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McKinsey's Diversity Matters/ Delivers/Wins Results Revisited

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LINK TO ABSTRACT

Consultants, business leaders, and activists often promote the view that a strong and settled business case exists behind the normative view that firms should increase the racial/ethnic diversity of their employees.[3] A highly influential piece of evidence in support of this view comes from McKinsey & Co., which in a series of studies[4] in 2015 ("Diversity Matters"), 2018 ("Delivering through Diversity"), 2020 ("Diversity Wins: How Inclusion Matters"), and 2023 ("Diversity Matters Even More: The Case for Holistic Impact") reports finding statistically significant positive relations between the industry-adjusted earnings before interest and taxes as a percentage of revenues (EBIT margin) of global McKinsey-chosen sets of large public firms and the racial/ethnic diversity of their executives. Exhibit 7 from McKinsey's 2020 study (p. 20), reproduced in our Figure 1, summarizes their 2015, 2018, and 2020 studies' results.

Dame Vivian Hunt, McKinsey's managing partner in the UK and Ireland at the time and a coauthor on all four of McKinsey's studies, crystalizes McKinsey's view that greater racial/ethnic diversity in a firm's executive team drives better firm financial performance: "What our data shows is that companies that have more diverse leadership teams are more successful. And so the leading companies in our datasets are pursuing diversity because it's a business imperative and driving real business results" (**link**).

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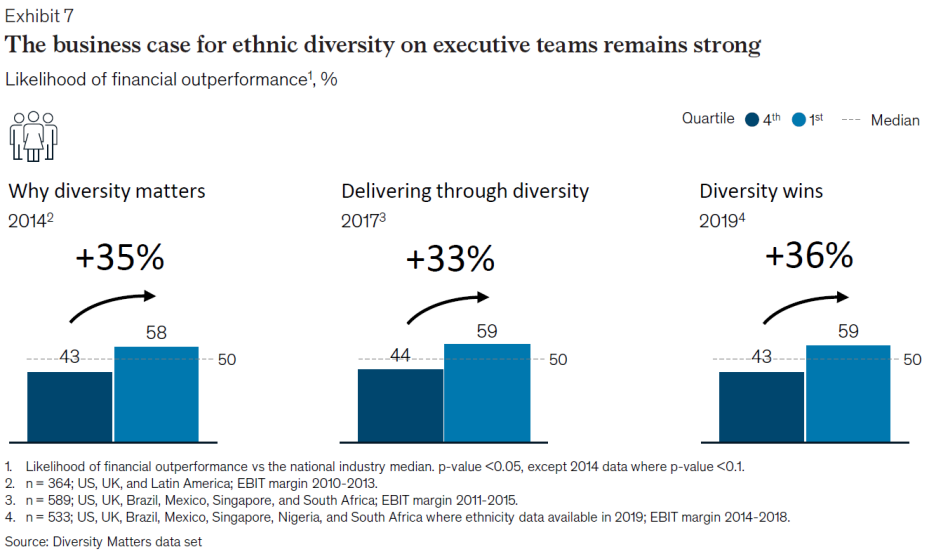
3. *See* Eswaran 2019; Holger 2019; Kim 2018; Lorenzo and Reeves 2018; Lorenzo et al. 2017; 2018; Richard, Triana, and Li 2021; Wittenberg 2017. Different or contrary views include those of Edmans 2018; Ely and Thomas 2020; Levitt 2021.
4. In the References section these McKinsey studies are listed under their authors' names: Hunt et al. 2015; 2018; Dixon-Fyle et al. 2020; 2023.

Figure 1. Reproduction of Exhibit 7 from McKinsey's 2020 study (p. 20)



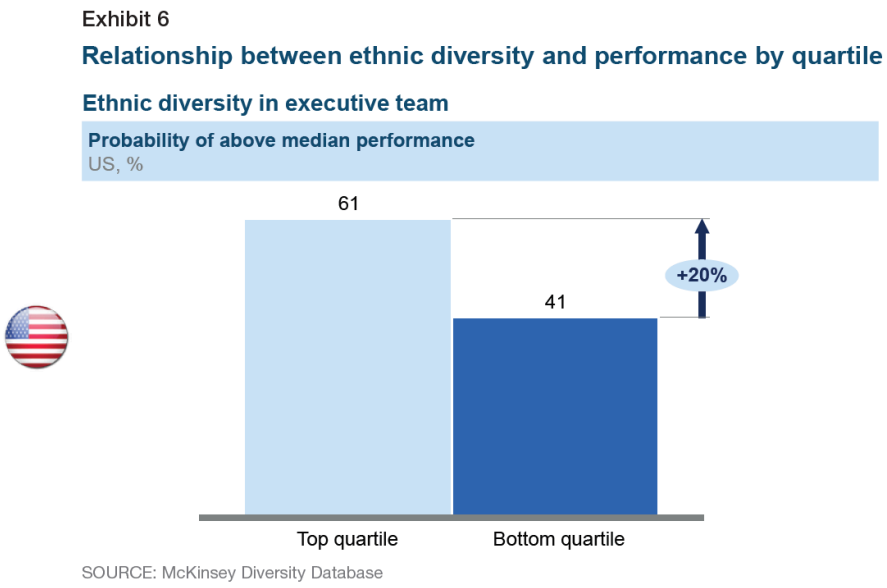
Given the business and societal importance of determining whether greater racial/ethnic diversity in corporate executives does or does not correlate in a statistically reliable way with higher firm financial performance, the goal of our paper is to revisit McKinsey's results by means of a quasi-replication. We do so by applying McKinsey's empirical testing approach to those firms that were in the S&P 500® Index on 12/31/19. We choose 12/31/19 so as to keep our quasi-replication within the same pre-covid time window as McKinsey's 2015, 2018, and 2020 studies. We focus on the large public US companies in the S&P 500® for two reasons. First, McKinsey would not provide us with their detailed datasets, nor the names of the firms in their datasets, so we were unable to directly replicate or investigate their analyses.[5] Second, in their first study, McKinsey reports finding a statistically significant positive relation between the racial/ethnic diversity of the executive teams of 186 large public firms in US + Canada with annual revenues of at least $1.5 billion (hereafter, 'US firms') and the likelihood that these firms display financial outperformance (McKinsey 2015, 3–4). Since the firms in the S&P 500® are large US public companies, they likely match well with McKinsey's set of US firms, even if we cannot observe which firms are in McKinsey's datasets.[6]

5. We speculate that one reason why McKinsey may have chosen not to disclose the names of the firms in their datasets may be that the firms involved are McKinsey clients, and if so, this prevents McKinsey from sharing the data because of confidentiality agreements with those clients.

