>z</i> -stat (VRAED US execs age ≥ 56 – PEERRAED)	-0.7	-0.7	-3.3	2.8

Panel C-3: Representation-gaps in US execs age ≥ 56 vs. Representation-gaps in US execs age ≤ 55

VRAED rep-gap US execs age ≥ 56 – VRAED rep-gap US execs age ≤ 55	0.2%	-0.7%	0.6%	-0.1%
<i>z</i> -stat (VRAED rep-gaps US execs age ≥ 56 – VRAED US execs age ≤ 55)	0.1	-0.2	0.2	-0.1

Panel D-1: VRAEDs of US execs vs. ALLCOLLRAED = RAEDs of All US Colleges matched to exec age

Benchmark = ALLCOLLRAED	api	b	h	w
VRAED US execs (<i>n</i> = 4,541)	4.2%	4.8%	1.8%	89.2%
ALLCOLLRAED	3.5%	6.4%	3.1%	86.5%
VRAED US execs – ALLCOLLRAED	0.7%	-1.7%	-1.3%	2.7%
<i>z</i> -stat (VRAED US execs – ALLCOLLRAED)	2.5	-5.3	-6.8	5.9

Panel D-2: Decomposition of VRAED US execs – ALLCOLLRAED

PEERRAED – ALLCOLLRAED	0.9%	-1.8%	-0.2%	1.1%
VRAED US execs – PEERRAED	-0.4%	0.1%	-1.2%	1.9%
VRAED US execs – ALLCOLLRAED	0.6%	-1.7%	-1.4%	3.0%

Panel E-1: VRAEDs of US execs vs. NYTTop100RAED = RAEDs of NYT Top 100 US Colleges matched to exec age

VRAED US execs (<i>n</i> = 4,541)	4.2%	4.8%	1.8%	89.2%
NYTTop100RAED	6.3%	3.5%	3.0%	86.8%
VRAED US execs – NYTTop100RAED	-2.1%	1.3%	-1.2%	2.4%
<i>z</i> -stat (VRAED US execs – NYTTop100RAED)	-7.0	4.1	-6.2	5.3

Panel E-2: Decomposition of VRAED US execs – NYTTop100RAED

PEERRAED – NYTTop100RAED	-1.9%	1.2%	-0.1%	0.9%
VRAED US execs – PEERRAED	-0.4%	0.1%	-1.2%	1.9%
VRAED US execs – NYTTop100RAED	-2.2%	1.3%	-1.3%	2.7%

or more smaller when the college-peer benchmark is applied than when the conventional benchmark of the US population is used. Previewing the set of results that we next proceed

to describe in detail, Fig. 5 visually summarizes the key misrepresentations reported in Table 6. We emphasize the striking visual contrasts between the large heights of the

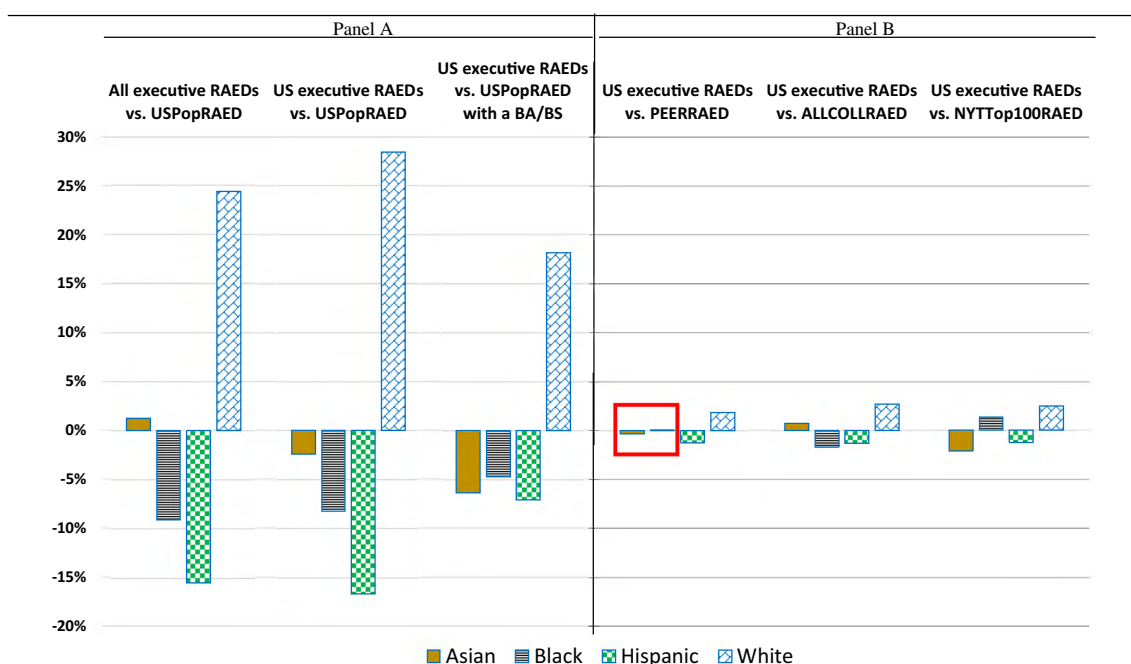


Fig. 5 Racial misrepresentations of executives in S&P 500® firms at mid-2020 as measured by their racial densities (RAEDs) benchmarked per (1) RAEDs of all executives as compared to the 2019 US population (USPopRAED); (2) RAEDs of US executives as compared to USPopRAED; (3) RAEDs of US executives as compared to the 2021 US population with a BA/BS; (4) RAEDs of US executives as compared to executives' college peers (PEERRAED); (5) RAEDs of US executives as compared to all US colleges, matched

to executives' BA/BS graduation years (ALLCOLLRAED); and (6) RAEDs of US executives as compared to the 2017 NYT Top 100 US Colleges, matched to executives' BA/BS graduation years (NYTTOP100RAED). Racial misrepresentation \equiv executive RAED – benchmark RAED. The solid red box denotes the two misrepresentations that are not reliably different from zero, namely Asian and Black US executives benchmarked against their college-peers

bars in panel A of Fig. 5, where the benchmark is always USPopRAED, and the ten times or more smaller heights of the bars in panel B of Fig. 5, where from left to right the benchmarks are PEERRAED, NYTTOP100RAED, and ALLCOLLRAED, respectively.

Results for the Executive College-Peer Benchmark

When US executive RAEDs are calibrated against PEER-RAEDs, the RAEDs of the executives' college-peer benchmark, three results come to the fore.

First, the differences between US executive RAEDs and the RAEDs of executives' college peers are always very much smaller than those found using the benchmark of the current US population, typically by an order of magnitude or more. For example, the -16.7% under-representation of Hispanics and the 28.4% over-representation of Whites when the benchmark is the US population (Table 6 panel A) are 13 times greater than those of the -1.2% under-representation of Hispanics and the 1.9% over-representation of Whites (panel B).

Second, while among US executives, Whites are statistically reliably slightly above their college-peer benchmarks by 1.9% and Hispanics reliably slightly below by -1.2%

(z -stats = 3.8 and -6.0 , respectively); Asian and Black executives are statistically at their college-peer benchmarks, having college-peer-based misrepresentations of just -0.4% and 0.1% (z -stats = -1.2 and 0.2 , respectively). In Fig. 5, the Asian and Black college-peer-benchmarked misrepresentations are shown within a red box to highlight how different they are when measured against the US population benchmark.