6. McKinsey also studies large companies in the Asia-Pacific region, Continental Europe, Latin America, Sub-Saharan Africa, and the UK. We focus on the US, as racial and ethnic diversity is an ongoing and currently politically and socially important issue in the US and collecting racial and ethnic background data

To use their 2015 study as the representative example, McKinsey measures the racial/ethnic diversity of executives in US firms using a Herfindahl-Hirschman index applied to eight racial/ethnic groups, where race/ethnicity is judged by McKinsey researchers using the photos and names of the executives found on the firms' 2014 websites. The eight racial/ethnic groups used were African ancestry, European ancestry, Near Eastern, East Asian, South Asian, Latino, Native American, and Other. McKinsey defines financial outperformance as a firm's EBIT margin during the years 2010–2013 minus the firm's national industry median EBIT margin over the same period, and they compare the likelihood of financial outperformance in the top vs. bottom quartiles of their US firms ranked on the degree of executive racial/ethnic diversity. As reproduced below from Exhibit 6 of their 2015 study, McKinsey reports that 61 percent of US firms in the top McKinsey quartile of executive racial/ethnic diversity measured in 2014 exhibited financial outperformance in 2010–2013, versus 41 percent in the bottom quartile. The difference of 20 percent is statistically significant based on the z-statistic of 2.0 (p-value = 0.05).[7]

Figure 2. Reproduction of Exhibit 6 from McKinsey's 2015 study (p. 6)



is a very time-consuming task.

7. McKinsey does not report a z-statistic in their exhibit 6. Our calculation assumes there are 47 firms in each of the top and bottom quartiles, leading to our estimation of a z-statistic equal to 20% ÷ $[(61\%\times39\%/47) + (41\%\times59\%/47)]^{½}$ = 2.0 per the Bernoulli-based test of the difference between two proportions.

In contrast to McKinsey's results, the key finding of our study is that we observe no statistically significant difference between the likelihood of financial outperformance as measured by the industry-adjusted EBIT margin of S&P 500® firms during the years 2015–2019 in the top vs. bottom quartiles of S&P 500® firms ranked on McKinsey's executive racial/ethnic diversity metric measured in mid-2020. Instead, we find that 54.0 percent of S&P 500® firms in the top executive race/ethnicity-ranked quartile have a positive industry-adjusted EBIT margin vs. 51.2 percent in the bottom quartile, with the z-statistic on the difference of 2.8 percent being a not statistically significant 0.5 (p-value = 0.65).[8]

Because our key finding differs from that of McKinsey and does not provide empirical support for McKinsey's interpretation that greater racial/ethnic diversity in a firm's executives "is a business imperative that drives real business results," we expand our tests and critiques in several directions:

- We extend beyond the likelihood of financial outperformance per se by calculating the mean levels of industry-adjusted EBIT margin in the top and bottom executive racial/ethnic diversity-ranked quartiles. Here too, we find a not statistically significant difference between the top and bottom diversity quartiles. The mean industry-adjusted EBIT margin in the top racial/ethnic diversity quartile is 1.9 percent vs. 0.8 percent in the bottom quartile (t-statistic on the 1.1 percent difference in means = 0.9).
- We relax McKinsey's focus on only the top and bottom executive racial/ethnic diversity quartiles. Letting *DIV_McK8* denote the degree of executive racial/ethnic diversity measured using eight racial/ethnic groups per McKinsey (2015) and using data on all S&P 500® firms, not just a subset, we find that *DIV_McK8* is uncorrelated with the likelihood that a firm's industry-adjusted EBIT margin is positive (Pearson correlation = 0.02, t-statistic = 0.5) and is also uncorrelated with firms' industry-adjusted EBIT margin (Pearson correlation = 0.02, t-statistic = 0.5).
- Since in their 2018 and 2020 studies McKinsey uses a maximum of five racial/ethnic groups within a given geography to measure executive racial/ethnic diversity, including the US, we also repeat all our tests using *DIV_McK5* instead of *DIV_McK8*. We find correlations using *DIV_McK5* that are almost uniformly even closer to zero than with

8. We place all n = 127 S&P 500® firms with zero executive racial/ethnic diversity in the bottom quartile and only the bottom quartile; the n = 124 firms with the highest executive racial/ethnic diversity are in the top quartile.

DIV_McK8.[9]

- We evaluate five other measures of firm financial performance: sales growth, gross margin, return on assets (*ROA*), return on equity (*ROE*), and total shareholder return (*TSR*), all on an industry-adjusted basis. For each, we repeat the tests described above based on industry-adjusted EBIT margin. This yielded 40 non-independent χ-statistics or *t*-statistics testing the null hypothesis that there is no relation between firm financial performance and McKinsey's metric for executive racial/ethnic diversity in US S&P 500® firms. Of the 40 test statistics, 37 are insignificant, one is reliably positive and two are reliably negative.
- We highlight the fact that even if our results had agreed with those of McKinsey, McKinsey's interpretation of their results, namely that US publicly traded firms can deliver improved financial performance if they increase the racial/ethnic diversity of their executives, is flawed because their tests are structured so as to evaluate the opposite direction of causality, namely that higher firm financial performance leads to or causes greater executive racial/ethnic diversity.

In conclusion, our results indicate that despite the imprimatur often given to McKinsey's 2015, 2018, 2020, and 2023 studies, McKinsey's studies neither conceptually (in terms of the correct direction of causality) nor empirically (in terms of their set of large US public firms) support the argument that large US public firms can expect on average to deliver improved financial performance if they increase the racial/ethnic diversity of their executives.

Data and metrics

Firms and executives

We gathered data on the race, ethnicity, and other characteristics of all executives for all firms that were in the S&P 500® Index at 12/31/19.[10] We follow the website-disclosure approach of McKinsey (2015) by defining an executive as any individual who is publicly disclosed by a firm to be on its leadership team,

9. In their 2018 and 2020 studies, McKinsey uses the following five racial/ethnic groups for US-geography firms: White/European ancestry, Black/African ancestry, Latino/Hispanic of any race, Asian/Asian ancestry, and Other* including mixed race (McKinsey 2018, 37; McKinsey 2020, 49).

10. A full description of the executive characteristics that were coded is provided in the Appendix. Many of the reported items do not pertain to this study but may be relevant to other research questions and projects.

most often on the firm's website. In the infrequent cases in which we found no executives on the firm's website, we took a firm's executives to be the employees listed on the firm's Bloomberg or Yahoo! Finance profile page, else the firm's annual report, else we judged them from among the employees on its Comparably.com page.[11] Primarily from each firm's website, we then tracked down and, where present, captured in a screenshot the face photo of each executive, together with her or his first and last names.[12] The Appendix presents raw firm and executive data items for two example firms.

Table 1. Waterfall criteria applied in arriving at those S&P 500® firms that were publicly traded on US stock exchanges at 12/31/19 and for which at least one named executive was found on the firm's website, or the firm's Yahoo! Finance profile page, or the firm's Bloomberg profile page, or the firm's Annual Report, or on comparably.com

Step		Waterfall	
	1.	# firms in S&P 500® Index (SP) at 12/31/2019	500
less:	2.	# SP firms with no website or no executive/s on firm's website	(9)
plus:	3.	# firms of the n = 9 SP in Step 2 where ≥ 1 executive was found on Yahoo! Finance, Bloomberg, Annual Report, or comparably.com	6
	=	# SP firms with ≥ 1 named executive	497
less:	4.	# RS firms in the n = 497 above where no executive photo could be found	0
	=	# SP firms with ≥ 1 executive with a face photo	497

Notes: Executives are defined as employees whose names are disclosed on the firm's website as part of the firm's executive, leadership, and/or management teams, or in its set of officers.

Table 1 presents our data availability waterfall. Based on our definition of an executive and the availability of individual data items, we arrived at 497 S&P 500® firms for which we were able to identify at least one named executive. In Table 2 we present descriptive statistics on the industry composition and selected financial characteristics of our sample firms at the most recent fiscal year-end on or prior to 12/31/19. Panel A reveals that in terms of the Fama-French 12-industry classification, S&P 500® firms are spread out, being most concentrated in Finance (20 percent) and Business Equipment (17 percent) and least concentrated in Consumer Durables (2 percent) and Telephone and Television Transmission (2 percent).[13] Panels B and C present descriptive statistics on key firm financial

11. 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.

12. 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 screenshots of executives in a separate Word + PDF file for each firm.

13. McKinsey includes seven industries in their studies: Finance, Insurance, and Professional Services;

characteristics either at 12/31/19 or at the most recent fiscal year-end before 12/31/19, and show that S&P 500® firms are large from a capital market and accounting perspective and usually in strong financial positions.

Table 2. Descriptive statistics on the industry composition and selected firm financial characteristics at 12/31/19 or for the fiscal year ended on or before 12/31/19 for firms in the S&P 500® Index

Panel A. Fama-French industry

Fama-French 12 Industry:	#
Business Equipment	86
Chemicals and Allied Products	21
Consumer Durables	10
Consumer Nondurables	31
Finance	102
Healthcare, Medical Equipment, and Drugs	41
Manufacturing	45
Oil, Gas, and Coal Extraction and Products	22
Other	57
Telephone and Television Transmission	11
Utilities	30
Wholesale, Retail, and Some Services	44

Panel B. Firm financial characteristics ($ millions)

	5th pctile	Median	95th pctile
Market cap	$ 9,842	$ 20,646	$ 102,130
Total assets	$ 3,693	$ 22,684	$ 153,219
Total liabilities	$ 914	$ 14,563	$ 143,789
Total equity	$ 1,653	$ 6,732	$ 25,067
Revenue	$ 1,630	$ 6,611	$ 28,563
COGS	$ 438	$ 3,420	$ 17,342
R&D	$ 0	$ 0	$ 729
EBIT	$ 296	$ 1,395	$ 3,949
Net income	$ 175	$ 912	$ 3,050
CFOPS	$ 359	$ 1,697	$ 6,539
CAPEX	$ 0	$ 195	$ 3,218
TSR	-4%	31%	64%

Panel C. Annual financial performance over the years 2015–2019, both raw and Fama-French 12-industry median-adjusted

Raw: Not industry-adjusted	5th pctile	Median	95th pctile
EBIT margin %	3%	17%	45%
Revenue growth	-12%	6%	33%
Gross margin %	13%	42%	88%
ROA	-1%	5%	19%
ROE	-23%	14%	67%
TSR	-32%	12%	57%
Raw *less* median of FF12 Industry	5th pctile	Median	95th pctile
EBIT margin %	-17%	0%	23%
Revenue growth	-15%	0%	26%
Gross margin %	-28%	0%	39%
ROA	-8%	0%	11%
ROE	-37%	0%	49%
TSR	-38%	0%	41%

McKinsey's primary measure of firm financial performance is the firm's average annual EBIT margin less the national median EBIT margin for the firm's industry.[14] The annual periods that McKinsey uses in its averaging are 2010–2013

Heavy Industry; Healthcare and Pharmaceuticals; Telecom, Media, and Technology; Consumer Goods and Retail; Transportation, Logistics, and Tourism; and Energy and Basic Materials (e.g., McKinsey 2015, 2 n.1). We use the Fama-French 12-industry classification as a balance between McKinsey's seven industries on one end of the spectrum and the 83 2-digit Standard Industrial Classification (SIC) industry groups on the other end of the spectrum (setting aside the 416 3-digit SIC industry groups and 1,004 4-digit SIC industry groups).

14. There are three exceptions to McKinsey's focus on EBIT margin. First, in their 2018 and 2020 studies, McKinsey reports using average ROE for financial companies in place of EBIT margin. Second, in their

in their 2015 study, 2011–2015 in their 2018 study, and 2014–2018 in their 2020 study. We follow McKinsey by making EBIT margin our primary measure of firm performance, and defining annual financial data over 2015–2019 and industries according to Fama-French's 12-industry classification. However, as part of our subjecting McKinsey's approaches to critique and stress testing, we also compute and evaluate five other measures of raw and industry median-adjusted firm financial performance: revenue growth, gross margin, ROA, ROE, and TSR. In panel C of Table 2 we report the 5th, 50th, and 95th percentiles of each performance measure, noting that while industry median–adjusted firm financial performance is zero for all six measures, there is substantial variation across S&P 500® firms within each measure.