Overall, conditional on the validity and informativeness of our college-peer benchmark, the results in panel B of Table 6 indicate that (1) direct biases against minorities by S&P 500® firms in their hiring, development, and promotion decisions are much smaller than those presumed by academics, activists, business leaders, and commentators; (2) contrary to the claims often made by these parties (Shah Paikeday and Qosja 2023; Murray 2024), we find no statistically reliable evidence that S&P 500® firms have exhibited direct bias against Asians or Blacks in their executive development and promotion decisions.

Third, in Table 6, panels C-1 and C-2, we report robustness tests pertaining to the construct validity of our PEER-RAED benchmark by separating US executives into those who were 55 years old or younger at mid-2020 (panel C-1) compared to those who were aged 56 years or older (panel

C-2). We do this to assess the reliability of the values of the BA/BS-matched-peers RAEDs over the years 1971–1986 that were estimated using straight-line backward-in-time extrapolation of 1987–1991 data. Since the median executive graduated with a BA/BS in 1987, the first year for which we have reliable data on the RAEDs of US universities from IPEDS, half of the observations used in arriving at the results reported in Tables 5 and 6 are from 1971 to 1986, where RAEDs were estimated via backward extrapolation, as compared to 1987–2020, where RAEDs are actual rather than estimated. Panels C-1 and C-2 show that the same inferences are obtained in those panels as in panel B, where all US executives are included regardless of their age category. Panel C-3 formally confirms that the misrepresentation differences between executives' RAEDs and PEERRAEDs are not significantly different across the younger vs. older groups of executives.

Results for the All-US-Colleges and 2017 New York Times Top 100 Colleges Benchmarks

In Table 6, panels D-1 and D-2, we report the results of benchmarking US executive RAEDs against the RAEDs of all US colleges, while panels E-1 and E-2 change the benchmark to the NYT Top 100 colleges. Panels D-1 and E-1 parallel the structure in panels A and B of Table 6, except that they use the All-US-Colleges and NYT Top 100 colleges benchmarks, respectively. Panels D-2 and E-2 show how much of the total misrepresentation per the All-US-Colleges and NYT Top 100 colleges benchmarks can be attributed to indirect hiring bias versus direct hiring, development, and promotion biases by S&P 500® firms. We highlight three results.

First, per panels D-1 and E-1, Hispanics are similarly under-represented in size and statistical significance across each benchmark, while Whites are similarly over-represented across each benchmark. Second, however, we find that this is not the case for Asian and Black executives. Panel D-1 shows that whereas when the benchmark is All-US-Colleges, Asians are reliably over-represented by 0.7% but Blacks are reliably under-represented by – 1.7%, panel E-1 shows the reverse: when the benchmark is the NYT Top 100 colleges, Asians are reliably under-represented by – 2.1% and Blacks are reliably over-represented by 1.3%.

Third, in panel D-2, we report the decomposition of total racial misrepresentation measured using the All-US-Colleges benchmark (namely, VRAED US execs – ALLCOLLRAED) into that which can be attributed to indirect hiring bias by firms (namely, PEERRAED – ALLCOLLRAED) and that which can be attributed to direct hiring, development, and promotion biases by firms (namely, VRAED US execs – PEERRAED). In panel E-2, we do

the same, except for the NYT Top 100 colleges benchmark NYTTop100RAED instead of ALLCOLLRAED.¹⁷ We find that across both panels D-2 and E-2, for Asians and Blacks, the majority of total racial misrepresentation comes from indirect hiring bias, whereas for Hispanics and Whites, the majority of total racial misrepresentation comes from direct development and promotion biases.

Overall then, the results reported in Table 6 indicate that (1) direct biases in firms' executive development and promotion decisions matter in the misrepresentations of Hispanics and Whites, but are essentially absent for Asians and Blacks (panel B); (2) indirect hiring bias caused by firms selectively choosing the colleges from which to hire matters in the misrepresentations of all races; and (3) while the signs and magnitudes of the indirect biases experienced by Hispanics and Whites do not depend on which set of US colleges firms should have gone to if their goal was to hire in a racially unbiased way, the opposite is the case for Asians and Blacks.

Results by Executive Rank and Title

In Tables 7 and 8, we provide results that extend panel B of Table 6 by conditioning on executive rank and title. In panels A-1 through A-5 of Table 7, we find that across the ranks of US President, SEVP/EVP, SVP, VP, and below VP, findings are similar to those of Table 6 panel B. Asians are at their college-peer densities across 4 out of 5 executive ranks based on the PEERRAED benchmark; Blacks are at their college-peer densities in all 5 ranks, and Hispanics are under their college-peer densities in 4 out of 5 ranks. The only departure from the patterns in panel B of Table 6 is that for Whites, only 2 out of 5 ranks are over their college-peer densities, with 3 out of 5 ranks being at their college-peer densities.

In contrast, in panels A-1 through A-5 of Table 8, we uncover rich variation across the executive titles of CEO, CFO, GC/CLO, Corporate Secretary, and CHRO/Chief People Officer. For example, among US executives, in panel A-2, Asians, Blacks, and Hispanics are reliably under their college-peer densities and Whites are reliably over theirs in CFOs, replicating the findings in panel A of Table 6 for all US executives, whereas no differences are seen in panel A-4 of Table 8 for Corporate Secretaries. However, we find that in CEOs, Asians are at their college-peer densities, Blacks and Hispanics are reliably under their college-peer densities, and Whites are reliably over theirs, while in GCs and CHROs, all races are at their

¹⁷ The totals of VRAED US execs—NYTTop100RAED and VRAED US execs—ALLCOLLRAED in panels D-2 and E-2 do not exactly equal those shown in panels D-1 and E-1 due to rounding and slightly different data restrictions being present for the components separately versus the components in total.

Table 7 VIAF-based racial/ethnic densities (VRAEDs) of US SEVPs/EVPs, EVPs, SVPs, VPs, and all other ranks (including no rank) in S&P 500® companies at mid-2020 vs. the RAEDs of theexecutives' college peers. z-statistics in bold red are < -1.96 (bold green > 1.96). *api* Asian+ Pacific Islander, *b* Black, *h* Hispanic, *w* White*Panel A-1: VRAEDs of US Presidents vs. RAEDs of President college-peers*

<i>Benchmark = US President college-peers</i>	<i>api</i>	<i>b</i>	<i>h</i>	<i>w</i>
VRAED US Presidents ($n = 306$)	4.6%	4.0%	2.2%	89.3%
RAED US President college-peers	4.6%	4.9%	2.9%	87.2%
VRAED US Presidents – RAED US President college-peers	-0.1%	-1.0%	-0.7%	2.1%
z-stat (VRAED US Presidents – RAED US President college-peers)	-0.1	-0.8	-0.8	1.1

Panel A-2: VRAEDs of US SEVPs/EVPs vs. RAEDs of SEVP/EVP college-peers

<i>Benchmark = US SEVP/EVP college-peers</i>	<i>api</i>	<i>b</i>	<i>h</i>	<i>w</i>
VRAED US SEVP/EVPs ($n = 1,197$)	3.0%	5.5%	1.7%	89.7%
RAED US SEVP/EVP college-peers	4.3%	5.0%	2.9%	87.5%
VRAED US SEVP/EVPs – RAED US SEVP/EVP college-peers	-1.2%	0.5%	-1.2%	2.3%
z-stat (VRAED US SEVP/EVPs – RAED US SEVP/EVP college-peers)	-2.3	0.8	-3.2	2.4

Panel A-3: VRAEDs of US SVPs vs. RAEDs of SVP college-peers

<i>Benchmark = US SVP college-peers</i>	<i>api</i>	<i>b</i>	<i>h</i>	<i>w</i>
VRAED US SVPs ($n = 1,065$)	4.5%	4.6%	1.9%	88.9%
RAED US SVP college-peers	4.5%	4.4%	2.8%	87.9%
VRAED US SVPs – RAED US SVP college-peers	0.0%	0.3%	-0.9%	1.0%
z-stat (VRAED US SVPs – RAED US SVP college-peers)	0.0	0.4	-2.1	0.9