Table 3. Descriptive statistics on the key non–race/ethnicity characteristics of the named executives with a face photo as of mid-2020 in the set of firms in the S&P® 500 Index at 12/31/19

Panel A. Number of executives per S&P® 500 firm

	# execs	Min.	25%	Mean	75%	Max.
# executives per firm	7,246	2	9	14.6	17	79

Panel B. Executive gender

Male	Female	Total
5,533	1,713	7,246
76%	24%	100%

Panel C. Executives occupying Chief and Officer positions and executive presidential rank

Chief or Officer (outright or Co-) position	C-Label	#
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	CACO	84
Chief Diversity/Equity/Inclusion Officer	CDEIO	19

	Rank	#
Senior Executive Vice-President	SEVP	65
Executive Vice-President	EVP	1,686
Senior Vice-President	SVP	1,676
Vice-President	VP	1,162

Table 3 reports descriptive statistics for selected non-race/ethnicity characteristics of the 7,246 executives we identified in S&P 500® firms. Panel A indicates

2018 study, McKinsey reports the results of tests relating to executive and board member gender using economic profit margin defined as "Net Operating Profit Less Adjusted Taxes − [Invested Capital × Weighted Average Cost of Capital] ÷ Total Revenues" (McKinsey 2018, 5 n.3, 35). Since McKinsey uses and emphasizes EBIT margin in all three of their 2015, 2018, and 2020 studies, we conduct our stress tests using McKinsey's EBIT margin measure of firm financial performance.

that S&P 500® firms have on average 14.6 executives, and panel B shows that 76 percent (24 percent) of executives are male (female). Panel C presents the frequencies of different chief and officer-level positions. The most common executive positions are CEO, CFO, General Counsel, President, Corporate Secretary (often the same person as the General Counsel), Chief HR Officer, and COO. In terms of seniority, the most senior VP level (Senior EVPs plus EVPs) slightly outnumbers Senior VPs, who in turn outnumber VPs.

Executive judged race/ethnicity

In judging an executive's race/ethnicity, we follow McKinsey (2015) by visually studying each executive's photo and first and last names and classifying the executive into one of eight categories: African ancestry (aa), European ancestry (eur), Near Eastern (ne), East Asian (ea), South Asian (sa), Latino (lat), Native American (na), and Other (o). All race/ethnicity judgments were made by one coauthor. Because we stress test McKinsey's results in part by ascertaining the effects of shrinking the number of racial/ethnic categories, we also separately place executives into the five race/ethnicity categories used by the National Center for Educational Statistics' Integrated Postsecondary Education Data System (IPEDS). The five IPEDS race/ethnicity categories are American Indian/Alaska Native (aian), Asian/Pacific Islander (api), Black (b), Hispanic (h) and White (w), where given the allocation of Other (o) into Pacific Islander (pi) and Alaska Native (an), we set aian = na + an, api = ea + sa + pi, b = aa, h = lat, and w = eur + ne. The categories match closely with the race/ethnicity groups that McKinsey uses for the US firms in their 2018 and 2020 studies.

These methods enable us to judge the race/ethnicity of 6,931 of the 7,246 S&P 500® executives we identified as being in place in mid-2020. The top portion of Table 4 classifies executives by the eight racial/ethnic categories in McKinsey (2015), while the bottom portion classifies executives by the five IPEDS race/ethnicity categories. Of executives, 0.01 percent are American Indian or Alaska Natives, 2.8 percent are East Asian and 4.4 percent are South Asian (total Asian/Pacific Islander is 7.2 percent), 3.5 percent are African ancestry/Black non-Hispanic, 2.1 percent are Latino/Hispanic, and 1.4 percent are Near Eastern and 85.8 percent are European ancestry (total White non-Hispanic is 87.2 percent). While no approach outside of self-reported identification by each executive would achieve perfect accuracy, and no large database is likely to be completely accurate (and we make no representation of such), we undertook several cross-checks to do our best to obtain accurate assessments of executive race/ethnicity.[15]

15. These included the qualified assessment of an expert who is fluent in Spanish and deeply involved

Table 4. Numbers and densities of executives in S&P 500® firms at 12/31/19 classified into two sets of racial/ethnic (RAETH) categories

		Classification by ethnic & racial category per McKinsey (2015)								
Racial/ethnic category per McKinsey (2015)		Native American	Other	East Asian	South Asian	African ancestry	Latino	European ancestry	Near Eastern	
McKinsey racial/ethnic tag		na	=pi + an	ea	sa	aa	lat	eur	ne	Total
All Executives	#	0	1	191	302	246	149	5,944	98	6,931
RAED	%	0.0%	0.01%	2.8%	4.4%	3.5%	2.1%	85.8%	1.4%	100%

		Classification per National Center for Education Statistics' Integrated Post-Secondary Education System (NCES					
		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	6,042	6,931
% of all executives		0.01%	7.1%	3.5%	2.1%	87.2%	100%
CEO	#	0	23	6	9	463	501
	%	0.00%	4.6%	1.2%	1.8%	92.4%	100%
President	#	0	23	4	7	316	350
	%	0.00%	6.6%	1.1%	2.0%	90.3%	100%
CFO	#	0	22	6	6	447	481
	%	0.00%	4.6%	1.2%	1.2%	92.9%	100%
GC or CLO	#	0	18	33	7	379	437
	%	0.00%	4.1%	7.6%	1.6%	86.7%	100%
COO	#	0	8	4	4	150	166
	%	0.00%	4.8%	2.4%	2.4%	90.4%	100%
Corporate Secretary	#	0	12	14	3	200	229
	%	0.00%	5.2%	6.1%	1.3%	87.3%	100%
CHRO	#	0	12	25	5	205	247
	%	0.00%	4.9%	10.1%	2.0%	83.0%	100%
CIO	#	0	21	3	1	147	172
	%	0.00%	12.2%	1.7%	0.6%	85.5%	100%
CTO	#	0	25	1	2	89	117
	%	0.00%	21.4%	0.9%	1.7%	76.1%	100%
CMO	#	0	10	3	2	117	132
	%	0.00%	7.6%	2.3%	1.5%	88.6%	100%
Chief Accounting Officer	#	0	3	3	1	90	97
	%	0.00%	3.1%	3.1%	1.0%	92.8%	100%
CDO/CIO/CDIO/DIO	#	0	1	8	1	11	21
	%	0.00%	4.8%	38.1%	4.8%	52.4%	100%
SEVP or EVP	#	0	100	73	31	1,518	1,722
	%	0.00%	5.8%	4.2%	1.8%	88.2%	100%
SVP	#	0	119	56	63	1,358	1,596
	%	0.00%	7.5%	3.5%	3.9%	85.1%	100%
VP	#	0	65	33	17	918	1,033
	%	0.00%	6.3%	3.2%	1.6%	88.9%	100%

Notes: [1] Expanding on McKinsey (2015), we classified an executive's RAETH into one of nine categories by visually examining their photo and first and last names. All classifications were done by the same coauthor. The categories are as follows (RAETH tag in parentheses): African ancestry (aa), European ancestry (eur), Near Eastern (ne), East Asian (ea), South Asian (sa), Latino (lat), Native American (na, ai), Pacific Islander (pi) and Alaska Native (an). Following McKinsey (2015, 2), we then combined pi and an into the category Other (o) to arrive at McKinsey's (2015) eight RAETH categories. [2] We also created five RAETH supracategories to parallel those used in much of the historical data in the National Center for Educational Statistics' Integrated Postsecondary Education Data System (NCES IPEDS). With our tag for each, these categories (RAETH supracategory tag in parentheses) 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. The five IPEDS' RAETH supracategories closely match those used for US executives in McKinsey (2018; 2020).

in Latino culture for those executives where the uncertainty in classification lay in deciding between European and Latino. We did so because we found that classifying European versus Latino was the hardest to undertake.