Panel A-4: VRAEDs of US VPs vs. RAEDs of VP college-peers

<i>Benchmark = US VP college-peers</i>	<i>api</i>	<i>b</i>	<i>h</i>	<i>w</i>
VRAED US VPs ($n = 649$)	3.6%	4.4%	1.7%	90.3%
RAED US VP college-peers	4.4%	4.2%	3.1%	87.9%
VRAED US VPs – RAED US VP college-peers	-0.8%	0.2%	-1.4%	2.4%
z-stat (VRAED US VPs – RAED US VP college-peers)	-1.0	0.2	-2.6	1.9

Panel A-5: VRAEDs of All Other Ranks vs. RAEDs of All Other Ranks college-peers

<i>Benchmark = US All Other Ranks college-peers</i>	<i>api</i>	<i>b</i>	<i>h</i>	<i>w</i>
VRAED US All Other Ranks ($n = 1,269$)	4.7%	4.4%	1.5%	89.4%
RAED US All Other Ranks college-peers	4.4%	4.8%	2.9%	87.5%
VRAED US All Other Ranks – RAED US All Other Ranks college-peers	0.3%	-0.4%	-1.4%	1.9%
z-stat (VRAED US All Other Ranks – RAED US All Other Rank college-peers)	0.5	-0.6	-4.0	2.1

college-peer densities except Blacks, who are reliably over theirs. Given the variety that is suggested by the results in Tables 7 and 8, we recommend that future research in this area consider addressing questions such as why Asians are underdense in SEVPs/EVPs (Table 7, panel A-2) and Blacks are overdense in GCs/CLOs (Table 8, panel A-2), and that such research explore those policy questions and/or implications that our results suggest warrant attention.

Limitations, Caveats, Cautions, and Opportunities

As with any study, ours comes with limitations, caveats, and cautions. For example, we do not claim that our college-peer benchmark is the only or the best that could be developed. Rather, it offers one informative way to measure racial misrepresentation and attribute bias or lack

Table 8 VIAF-based racial/ethnic densities (VRAEDs) of US CEOs, CFOs, GCs/CLOs, Corporate Secretaries and CHROs/Chief People Officers in S&P 500® companies at mid-2020 vs. RAEDs of executives' college peers. z-statistics in bold red are < -1.96 (bold green > 1.96). *api* Asian+Pacific Islander, *b* Black, *h* Hispanic, *w* White

Panel A-1: VRAEDs of US CEOs vs. RAEDs of CEO college-peers

<i>Benchmark = US CEO college-peers</i>	<i>api</i>	<i>b</i>	<i>h</i>	<i>w</i>
VRAED US CEOs ($n = 363$)	3.8%	1.8%	1.1%	93.2%
RAED US CEO college-peers	3.4%	4.2%	2.6%	89.4%
VRAED US CEOs – RAED US CEO college-peers	0.4%	-2.4%	-1.5%	3.8%
z-stat (VRAED US CEOs – RAED US CEO college-peers)	0.4	-3.3	-2.6	2.8

Panel A-2: VRAEDs of US CFOs vs. RAEDs of CFO college-peers

<i>Benchmark = US CFO college-peers</i>	<i>api</i>	<i>b</i>	<i>h</i>	<i>w</i>
VRAED US CFOs ($n = 354$)	2.4%	1.9%	1.1%	94.6%
RAED US CFO college-peers	4.6%	4.8%	3.2%	87.0%
VRAED US CFOs – RAED US CFO college-peers	-2.2%	-2.9%	-2.0%	7.5%
z-stat (VRAED US CFOs – RAED US CFO college-peers)	-2.5	-3.5	-3.4	5.5

Panel A-3: VRAEDs of US GCs/CLOs vs. RAEDs of GC/CLO college-peers

<i>Benchmark = US GC/CLO college-peers</i>	<i>api</i>	<i>b</i>	<i>h</i>	<i>w</i>
VRAED US GCs/CLOs ($n = 380$)	4.5%	8.7%	2.1%	84.7%
RAED US GC/CLO college-peers	4.5%	4.5%	2.9%	87.7%
VRAED US GC/CLOs – RAED US GC/CLO college-peers	0.0%	4.2%	-0.8%	-3.1%
z-stat (VRAED US GC/CLOs – RAED US GC/CLO college-peers)	0.0	2.8	-1.0	-1.6

Panel A-4: VRAEDs of US Corporate Secretaries vs. RAEDs of Corporate Secretaries college-peers

<i>Benchmark = US Corporate Secretary college-peers</i>	<i>api</i>	<i>b</i>	<i>h</i>	<i>w</i>
VRAED US CorpSecs ($n = 204$)	7.9%	7.5%	2.0%	82.6%
RAED US CorpSec college-peers	5.0%	4.2%	3.0%	87.5%
VRAED US CorpSecs – RAED US CorpSec college-peers	2.9%	3.4%	-1.0%	-4.9%
z-stat (VRAED US CorpSecs – RAED US CorpSec college-peers)	1.5	1.8	-1.0	-1.8

Panel A-5: VRAEDs of US CHROs/Chief People Officers vs. RAEDs of CHRO/Chief People Officer college-peers

<i>Benchmark = US CHRO/CPO college-peers</i>	<i>api</i>	<i>b</i>	<i>h</i>	<i>w</i>
VRAED US CHROs/CPOs ($n = 162$)	3.3%	14.3%	1.7%	80.8%
RAED US CHRO/CPO college-peers	4.5%	6.6%	2.5%	86.1%
VRAED US CHRO/CPOs – RAED US CHRO/CPO college-peers	-1.2%	7.6%	-0.8%	-5.3%
z-stat (VRAED US CHRO/CPOs – RAED US CHRO/CPO college-peers)	-0.8	2.6	-0.8	-1.6

thereof in US public company executives in a way that overcomes the problems of using the US population as the benchmark.

Also, based as they are on S&P 500® firms and the executives in those firms as of mid-2020, our results do not necessarily generalize to small public firms, start-ups, private firms, non-US firms, or partnerships, or years outside 2020. Each of the aforementioned types of organization warrants

its own cross-sectional as well as intertemporal analyses, including the choice of benchmark or benchmarks to use in the analyses, as do other time periods of study, and we encourage others to pursue such research.

We stress that our measures of race/ethnicity are subjectively coded and may contain inaccuracies and/or errors. This is unavoidable outside of self-reported identification for, of, or from every executive. We therefore undertook a

number of steps to arrive at executive race/ethnicity classifications that are of high quality.¹⁸ Future research may wish to explore alternative methods of classifying the race/ethnicity of large numbers of executives. We also undertook robustness tests with regard to the VIAFs that we used—namely (per the italicized section of panel B of Table 4) 1.07 for Asians, 1.10 for Blacks, and 1.35 for Hispanics. The results of these robustness tests were that while increasing and decreasing VIAFs by 50% over the aforementioned values yielded small changes in the magnitudes of {VRAED US execs – USPopRAED}, {VRAED US execs – PEER-RAED}, {VRAED US execs – ALLCOLLRAED}, and {VRAED US execs – NYTTop100RAED}, there were no changes in the overall statistical significance of these differences between VRAED US execs and the RAEDs of alternative benchmarks.