McKinsey's executive racial/ethnic diversity metrics

McKinsey measures the racial/ethnic diversity of a firm's executives using an inverse normalized version of the Herfindahl-Hirschman Index (HHI) that they apply to the executives in the US + international sets of firms that they identified as being in place in 2014, 2017, and 2019. The Herfindahl-Hirschman Index is a standard measure of market concentration used to determine market competitiveness (**link**), such as before vs. after a merger or acquisition. Let $i = 1$ to N be mutually exclusive racial/ethnic groups into which an executive may be classified, and for any firm j let n_{ij} be the number of firm j's executives that are classified in racial/ethnic group i. Further letting the racial/ethnic density of racial/ethnic group i in firm j be given by $RAED_{ij} = \frac{n_{ij}}{\sum_{i=1}^{N} n_{ij}}$, McKinsey defines HHI_j as:

$$HHI_j = \sum_{i=1}^{N} RAED_{ij}^2 \qquad (1)$$

McKinsey then defines racial/ethnic diversity $NHHI_j$ for firm j on a normalized and inverse basis:[16]

$$NHHI_j = 1 - \frac{HHI_j - N^{-1}}{1 - N^{-1}} \qquad (2)$$

We follow McKinsey (2015) by using $N = 8$ racial/ethnic groups in our main tests, leaving the less differentiated $N = 5$ racial/ethnic groups for robustness tests.[17] We denote *NHHI* when calculated using $N = 8$ as *DIV_McK8*, and using $N = 5$ as *DIV_McK5*.

16. McKinsey defines *NHHI* per equation (2) in their 2018 and 2020 studies (2018, 37; 2020, 49). In their 2015 study, McKinsey defines $NHHI_j = \frac{HHI_j - N^{-1}}{1 - N^{-1}}$, that is, without applying an inverse by subtracting from one. McKinsey applies an inversion in their 2018 and 2020 studies in order that, per intuition, *NHHI* = 0 indicates a firm whose executives are all in the same racial/ethnic group, and $NHHI_j = 1$ indicates that firm j's executives are exactly equally spread out across the N racial/ethnic groups $s_{ij} = N^{-1}\ \forall\ i$. The result of this inversion is that *NHHI* in equation (2) is increasing in McKinsey's definition of the degree of racial/ethnic diversity in a firm's executives.

17. In their first study, McKinsey (2015, 2) states that $N = 7$, but in a footnote on the same page it says that "ethnic and racial categories used were African ancestry, European ancestry, Near Eastern, East Asian, South Asian, Latino, Native American, other" (McKinsey 2015, 2 n.2), which suggests that $N = 8$. In their later studies, McKinsey uses $N = 5$ for US firms (White/European ancestry, Black/African ancestry, Latino/Hispanic of any race, Asian/Asian ancestry including South Asian, and Other including mixed race; see McKinsey 2018, 37; McKinsey 2020, 49).

Table 5. Relations between McKinsey's inverse normalized Herfindahl-Hirschman metrics of the racial/ethnic diversity of a firm's executives *DIV_McK8* and *DIV_McK5* and the firm's average annual financial performance *FP* in McKinsey's 2015, 2018, and 2020 studies

Panel A. McKinsey's normalized Herfindahl-Hirschman measures of the racial/ethnic diversity of S&P 500® firms' executives (*DIV_McK8* and *DIV_McK5*)

	DIV_McK8	*DIV_McK5*
Min	0	0
5%	0	0
25%	0	0
50%	0.25	0.25
75%	0.39	0.40
95%	0.57	0.58
Max	0.83	0.86
# obs	497	497

	DIV_McK8	*DIV_McK5*
% = 1	0	0
% = 0	26%	28%
Std. dev of non-zero obs.	0.15	0.15

Panel B. Relations between McKinsey's inverse normalized Herfindahl-Hirschman metrics of the racial/ethnic diversity of a firm's executives *DIV_McK8* and *DIV_McK5* and the firm's average annual financial performance FP in McKinsey (2015; 2018; 2020)

	2015 study		**2018 study**		**2020 study**		**2015 study**	
McKinsey's results per McKinsey (2015 p.6; 2020, p.14)	FP = Firm's EBIT margin – FF_Ind Median EBIT margin		FP = Firm's EBIT margin – FF_Ind Median EBIT margin		FP = Firm's EBIT margin – FF_Ind Median EBIT margin		FP = Firm's EBIT margin – FF_Ind Median EBIT margin	
Statistic used to assess average *FP* in a given decile; *FP* data window	Mean p(*AMFP*)	*FP* over 2010-13	Mean p(*AMFP*)	*FP* over 2011-15	Mean p(*AMFP*)	*FP* over 2014-18	Mean p(*AMFP*)	*FP* over 2010-13
Q1 = lowest exec diversity quartile	43.0%	n = 91 firms per quartile	44.0%	n = 147 firms per quartile	43.0%	n = 133 firms per quartile	41.0%	n = 47 firms per quartile
Q2								
Q3								
Q4 = highest exec diversity quartile	58.0%		59.0%		59.0%		61.0%	
Q4 - Q1 (exact is rounded to 1 dp)	15.0%		15.0%		16.0%		20.0%	
z-stat(Q4 - Q1); 2-tailed p-value	2.0	0.04	2.6	0.01	2.6	0.01	2.0	0.05
Number of racial/ethnic categories	8 per *DIV_McK8*		5 per *DIV_McK5* *		5 per *DIV_McK5* *		8 per *DIV_McK8*	
* up to 5 racial/ethnic categories in each of 6 geographies.	Countries	# firms	Countries	# firms**	Countries	# firms***	Country	# firms
** estimated using geographic data on 2018 study p.36 applied to n = 589 firms.	US + CAN	186	US + CAN	194	US + CAN	164	US + CAN	186
*** estimated using geographic data on 2020 study p.11 applied to n = 533 firms.	UK	107	Asia/Pac	165	Asia/Pac	138		
	Latin Am	73	Europe	165	Europe	175		
			Latin Am	41	Latin Am	36		
			SS Africa	24	SS Africa	20		

Notes: *FP* is measured by EBIT margin. Above-median financial outperformance (*AMFP*) is defined as a firm's mean *FP* over the benchmark period used in the study less the median *FP* for the McKinsey-defined industry over the same period. p(*AMFP*) = 1 if *AMFP* > 0, else p(*AMFP*) = 0. Executive race/ethnicity judgments were made by McKinsey researchers during the year following the last year used in calculating annual *FP*. *DIV_McK8* uses the eight different racial/ethnic groups delineated in McKinsey (2015, 2), while *DIV_McK5* uses the five racial/ethnic groups delineated in McKinsey (2018, 37; 2020, 49). We assume that each quartile comprises the same number of firms (rounded down to the nearest one firm). *Source*: McKinsey (2020, 14; 2015, 6).

In panel A of Table 5 we report descriptive statistics on *DIV_McK8* and *DIV_McK5* for firms in the S&P 500® at 12/31/19.[18] The two distributions are similar, with an average of 27 percent of firms having executives entirely of one

18. McKinsey does not provide descriptive statistics of *DIV_McK8* in their studies that we can use for comparison.

race/ethnicity, and a standard deviation for non-zero observations of 0.15. No firm has a McKinsey diversity score equal to 1.0, indicating that no firm in the S&P 500® had an equal number of the eight narrow or five broader races/ethnicities required under *DIV_McK8* and *DIV_McK5* for maximum diversity as defined by McKinsey.

McKinsey's approach to measuring, analyzing, and evaluating the relations between executive racial/ethnic diversity and firm financial performance

McKinsey measures, analyzes, and evaluates the relations between the racial/ethnic diversity of firms' executive teams and firms' financial performance according to this sequence:

1. Rank the pertinent firms (e.g., all firms, or only US firms) by their $NHHI_j$ as defined in equation (2), with firms in the bottom executive race/ethnicity diversity quartile Q1 being those with the lowest $NHHI_j$ and firms in the top executive race/ethnicity diversity quartile Q4 being those with the highest $NHHI_j$.
2. In each of Q1 and Q4, calculate the "likelihood of financial outperformance" defined by McKinsey as the proportion of firms in a given quartile that have an EBIT margin above their national industry median EBIT margin.
3. Report the 2-tailed p-value on the z-statistic testing the null hypothesis that the difference in the likelihood of financial outperformance in Q4 versus Q1 is zero.[19]
4. Present the percentage by which the likelihood of financial outperformance in Q4 exceeds the likelihood of financial outperformance in Q1. As an example, in Exhibit 1 of McKinsey's 2018 study the likelihoods of financial outperformance are shown as 44 percent for Q1 and 59 percent for Q4. While McKinsey reports a p-value < 0.05 on the difference of 15% = 59% − 44%, what they emphasize is not the 15%, but the 33% that is 15% ÷ 44% (McKinsey 2018, 8).

19. McKinsey does not report what type of statistic underlies their inferences. We assume that McKinsey is calculating a z-statistic testing a difference in proportions, namely in this situation the difference in the likelihood of financial outperformance in Q4 versus Q1. McKinsey does not report whether their p-values are one-tailed or two-tailed. Based on our calculations using their Exhibit 7 results (McKinsey 2020, 20), we believe McKinsey's p-values are two-tailed.

Results

McKinsey's results as reported in their 2015, 2018, and 2020 studies

In each of their 2015, 2018, and 2020 studies, McKinsey reports finding a statistically significant positive relation between the industry-adjusted EBIT margin in their global samples of large public firms and the racial/ethnic diversity of the firms' executive teams. In panel B of Table 5, we tabulate McKinsey's results on financial outperformance, which we denote as above-median financial performance (*AMFP*), and the likelihood of financial outperformance, which we denote p(*AMFP*), in top *NHHI*-ranked quartile Q4 firms versus bottom *NHHI*-ranked quartile Q1 firms, based on Exhibit 6 of McKinsey's 2015 study and Exhibit 7 of McKinsey's 2020 study.

Columns 2–4 of panel B of Table 5 report McKinsey's results for the global samples of large public firms used in their studies. For example, in their 2015 study, McKinsey reports that in their full set of global firms, 58 percent of Q4 firms had above-median financial outperformance compared to 43 percent of Q1 firms. We report the 15 percent difference between Q4 and Q1; the z-statistic of 2.0 on the difference of 15 percent, assuming there are $n = 91$ firms in each of Q1 and Q4; and the 2-tailed p-value of 0.04 on the z-statistic of 2.0. In column 5 we also report the results that McKinsey presents for just the US in their 2015 study, since our interest is in US S&P 500® firms.[20]

In all four of columns 2–5, McKinsey's results consistently indicate that for the firms in their samples of large public companies, there is a statistically significant higher likelihood of financial outperformance in top *NHHI*-ranked quartile firms than in bottom *NHHI*-ranked quartile firms. Specifically, the z-statistics on the differences between the means of p(*AMFP*) in Q4 versus Q1 are 2.0, 2.6, and 2.6 in McKinsey's 2015, 2018, and 2020 studies that use all McKinsey's pooled samples of global public firms (number of observations = 366, 589, and 533, and p-values = 0.04, 0.01, and 0.01, respectively), and 2.0 in McKinsey's 2015 study that uses only McKinsey's sample of US plus Canadian public firms (number of observations = 186, p-value = 0.05).

20. In Tables 5 and 6, means and z-statistics are reported to the nearest first decimal place and p-values to the nearest second decimal place. Because, however, the underlying calculations are based on exact figures without any rounding, the reported means, z-statistics, and p-values may differ slightly from their actual calculated values.

Our results for the firms in the S&P 500® Index at 12/31/19

In panel A of Table 6 we present the results of applying McKinsey's approach to the firms in the S&P 500® Index at 12/31/19, and in panels B and C we report the results of expanding our analysis beyond McKinsey's in several ways. The key takeaway from Table 6 is that, in contrast to McKinsey's results, we do not find a statistically significant positive correlation between McKinsey's measures of the racial/ethnic diversity of the executive teams of firms in the S&P 500® Index at 12/31/19 and either the likelihood of financial outperformance over 2015–2019 or financial outperformance per se over 2015–2019.