Lastly, with respect to cautions, the focus of our study has been on measuring and analyzing racial misrepresentation and bias against minorities in US executives. Our results do not therefore necessarily extrapolate to outcomes relating to middle managers, front-line employees, boards of directors, or non-US executives. Future research pertaining to these stakeholder groups could combine data on executive race/ethnicity with other types of data within and across the stakeholder groups to assess whether the results we have found for S&P 500® executives do or do not generalize, and to explore whether and why racial misrepresentations of corporate executives contribute to or are different from the effects of other executive characteristics on corporate decision making.

On the opportunities side of the coin, our study and its benchmarking methods may provide fresh perspectives into areas outside of business where fears of racial misrepresentation and bias have been raised, or where the racial representations of individuals are very different than those of the US population. One such area is professional sports, where

concerns have been raised about the under-representation of Black players in the MLB (Summers, Mehta, and Kenin 2023), and where the magnitudes of the racial representations of players in the NBA, MLB, MLS, and NFL almost always diverge from those of the US population in ways that are large and commonly run in the opposite directions to the USPopRAED-based misrepresentations of US executives. In Table 9, we report the racial misrepresentations of the rosters of players in the NBA, MLB, MLS, and NFL in season 2018–2019 as measured by the difference between their RAEDs and USPopRAED. Table 9 shows that in a manner quite opposite to that of US executives in S&P 500® firms, Whites are never over-represented in any of the four sports (and indeed are greatly under-represented in the NBA and NFL), whereas Asians are always moderately under-represented, Blacks are greatly over-represented in the NBA and NFL but under-represented in the MLB, and Hispanics are materially over-represented in the MLB and MLS but under-represented in the NBA and NFL.

However, rather than these results indicating the presence of large racial biases in the hiring and development of players by the coaches or front offices of the teams the players work for, we propose that player RAEDs are more informatively benchmarked against the RAEDs of the labor markets that supply qualified proto-talent to the teams, e.g., those of players in NCAA Division 1 colleges, rather than against the RAEDs of the US population. This is because the economic incentives for coaches to hire the very best players who will help their team win and thus reap large financial benefits are very large, likely far outweighing any psychic benefits that some coaches or front offices might gain from discriminating against players of a certain race/ethnicity. Thus, similar to S&P 500® firms, this view predicts that if one were to benchmark the RAEDs of players in the NBA, MLB, MLS, and NFL against the RAEDs of players in NCAA Division 1 colleges, the resulting racial misrepresentations would be far smaller than those from benchmarking player RAEDs against the US population, and thus less indicative of racial bias by coaches.

Conclusions

In our study, we have challenged the dominant view of academics, activists, business leaders, and others that Blacks and Hispanics are greatly under-represented and Whites greatly over-represented in executive ranks, particularly in large public companies, and that this is evidence of racial bias and discrimination against minority executives in firms' hiring, development, and promotion decisions. We did so by first highlighting problems with the US population benchmark that has been used to measure racial misrepresentation and from which racial discrimination and bias have been

¹⁸ In particular, the adjustment factor we applied to Hispanics has a larger lack-of-confidence interval around it than those for Asians and Blacks because Hispanic and European faces and names are not infrequently similar, especially with regard to individuals from Italy and related regions. However, bias or noise that exists due to our miscoding Hispanic as White or White as Hispanic should have no effect on the results we have reported for Asians and Blacks. The VIAF we use to convert raw Hispanic RAEDs into VRAEDs is 1.35, per the “Executives in S&P 500 Firms” section, based on comparing our identification of Hispanic CEOs and CFOs with those of Crist | Kolder. For the purpose of additional robustness, we obtained a cross-check of the Hispanic VIAF of 1.35 by employing an expert in Hispanic culture and people (high school Spanish teacher and former resident of Central America) to independently arrive at her assessments of whether or not each of our full set of S&P 500 executives as of mid-2020 was Hispanic. The VIAF for Hispanic executives per her assessments was 1.42, close to the Crist | Kolder-based 1.35.

Table 9 Racial/ethnic densities of the rosters of players in the NBA, MLB, MLS, and NFL in the 2018–2019 season vs. the RAEDs of 2019 US population (USPopRAED). Data are from The Institute

for Diversity and Ethics in Sports (TIDES). *z*-statistics in bold red are < -1.96 (bold green > 1.96). *api* Asian + Pacific Islander, *b* Black, *h* Hispanic, *w* White

	Race/ethnicity of players			
	api	b	h	w
<i>Panel A: NBA Roster 2018–2019 (n = 461) *</i>				
RAED {NBA 2019–2020}	0.4%	79.2%	2.4%	18.0%
USPopRAED	6.4%	13.0%	18.5%	61.2%
RAED {NBA 2019–2020} – USPopRAED	-6.0%	66.2%	-16.1%	-43.2%
<i>z</i> -stat (RAED {NBA 2019–2020} – USPopRAED)	-5.2	42.3	-8.9	-19.0
* Excludes 31 players classified by TIDES as Other				
<i>Panel B: MLB Roster 2018–2019 (n = 896)</i>				
RAED {MLB 2019–2020}	2.2%	7.5%	29.9%	60.2%
USPopRAED	6.4%	13.0%	18.5%	61.2%
RAED {MLB 2019–2020} – USPopRAED	-4.2%	-5.5%	11.5%	-1.0%
<i>z</i> -stat (RAED {MLB 2019–2020} – USPopRAED)	-5.1	-4.9	8.8	-0.6
<i>Panel C: MLS Roster 2018–2019 (n = 756) **</i>				
RAED {MLS 2019–2020}	1.6%	23.3%	31.6%	41.5%
USPopRAED	6.4%	13.0%	18.5%	61.2%
RAED {MLS 2019–2020} – USPopRAED	-4.8%	10.3%	13.2%	-19.7%
<i>z</i> -stat (RAED {MLS 2019–2020} – USPopRAED)	-5.4	8.4	9.3	-11.1
** Excludes 31 players classified by TIDES as 2 or more races				
<i>Panel D: NFL Roster 2018–2019 (n = 1,456) ***</i>				
RAED {NFL 2019–2020}	1.7%	67.0%	0.5%	30.5%
USPopRAED	6.4%	13.0%	18.5%	61.2%
RAED {NFL 2019–2020} – USPopRAED	-4.7%	54.0%	-18.0%	-30.7%
<i>z</i> -stat (RAED {NFL 2019–2020} – USPopRAED)	-7.3	61.4	-17.6	-24.0
*** Excludes 150 players classified by TIDES as 2 or more races				

inferred. Then, in light of these problems, instead of the US population, we benchmarked the RAEDs of US executives against the RAEDs of their college peers to measure misrepresentation, because those college-peer cohorts reflect the time-conditional pool of candidates from which US executives were hired, developed, and promoted.

Our key result is that whereas under the US population benchmark Black and Hispanic S&P 500® firm US executives are reliably under-represented by -9.1% and -15.5%, and Asians and Whites are reliably over-represented by 1.3% and 24.4%, Asians and Blacks are statistically at their college-peer benchmark levels, with college-peer-benchmarked misrepresentations of just -0.4% and 0.1%, respectively. Whites are reliably slightly above their college-peer benchmarks by 1.9%, and Hispanics are reliably slightly below by -1.2%. We interpret these findings as indicating that the

direct biases and discrimination against minorities by S&P 500® firms—defined as those in firms' executive hiring, development, and promotion decisions, taking as given the set of colleges from which executives were hired as proto-executives—are much smaller than is commonly presumed. In particular, we conclude that for Asian and Black US executives, direct racial biases are not present at all in S&P 500® firms. Our results therefore run counter to the claims made by many parties (e.g., Shah Paikeday and Qosja 2023; Murray 2024) that large US companies have engaged in, and exhibited bias and discrimination against, Asians and Blacks in their executive direct hiring, development, and promotion decisions.

Since our college-peer benchmark takes firms' decisions as to which colleges to hire proto-executives from as given—it is silent as to the set of US colleges from which

firms could have hired BA/BS graduates into their proto-executive pipelines in a racially unbiased manner, but chose not to—we also put forward two candidates for the sets of colleges that firms could have chosen to recruit from if they had been seeking to do so in a racially unbiased manner: all US colleges and the NYT Top 100 colleges. By comparing the RAEDs of these sets of colleges when US executives were first hired as proto-executives with the RAEDs of executives' college peers, we sought to assess the extent of indirect hiring biases due to firms' choices as to which colleges not to hire BA/BS graduates from as compared to direct biases arising from firms' development and promotion decisions once proto-executives had been hired. We found that indirect hiring biases due to firms selectively choosing which colleges to hire their proto-executives from matters in the misrepresentations of all races, but that while the signs and sizes of the indirect biases experienced by Hispanics and Whites do not depend on the set of US colleges firms should have gone to if their goal was to hire in a racially unbiased way, they do matter for Asians and Blacks.

Our study raises a number of implications for academics, practitioners, and policy makers both within and outside of business. One social policy implication is that actions intended to affect the racial compositions of business executives are most likely to yield results if they focus on the hiring of proto-executives, such as graduating college students, rather than individuals who are already working for firms and thus who are already in the executive pipeline. And that policy makers will likely need to accept that the effects of any of their policy actions will take 20–40 years to come

to fruition. A second implication is that the different racial proportions seen across non-US vs. US college graduates, combined with the increasingly global nature of US firms and their executives, and the US Supreme Court's June 2023 ruling against race-conscious admissions at US universities, point to there being very large challenges to all races attaining the levels of executive representation in US public companies that contemporaneously equate to their densities in the US population. We also conjecture that the benchmarking approaches that we have developed and employed in our study can and will be useful in accurately describing the many changes in executive RAEDs that have occurred since 2020, particularly the disproportionately large increases relative to historical trends in the density of Black and Hispanic executives documented by Bermiss et al. (2023), and in identifying the causal determinants of these increases.

In conclusion, our study highlights the importance of the benchmark used to measure the signs and magnitudes of racial misrepresentation in executives and the sensitivity of inferences regarding the presence and magnitude of racial bias and discrimination by firms against their executives to the benchmark used to measure misrepresentation. In particular, we do not find that S&P 500® firms have engaged in direct bias against Asians and Blacks in their US executive direct hiring, development, and promotion decisions. We hope that future studies that investigate the causes and consequences of racial misrepresentation across a wide variety of areas of society, including but not limited to firms and business, will benefit from the ideas, methods, results, and inferences that we have presented.

Appendix A

Screenshots of the firm and executive data items for three example firms in the S&P 500® at mid-2020, along with an explanation of what each data item means, how it was collected, and how it was coded.

Panel A: Items 1-19

SP Firm ID	SP Company Name	SP Webpg1	SP Webpg2	SP Webpg3	SP Webpg4	YWP, YWN or NWN?	SP Exec #	SP Last name(s)	SP First name(s)	SP Middle initial(s)	SP Chief or Officer 1	SP Chief or Officer 2	SP Chief or Officer Domain	SP Rank or Title	SP Rank or Title Domain	SP Area	SP Photo
1	CITRIX SYSTEMS INC	About Us	Executives			YWP	1	Henshall	David	J	CEO	President	CEO-PRES				y
1	CITRIX SYSTEMS INC					YWP	2	Shenkman	Arlen		CFO		Finance	EVP	EVP		y
1	CITRIX SYSTEMS INC					YWP	3	Gomes	Tony		GC		Legal	EVP	EVP		y
1	CITRIX SYSTEMS INC					YWP	4	Ferrer	Mark		Chief Revenue Officer		Revenue	EVP	EVP		y
1	CITRIX SYSTEMS INC					YWP	5	Hough	PJ		Chief Product Officer		Product	EVP	EVP		y
1	CITRIX SYSTEMS INC					YWP	6	Kimmel	Donna		Chief People Officer		HR	EVP	EVP		y
1	CITRIX SYSTEMS INC					YWP	7	Minahan	Tim		Chief Marketing Officer		Marketing	EVP	EVP	Business Str	y
1	CITRIX SYSTEMS INC					YWP	8	Schmitz	Mark	J	COO		Operations	EVP	EVP		y
1	CITRIX SYSTEMS INC					YWP	9	van Rotterdam	Jeroen		Chief Information Secu		IT	EVP	EVP	Engineering	y
9	NORTHERN TRUST CORP	About Us	Investor Rela	Governance	Senior Leader	YWN	1	O'Grady	Michael	G	CEO	President	CEO-PRES				y
9	NORTHERN TRUST CORP					YWN	2	Browne	Robert	P	Chief Investment Office		Finance	EVP	EVP		y
9	NORTHERN TRUST CORP					YWN	3	Cherewich	Peter	B				EVP	EVP	Corporate &	y
9	NORTHERN TRUST CORP					YWN	4	Fradkin	Steven	L				EVP	EVP	Wealth Ma	y
9	NORTHERN TRUST CORP					YWN	5	Gossett	Mark	C	Chief Risk Officer		Risk	EVP	EVP		y
9	NORTHERN TRUST CORP					YWN	6	Levy	Susan	C	CS	GC	Legal	EVP	EVP		y
9	NORTHERN TRUST CORP					YWN	7	Parker	Teresa	A				EVP	EVP	EMEA	y
9	NORTHERN TRUST CORP					YWN	8	South	Thomas	A	Chief Information Secu		IT	EVP	EVP		y
9	NORTHERN TRUST CORP					YWN	9	St. Clair	Joyce		Chief HR Officer		HR	EVP	EVP		y
9	NORTHERN TRUST CORP					YWN	10	Thomas	Shundrawn	A				EVP	EVP		y
9	NORTHERN TRUST CORP					YWN	11	Tyler	Jason	J	CFO		Finance	EVP	EVP		y
17	MONSTER BEVERAGE CORP					NWN	1	Sacks	Rodney	C	CEO		CEO-PRES				n
17	MONSTER BEVERAGE CORP					NWN	2	Schlosberg	Hilton	H	President	COO	CEO-PRES				n
17	MONSTER BEVERAGE CORP					NWN	3	McHugh	Daniel		Chief Marketing Officer		Marketing				y
17	MONSTER BEVERAGE CORP					NWN	4	Kelly	Thomas	J				EVP	EVP	Finance	n
17	MONSTER BEVERAGE CORP					NWN	5	Carling	Guy	P				President	BU-CEO-PR EMEA		n
17	MONSTER BEVERAGE CORP					NWN	6	Tirre	Emelie					President	BU-CEO-PR Americas		y

Item 1 Firm ID.

Item 2 Company Name = Firm name per Compustat

Item 3 Webpg 1 = 1st level in firm's website address identifying the page with the executive on it.