Table 6. Comparison of the results reported by McKinsey in its 2015 study and our quasi-replication using S&P 500® firms as of 12/31/19, McKinsey's inverse normalized Herfindahl-Hirschman measures of the racial/ethnic diversity of the S&P 500® firms' executives (*DIV_McK8* and *DIV_McK5*), and S&P 500® firms' annual financial performance *FP* over 2015–2019, measured in six ways: EBIT margin as % of revenues, revenue growth, gross margin as % of revenues, return on assets (ROA), return on equity (ROE), and total shareholder return (TSR)

Panel A. Comparison of McKinsey's 2015 study results (left-hand side, green) with our results for S&P 500® firms based on the use of eight racial/ethnic categories in calculating McKinsey's inverse normalized Herfindahl-Hirschman diversity metric *DIV_McK8* (middle, dark blue) and the use of five racial/ethnic categories in calculating McKinsey's inverse normalized Herfindahl-Hirschman diversity metric *DIV_McK5* (right-hand side, pink)

2015 study

McKinsey's results per McKinsey (2015 p.6; 2020, p.14)	FP = Firm's EBIT margin – FF_Ind Median EBIT margin	
Statistic used to assess average *FP* in a given decile; *FP* data window	Mean p(*AMFP*)	*FP* over 2010-13
Q1 = lowest exec diversity quartile	**41.0%**	n = 47 firms per quartile
Q2		
Q3		
Q4 = highest exec diversity quartile	**61.0%**	
Q4 - Q1 (exact is rounded to 1 dp)	**20.0%**	
z-stat(Q4 - Q1); 2-tailed p-value	**2.0**	0.05
Number of racial/ethnic categories	8 per *DIV_McK8*	
* up to 5 racial/ethnic categories in each of 6 geographies.	Country	# firms
** estimated using geographic data on 2018 study p.36 applied to n = 589 firms.	US + CAN	186
*** estimated using geographic data on 2020 study p.11 applied to n = 533 firms.		

Our results using *DIV_McK8*	FP = Firm's EBIT margin – FF12_Ind Median EBIT margin	
Statistic used to assess average *FP* in a given decile; *FP* data window	Mean p(*AMFP*)	FP over 2015-19
Q1 = lowest exec diversity quartile	**51.2%**	n = 124 firms per quartile
Q2		
Q3		
Q4 = highest exec diversity quartile	**54.0%**	
Q4 - Q1 (exact is rounded to 1 dp)	**2.9%**	
z-stat(Q4 - Q1); t-stat(Q4 - Q1)	**0.5**	0.65
		# firms 497

Our results using *DIV_McK5*	FP = Firm's EBIT margin – FF12_Ind Median EBIT margin	
Statistic used to assess average *FP* in a given decile; *FP* data window	Mean p(*AMFP*)	FP over 2015-19
Q1 = lowest exec diversity quartile	**52.5%**	n = 124 firms per quartile
Q2		
Q3		
Q4 = highest exec diversity quartile	**51.3%**	
Q4 - Q1 (exact is rounded to 1 dp)	**-1.2%**	
z-stat(Q4 - Q1); t-stat(Q4 - Q1)	**-0.2**	0.84
		# firms 497

Table 6 (cont'd). *Panel B*. Full results for S&P 500® firms covering multiple measures of firm financial performance, based on the use of eight racial/ethnic categories in calculating McKinsey's inverse normalized Herfindahl-Hirschman diversity metric *DIV_McK8*

	Column 2		Column 3		Column 4		Column 5		Column 6		Column 7		Column 8	
Our results using *DIV_McK8* (usually n = 124 per Quartile)	FP = Firm's EBIT margin – FF12_Ind Median EBIT margin		*FP* = Firm's Rev growth – FF12_Ind Median Rev growth		*FP* = Firm's GM% – FF12_Ind Median Gross margin %		*FP* = Firm's ROA – FF12_Ind Median ROA		*FP* = Firm's ROE – FF12_Ind Median ROE		*FP* = Firm's TSR – FF12_Ind Median TSR		Average across all 6 *FP* measures	
Statistic used to assess average *FP* in a given decile; *FP* data window	Mean p(*AMFP*)	Mean *AMFP*	Mean p(*AMFP*)	Mean *AMFP*	Mean p(*AMFP*)	Mean *AMFP*	Mean p(*AMFP*)	Mean *AMFP*	Mean p(*AMFP*)	Mean *AMFP*	Mean p(*AMFP*)	Mean *AMFP*	Mean p(*AMFP*)	Mean *AMFP*
Q1 = lowest exec diversity quartile	**51.2%**	0.8%	52.0%	1.3%	44.1%	1.1%	52.8%	1.4%	52.0%	1.0%	52.0%	1.8%	50.7%	1.2%
Q2	45.5%	1.1%	55.3%	2.1%	52.8%	2.7%	48.8%	-0.1%	44.7%	-0.7%	49.6%	-0.3%	49.5%	0.8%
Q3	49.6%	0.4%	56.9%	1.0%	43.1%	-1.1%	43.1%	0.2%	52.0%	0.6%	51.2%	-0.2%	49.3%	0.2%
Q4 = highest exec diversity quartile	**54.0%**	1.9%	43.5%	0.1%	54.0%	2.1%	52.4%	1.2%	56.5%	5.6%	56.5%	0.8%	52.8%	1.9%
Q4 - Q1 (exact is rounded to 1 dp)	**2.9%**	1.1%	-8.4%	-1.2%	9.9%	1.1%	-0.3%	-0.3%	4.5%	4.5%	4.5%	-1.0%	2.2%	0.7%
z-stat(Q4 - Q1); t-stat(Q4 - Q1)	**0.5**	0.9	-1.3	-1.4	1.6	0.5	-0.1	-0.4	0.7	**2.1**	0.7	-0.7	0.3	0.4
Pearson_correlation(*DIV_McK8* , *FP*)	0.02	0.02	-0.07	-0.07	0.07	0.00	-0.02	-0.02	0.04	0.08	0.06	-0.03	0.02	0.00
t-stat(Pearson correlation)	0.5	0.5	-1.5	-1.5	1.6	0.0	-0.5	-0.4	0.9	1.7	1.3	-0.6	0.4	0.0

Panel C. Full results for S&P 500® firms covering multiple measures of firm financial performance, based on the use of five racial/ethnic categories in calculating McKinsey's inverse normalized Herfindahl-Hirschman diversity metric *DIV_McK5*