Item 4 Webpg 2 = 2nd level in firm's website address identifying the page with the executive on it

Item 5 Webpg 3 = 3rd level in firm's website address identifying the page with the executive on it

Item 6 Webpg 4 = 4th level in firm's website address identifying the page with the executive on it

Item 7 YWP = firm website shows the named executive and their photo

YWN = firm website shows the named executive but not their photo

NWN = firm website does not show an/the executive's name or photo

Item 8 Executive #, coded in the order shown on firm's website (if in a row, order taken is left to right)

Item 9 Last name(s) of executive

Item 10 First name(s) of executive

Item 11 Middle initial(s) of executive

Item 12 Chief or Officer 1 = 1st of a maximum of two Chief or Officer positions ascribed to the executive

Item 13 Chief or Officer 2 = 2nd of a maximum of two Chief or Officer positions ascribed to the executive

Item 15 Chief or Officer Domain = category covering one or more Chief or Officer 1 or 2 positions

Item 16 Rank or Title = rank or title of executive, outside of Chief or Officer 1 and 2

Item 17 Rank or Title Domain = category covering one or more Ranks or Titles

Item 18 Area = area of business responsibility covered by the executive, as judged by authors based on the text provided about the executive on firm's website

Item 19 Photo = y if a photo of the executive was found on the firm's website, else the executive's LinkedIn page (LIN), else the firm's Bloomberg profile (BB), else business media (OTH)

Panel B: Items 20–32

SP Firm	SP	SP		McK 2015 code	McK 2018 US	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP
ID	Company Name	Photo	Photo Source	Gender	race/ethnicity: aa,eur,ne,ea,sa,lat,na,pi,an	race/ethnicity w,b,h,api,aian	Visual est age	Formal attire?	Jacket?	Tie?	Smile (1–10)	Pay (\$M) Yahoo! Finance	Year Born Yahoo! Finance	True Age @ Feb-20			
1	CITRIX SYSTEMS INC	y	Website	m	eur	w	55	y	y	n	6	\$ 3.03	1968	52			
1	CITRIX SYSTEMS INC	y	Website	m	eur	w	55	y	y	n	4	\$ 0.83	1971	49			
1	CITRIX SYSTEMS INC	y	Website	m	lat	h	55	y	y	n	7	\$ 1.14	1966	54			
1	CITRIX SYSTEMS INC	y	Website	m	eur	w	60	y	y	y	6	\$ 1.33	1960	60			
1	CITRIX SYSTEMS INC	y	Website	m	eur	w	55	n	n	n	8						
1	CITRIX SYSTEMS INC	y	Website	f	eur	w	45	y	y	n	9						
1	CITRIX SYSTEMS INC	y	Website	m	eur	w	45	y	y	n	7						
1	CITRIX SYSTEMS INC	y	Website	m	eur	w	40	y	y	n	8						
1	CITRIX SYSTEMS INC	y	Website	m	eur	w	50	y	n	n	6						
9	NORTHERN TRUST CORP	y	BB	m	eur	w	60	y	y	y	6	\$ 3.05	1966	54			
9	NORTHERN TRUST CORP	y	LIN	m	eur	w	55	y	y	y	6	\$ 1.50	1965	55			
9	NORTHERN TRUST CORP	y	LIN	m	eur	w	55	y	y	y	6	\$ 1.71	1965	55			
9	NORTHERN TRUST CORP	y	LIN	m	eur	w	55	y	y	y	6	\$ 1.76	1962	58			
9	NORTHERN TRUST CORP	y	LIN	m	eur	w	55	y	y	y	5						
9	NORTHERN TRUST CORP	y	LIN	f	eur	w	55	y	y	n	7						
9	NORTHERN TRUST CORP	y	LIN	f	eur	w	60	y	y	n	6						
9	NORTHERN TRUST CORP	y	LIN	m	eur	w	50	y	y	y	5						
9	NORTHERN TRUST CORP	y	OTH	f	eur	w	55	y	n	n	8						
9	NORTHERN TRUST CORP	y	LIN	m	aa	b	45	y	y	y	5						
9	NORTHERN TRUST CORP	y	LIN	m	aa	b	50	y	y	y	7		1972	48			
17	MONSTER BEVERAGE CORP	n		m								\$ 1.48	1950	70			
17	MONSTER BEVERAGE CORP	n		m								\$ 1.44	1953	67			
17	MONSTER BEVERAGE CORP	y	LIN	m	eur	w	55	y	y	y	8						
17	MONSTER BEVERAGE CORP	n		m								\$ 0.71	1954	66			
17	MONSTER BEVERAGE CORP	n		m								\$ 0.87	1977	43			
17	MONSTER BEVERAGE CORP	y	LIN	f	eur	w	50	y	y	n	9	\$ 0.99	1970	50			

Item 20 Photo Source: If photo = y, photo source = firm's website, LIN, BB or OTH

Item 21 Gender: Male or female, based on the executive's photo and/or bio, where available

Item 22 McK 2015 race/ethnicity. We classified an executive's race or ethnicity by visually examining their photo and first and last name(s). All classifications were done by the same coauthor. The most granular racial and ethnic categories we employ are those of Hunt, Layton, and Prince (McKinsey, 2015). With our lowercase descriptor tag of each race/ethnicity category shown in parentheses, these are: African ancestry (aa), European ancestry (eur), Near Eastern (ne), East Asian (ea), South Asian (sa), Latino (lat), Native American (na), and Other (o). We specify Other as either Pacific Islander (pi) or Alaska Native (an). We use the nomenclature American Indian rather than Native American because American Indian is the nomenclature used in much of the historical data that we extract from the National Center for Educational Statistics' Integrated Postsecondary Education Data System (NCES IPEDS) and use in comparing executives' racial and ethnic densities against their expected executive labor supply metric densities

Item 23 NCES IPEDS race/ethnicity. For the historical data we use to benchmark executives' racial and ethnic densities against their expected densities, NCES IPEDS specifies five race/ethnicity categories outside of Nonresident aliens (lowercase descriptor tag of each race/ethnicity category in parentheses: American Indian/Alaska Native (aian), Asian/Pacific Islander (api), Black (b), Hispanic (h), White (w). We connect McK 2015 race/ethnicity categories into NCES IPEDS race/ethnicity categories by defining $b = aa$, $w = eur + ne$, $api = ea + sa + pi$, $h = lat$, $aian = ai + an$ (see item 23 for McK category descriptor tags). NCES IPEDS' race or ethnicity categories match closely with those used for US executives in McKinsey's 2018 and 2020 studies (Hunt et al. 2018, 2020)

Item 24 Visual estimated age. Executive age as judged by the same coauthor from their photo, assigned into one of the following point estimates: 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90

Item 25 Formal attire? = y if executive was wearing formal attire as judged by the same coauthor from the executive's photo. Sometimes not possible if photo was only of the executive's face

Item 26 Jacket? = y if executive was wearing a jacket as judged by the same coauthor from their photo. Sometimes not possible if photo was only of the executive's face

Item 27 Tie? = y if executive was wearing a tie as judged by the same coauthor from the executive's photo. Sometimes not possible if photo was only of the executive's face

Item 28 Smile (1–10). Degree of genuine smile on the executive's face as judged by the same coauthor from the executive's photo, where 1 = not at all smiling/"very grumpy" and 10 = very wide, "joyous" smile

Item 29 Pay (\$M) Yahoo! Finance. If executive is one of the maximum of five individuals listed on the firm's Yahoo! Finance Profile page, Pay is the amount of "salary, bonuses etc." for the last fiscal year ending December 31, 2019

Item 30 Year Born Yahoo! Finance. If executive is one of the maximum of five individuals listed on the firm's Yahoo! Finance Profile page, Year Born is the executive's YYYY year of birth

Item 31 True Age @ Feb-20. If Year Born is available, True Age @ Feb-20 is the age of the executive to the nearest one year at February 2020

Appendix B

Description of the calculations behind the Visual Identification Adjustment Factors (VIAFs) used to adjust the raw numbers and densities of the judged races of executives in our S&P 500® dataset to take into account the likely undercounting of non-Whites. VIAFs are estimated for Asian, Black, and Hispanic executives, with the VIAF-based number and density of Whites being a plug. The data we use to calculate the VIAFs were generously provided by Crist | Kolder Associates (CKA) from their 2020 Volatility Report. It consists of (1) the first and last names of all the CEOs and CFOs that during the summer of 2020 Crist | Kolder identified as being in the union of firms in the S&P 500® and the Fortune 500; (2) the name of the firm that the CEO or CFO works for; and (3) Crist | Kolder's classification of the CEO's or CFO's race/ethnicity. Our approach to calculating VIAFs uses only the subset of Crist | Kolder's firms that are also in our database of S&P 500® firms, and only those CEOs and CFOs who are identified by both Crist | Kolder and ourselves. We define an executive's race/ethnicity coding as being correct if both we and Crist | Kolder agree on the coding. For every case in which our coding of an executive's race/ethnicity differed from Crist | Kolder's, we carefully researched biographical and other data sources to confirm the classification. In testimony to the resources that Crist | Kolder spend on their highly visible and respected Volatility Report, we found only 2 executives out of 82 whose Crist | Kolder classification we believe is incorrect, as compared to 12 out of 80 from our own less resource-intensive classification process. Using Black executives as the example, we calculate $VIAF_b$ as the ratio of the number of CEOs + CFOs that Crist | Kolder coded as b to the number of CEOs + CFOs that we coded as b, multiplied by the number of correct b CEOs + CFOs divided by the total number of b CEOs + CFOs.

For CKA firms in our dataset of S&P® 500 firms (SP500):		CKA race/ethnicity using NCES IPEDS classifications				Total
		aian	api	b	h	
i	# CKA CEOs + CFOs coded correctly	0	44	11	25	80
ii	# CKA CEOs + CFOs coded incorrectly	0	0	0	2	2
iii	# SP500 CEOs + CFOs coded correctly	0	41	10	17	68
iv	# SP500 CEOs + CFOs coded incorrectly	0	3	1	8	12
$VIAF = (i / iii) * [(i - ii)/i]$		1.0	1.07	1.10	1.35	

Note: VIAF for aian is set at 1.0 since denomination in VIAF calculation = 0.

VIAF for w is not calculated as it is best thought of as a plug.

Appendix C

Derivation of the estimated racial densities of the US population at July 1, 2019 using the race and ethnicity categories defined in the US Department of Education's National Center for Educational Statistics' Integrated Postsecondary Education Data System (NCES IPEDS)^a

Panel A: Annual Estimates of United States Resident Population by Sex, Race, and Hispanic Origin: April 1, 2010 to July 1, 2019 (see [link](#) for raw data file NC-EST2019-SR11H, June 2020)

Sex, Race, and Hispanic Origin	Population estimate as of		
	July 1, 2019	Hispanic	Not Hispanic
TOTAL POPULATION	328,239,523	60,572,237	267,667,286
One Race:			
White	250,522,190	53,212,368	197,309,822
Black or African American	44,075,086	2,927,598	41,147,488
American Indian and Alaska Native	4,188,092	1,753,184	2,434,908
Asian	19,504,862	598,983	18,905,879
Native Hawaiian and Other Pacific Islander	806,937	211,029	595,908
Two or More Races	9,142,356	1,869,075	7,273,281

Panel B: Rules in Reporting Race and Ethnicity Data to IPEDS (see [link](#) for full details)

Institutions MUST give students and staff the opportunity to self-report their race and ethnicity. Students and staff do NOT have to respond. Institutions MUST use a 2-part question to collect these data. The questions must be presented in this order:

1. Are you Hispanic or Latino?
2. Select one or more of the following races:
 - American Indian or Alaska Native
 - Asian
 - Black or African American
 - Native Hawaiian or Other Pacific Islander
 - White

Report race and ethnicity data to IPEDS as follows:

If the individual self identifies as...	Report to IPEDS as...	IPEDS tag
Hispanic only, or Hispanic and any race category	Hispanic	h
Not Hispanic; American Indian or Alaska Native	American Indian or Alaska Native	aian
Not Hispanic; Asian only	Asian	api
Not Hispanic; Black or African American only	Black or African American	b
Not Hispanic; Native Hawaiian or Other Pacific	Native Hawaiian or Other Pacific Islander	api
Not Hispanic; White only	White	w
Not Hispanic; more than one race category	Two or more races	tomr

Panel C: Estimated Racial and Ethnic Densities by NCES IPEDS Label after Allocating Two or More Races (tomr) to aian, api, b, w

IPEDS label	Population estimate as of July 1, 2019	tomr allocations to aian, api, b, w	Population estimate as of July 1, 2019 after allocating tomr to aian, api, b, w	Estimated densities by IPEDS tag after allocating tomr to aian, api, b, w
h	60,572,237		60,572,237	18.5%
aian	2,434,908	1,010,678	3,445,586	1.0%
api	19,501,787	1,463,435	20,965,222	6.4%
b	41,147,488	1,383,906	42,531,394	13.0%
w	197,309,822	3,415,261	200,725,083	61.2%
tomr	7,273,281			
Total	328,239,523	7,273,281	328,239,523	100.0%

^aThe Integrated Postsecondary Education Data System is a system of interrelated surveys conducted annually by the National Center for Education Statistics, a part of the Institute for Education Sciences within the United States Department of Education. IPEDS consists of twelve interrelated survey components that are collected over three collection periods each year as described in the Data Collection and Dissemination Cycle. The completion of all IPEDS surveys is mandatory for all institutions that participate in, or are applicants for participation in, any federal financial assistance program authorized by Title IV of the Higher Education Act of 1965, as amended

Notes: 1. Per US Office of Management and Budget guidelines, the terms White, Black or African American, Asian, American Indian and Alaska Native, and Native Hawaiian and Other Pacific Islander are used to describe the race of people. Beginning in 2003, people in these categories are those who selected that race group only. Those who identify multiple race groups are categorized as people of Two or More Races. Prior to 2003, people identified a group as their main race

2. Hispanic or Latino ethnicity refers to people who identify themselves as being of Hispanic, Latino, or Spanish origin. Hispanic ethnicity sub-categories consist of Mexican, Puerto Rican, Cuban, Central and South American, and Other Hispanic or Latino

3. The allocation of the 7,272,381 tomr people to aian, api, b and w in panel C was done using the data in Table 2 (“Two or More Races Population by Specific Combination: 2000 and 2010”) reported on p. 6 of the 2010 Census Brief [The Two or More Races Population: 2010](#). In that table, for each j -race tomr group 2-races, 3-races, 4-races, 5-races, and 6-races, and within each tomr group for each permutation of the 6 races aian, a, b, pi, w, and sor (some other race), the total number of people in that permutation was allocated equally to the races (and only to those races) in that permutation. For example, for the aian/a/b/w/sor permutation in the 5-race group, 1/5 of the 1,023 people in that permutation were estimated to be aian, 1/5 a, 1/5 b, 1/5 w, and 1/5 sor. Then, because there is no sor category in IPEDS, that data in sor were in turn then indirectly allocated to aian, a, b, pi, and w through multiplying the total of 7,273,281 people in tomr by the fraction that each of the estimated-within-tomr numbers of aian, a, b, pi, and w people were of the total estimated-within-tomr numbers

Appendix D

Descriptive statistics on the overlaps between US colleges/universities (CUs) from which executives in our mid-2020 S&P 500® dataset come and (1) all US CUs, (2) US CUs ranked by US News & World Report, (3) the subset of US CUs consisting of those that supplied 6+ executives to S&P 500® firms, and (4) the subset of the US CUs in (3) that are also in the *New York Times* 2017 list of the 100 Top US CUs. We obtained executives’ education background from BoardEx. BoardEx’s data provided us with executives’ demographic information, employment history, compensation, networks, and educational background. Educational background includes college and graduate education, as well as certificates and executive education programs. As we are interested in college education, we use the dataset *BoardEx Individual Education Profile* to identify the institutions and qualifications earned at each institution for each executive in our S&P 500® dataset. We match each executive to BoardEx by their names and firm. BoardEx contains several variables that can be used to link to other databases, including International Security Identification Number and Central Index Key. For firms that are missing these identifiers, we hand-match the firms using a combination company name, company web address, telephone number, and fax number. If we did not find an exact match by executive name and firm, we sought to hand-match executives and firms one-by-one.

	S&P 500® firms		
# CUs in US per Statista in 2018-2019	2,698		
# CUs ranked by USNWR @ 2/15/2019	1,400		
# CUs that sample executives come from	1,312		
% of all CUs that sample executives come from	49%		
	S&P 500® firms		
# executives in sample dataset	6814		
# of sample executives with BA data in BoardEx	5470		
% sample executives with BA data in BoardEx	80%		
	S&P 500® firms		
Of executives in dataset with BA/BS data in BoardEx:	# CUs	# execs	% execs
# CUs with 1 exec	661	661	12%
# CUs with 2 executives	214	428	8%
# CUs with 3 executives	109	327	6%
# CUs with 4 executives	58	232	4%
# CUs with 5 executives	47	235	4%
# CUs with 6+ executives	223	3,587	66%
	1,312	5,470	100%
	S&P 500® firms		
% of S&P 500® executives whose BA/BS is from one of the 223 CUs that supplied 6+ executives to S&P 500® firms	66%		
% of S&P 500® executives who come from the 78 NYT top 100 CUs that are in the 223 CUs that have supplied 6+ executives to S&P 500® firms	35%		

Appendix E

This appendix lists the NCES IPED UnitIDs, names, and number of BA/BS degrees conferred in academic years 1986–1987 and 2007–2008 for each institution in the “Top 100 US colleges and universities” as defined by Ashkenas, Park, and Pearce in their *New York Times* article “[Even with affirmative action, Blacks and Hispanics are more under-represented at top colleges than 35 years ago](#)”(August 24, 2017).

Public, 4-year or above				Private not-for-profit, 4-year or above			
One per State (+8 additional from California)		# students		21 States + DC (max = 6 in CA, MA)		# students	
UnitID	Institution Name	1987	2008	UnitID	Institution Name	1987	2008
151351	Indiana University-Bloomington	4,546	5,779	164465	Amherst College	392	445
159391	Louisiana State Univ & Ag & Mech College	3,173	4,600	161004	Bowdoin College	345	451
204796	Ohio State University-Main Campus	6,853	8,721	217156	Brown University	1,515	1,542
214777	Pennsylvania State University-Main Campus	7,415	9,442	110404	California Institute of Technology	176	208
186380	Rutgers University-New Brunswick	5,148	5,454	173258	Carleton College	426	461
100751	The University of Alabama	2,247	3,398	112260	Claremont McKenna College	203	281
180489	The University of Montana	1,131	1,712	161086	Colby College	479	521
221759	The University of Tennessee-Knoxville	3,226	3,655	190099	Colgate University	619	675
228778	The University of Texas at Austin	6,751	8,669	190150	Columbia University	1,298	1,824
196088	University at Buffalo	2,454	3,966	190415	Cornell University	1,735	3,431
102614	University of Alaska Fairbanks	466	444	182670	Dartmouth College	1,053	1,084
104179	University of Arizona	3,598	5,619	198385	Davidson College	342	432
106397	University of Arkansas	1,655	2,343	198419	Duke University	1,654	1,505
110635	University of California-Berkeley	5,264	6,960	139658	Emory University	1,109	1,513
110644	University of California-Davis	3,031	5,785	131496	Georgetown University	1,399	1,730
110653	University of California-Irvine	2,040	5,209	153384	Grinnell College	304	408
110662	University of California-Los Angeles	4,909	7,089	191515	Hamilton College	419	442
445188	University of California-Merced	0	74	166027	Harvard University	1,766	1,755
110671	University of California-Riverside	665	3,544	115409	Harvey Mudd College	124	179
110680	University of California-San Diego	2,177	5,328	212911	Haverford College	288	301
110705	University of California-Santa Barbara	3,194	4,977	162928	Johns Hopkins University	733	1,548
110714	University of California-Santa Cruz	1,288	3,450	166683	MIT	1,159	1,217
126614	University of Colorado Boulder	3,515	5,790	230959	Middlebury College	558	636
129020	University of Connecticut	2,906	4,591	147767	Northwestern University	2,027	2,037
130943	University of Delaware	2,639	3,500	121345	Pomona College	333	385
134130	University of Florida	5,260	8,737	186131	Princeton University	1,129	1,137
139959	University of Georgia	3,871	6,414	227757	Rice University	629	792
141574	University of Hawaii at Manoa	2,594	2,994	167835	Smith College	684	708
142285	University of Idaho	1,110	1,833	243744	Stanford University	1,628	1,646
145637	University of Illinois at Urbana-Champaign	5,938	7,314	216287	Swarthmore College	353	374
153658	University of Iowa	3,826	4,488	144050	University of Chicago	717	1,185
155317	University of Kansas	2,887	3,997	152080	University of Notre Dame	1,867	2,087
157085	University of Kentucky	2,606	3,775	215062	University of Pennsylvania	2,363	2,766
161253	University of Maine	1,438	1,622	123961	University of Southern California	2,774	4,528
163286	University of Maryland-College Park	5,570	6,307	221999	Vanderbilt University	1,245	1,542
166629	University of Massachusetts-Amherst	4,167	4,431	197133	Vassar College	558	638
170976	University of Michigan-Ann Arbor	4,981	6,258	234207	Washington and Lee University	290	449
174066	University of Minnesota-Twin Cities	5,525	6,650	179867	Washington University in St Louis	1,355	1,760
176017	University of Mississippi	1,434	2,450	168218	Wellesley College	545	604
178396	University of Missouri-Columbia	3,494	4,779	130697	Wesleyan University	654	732
181464	University of Nebraska-Lincoln	2,937	3,246	168342	Williams College	522	510
182290	University of Nevada-Reno	904	2,119	130794	Yale University	1,283	1,319
183044	University of New Hampshire-Main Campus	1,934	2,377	Total for Private not-for-profit 4-yr or above		39,052	47,788
187985	University of New Mexico-Main Campus	1,803	3,052	Total for Public, 4-yr or above		179,664	252,520
199120	University of North Carolina at Chapel Hill	3,272	4,131	Total for Public + not-for-profit Private 4-yr or above		218,716	300,308
200280	University of North Dakota	1,561	1,836	Total all Bachelor's degrees conferred by post-secondary US institutions, excl. non-resident aliens		959,813	1,518,747
207500	University of Oklahoma-Norman Campus	2,455	3,817	Total for Public + not-for-profit Private 4-yr or above as % of Total all Bachelor's degrees conferred by post-secondary US institutions, excl. non-resident aliens		22.8%	19.8%
209551	University of Oregon	2,274	3,636	Note: 4-yr or above refers to US colleges and universities with at least a 4-year BA/BS program			
217484	University of Rhode Island	1,673	2,201	Source: NCES IPEDS Digest of Education Statistics			
218663	University of South Carolina-Columbia	2,910	3,823				
219471	University of South Dakota	703	819				
230764	University of Utah	2,639	4,882				
231174	University of Vermont	1,675	2,003				
234076	University of Virginia-Main Campus	2,809	3,526				
236948	University of Washington-Seattle Campus	4,959	6,952				
240444	University of Wisconsin-Madison	6,000	6,376				
240727	University of Wyoming	1,625	1,786				
238032	West Virginia University	2,539	3,790				
Total for Public, 4-yr or above		179,664	252,520				

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Data Availability The datasets generated and analyzed during the current study are available from mainly public sources.

Declarations

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