	Column 2		Column 3		Column 4		Column 5		Column 6		Column 7		Column 8	
Our results using *DIV_McK5* (usually n = 124 per Quartile)	FP = Firm's EBIT margin – FF12_Ind Median EBIT margin		*FP* = Firm's Rev growth – FF12_Ind Median Rev growth		*FP* = Firm's GM% – FF12_Ind Median Gross margin %		*FP* = Firm's ROA – FF12_Ind Median ROA		*FP* = Firm's ROE – FF12_Ind Median ROE		*FP* = Firm's TSR – FF12_Ind Median TSR		Average across all 6 *FP* measures	
Statistic used to assess average *FP* in a given decile; *FP* data window	Mean p(*AMFP*)	Mean *AMFP*	Mean p(*AMFP*)	Mean *AMFP*	Mean p(*AMFP*)	Mean *AMFP*	Mean p(*AMFP*)	Mean *AMFP*	Mean p(*AMFP*)	Mean *AMFP*	Mean p(*AMFP*)	Mean *AMFP*	Mean p(*AMFP*)	Mean *AMFP*
Q1 = lowest exec diversity quartile	**52.5%**	1.4%	52.5%	1.5%	47.5%	2.3%	51.8%	1.4%	52.5%	0.6%	52.5%	1.6%	51.5%	1.5%
Q2	48.3%	1.2%	55.9%	1.8%	52.5%	2.4%	50.8%	0.1%	45.8%	-0.1%	47.5%	0.1%	50.1%	0.9%
Q3	47.9%	-0.1%	59.7%	1.5%	45.4%	-0.1%	46.2%	0.4%	54.6%	2.5%	56.3%	0.5%	51.7%	0.8%
Q4 = highest exec diversity quartile	**51.3%**	1.5%	39.5%	-0.3%	48.7%	0.0%	47.9%	0.7%	52.1%	3.6%	52.9%	-0.3%	48.7%	0.9%
Q4 - Q1 (exact is rounded to 1 dp)	**-1.2%**	0.1%	-13.0%	-1.8%	1.2%	-2.3%	-3.9%	-0.7%	-0.4%	3.0%	0.5%	-2.0%	-2.8%	-0.6%
z-stat(Q4 - Q1); t-stat(Q4 - Q1)	**-0.2**	0.1	**-2.1**	**-2.0**	0.2	-1.0	-0.6	-1.0	-0.1	1.4	0.1	-1.4	-0.4	-0.5
Pearson_correlation(*DIV_McK5* , *FP*)	-0.01	-0.01	-0.08	-0.07	0.02	-0.04	-0.03	-0.03	0.02	0.06	0.04	-0.04	-0.01	-0.02
t-stat(Pearson correlation)	-0.2	-0.2	-1.8	-1.6	0.5	-0.9	-0.7	-0.8	0.4	1.3	0.9	-1.0	-0.1	-0.5

Notes: Above-median financial outperformance (*AMFP*) is defined as a firm's mean *FP* over the period 2015–2019 less the median Fama-French 12-industry *FP* over 2015–2019. The likelihood of above-median financial performance = p(*AMFP*) is set to 1 if *AMFP* > 0, else p(*AMFP*) = 0. Executive race/ethnicity judgments were made by the same coauthor during May–August 2020 as described in the section "Executive judged race/ethnicity." *DIV_McK8* uses the eight different racial/ethnic groups delineated in McKinsey (2015, 2), while *DIV_McK5* uses the five racial/ethnic groups delineated in McKinsey (2018, 37; 2020, 49).

Our results in Table 6 that are most directly comparable to McKinsey's are shown in panel A. On the left-hand side of panel A we show McKinsey's 2015 results per the far right-hand column of Table 5, panel B. In the middle and right-hand side of Table 6, panel A, we present for comparison our results based on the use of McKinsey's executive racial/ethnic diversity metrics *DIV_McK8* and *DIV_McK5*, respectively. We propose that these results are comparable because each set of firms consists of large US public companies (n = 186 McKinsey US firms vs. n = 497 S&P 500® firms) for which financial performance is measured reasonably after the Great Recession (2010–2013 for McKinsey's US firms vs. 2015–2019 for our S&P 500® firms). However, in sharp contrast to McKinsey's results in the left-hand side of Table 6, panel A, in the middle of this panel we show that only 54.0 percent of the S&P 500® firms that are in the top quartile Q4 of McKinsey's 2015 executive racial/ethnic diversity metric *DIV_McK8* have a positive industry-adjusted EBIT margin, vs. 51.2 percent in the bottom *DIV_McK8* quartile Q1.[21] The z-statistic on the difference of 2.8 percent is a not statistically significant 0.5 (p-value = 0.65).

Also in sharp contrast to McKinsey's results in the left-hand side of panel A of Table 6, in the right-hand side of the panel we find that only 51.3 percent of the S&P 500® firms that are in the top quartile Q4 of McKinsey's 2015 executive racial/ethnic diversity metric *DIV_McK5* have a positive industry-adjusted EBIT margin, vs. 52.5 percent in the bottom *DIV_McK5* quartile Q1. The z-statistic on the difference of −1.2 percent is a not statistically significant −0.2.

Because the results of our quasi-replication contradict those reported by McKinsey in their 2015, 2018, and 2020 studies, we expand our tests in five ways to assess the robustness of our inference. First, in Table 6, panel B, column 2, we report the mean p(*AMFP*) for *DIV_McK8* quartiles Q2 and Q3. If greater executive racial/ethnic diversity is positively associated with industry-adjusted EBIT margin, it should be that the mean p(*AMFP*) in Q1 < mean p(*AMFP*) Q2 < mean p(*AMFP*) Q3 < mean p(*AMFP*) Q4. However, the mean p(*AMFP*) figures for Q2 and Q3 do not support this prediction. Thus, the z-statistic on the difference of −5.7 percent between the mean p(*AMFP*) in Q2 and Q1 is −0.9 (p-value = 0.37). Second, we extend beyond the probability of financial outperformance per se and compare the mean levels of industry-adjusted EBIT margin in Q4 vs. Q1. Here too, however, we find a not statistically significant difference: the mean industry-adjusted EBIT margin for Q4 is 1.9 percent vs. 0.8 percent in Q1, and the t-statistic on the 1.1 percent difference in means is 0.9 (p-value = 0.37). Third, using the data in all four quartiles but in a continuous and unranked manner,

21. All n = 127 S&P 500® firms with zero executive racial/ethnic diversity are in the bottom quartile, and the n = 124 firms with the highest executive racial/ethnic diversity are in the top quartile.

we find that executive racial/ethnic diversity is uncorrelated with the likelihood that a firm's industry-adjusted EBIT margin is positive (Pearson correlation coefficient = 0.02, *t*-statistic = 0.5), and with the firm's industry-adjusted EBIT margin (Pearson correlation = 0.02, *t*-statistic = 0.5).

Fourth, since in their 2018 and 2020 studies McKinsey use five rather than eight racial/ethnic groups to measure US executive racial/ethnic diversity, in column 2 of Table 6, panel C, we repeat our tests from column 2 of Table 6, panel B, using *DIV_McK5* instead of *DIV_McK8*. We find *z*-statistics and correlations using *DIV_McK5* that are even closer to zero than those found using eight racial/ethnic groups. Fifth, in panels A and B of Figure 3 we present the scatterplots and univariate regression lines for *DIV_McK8* (*y*-axis) vs. *AMPF* (*x*-axis), and *DIV_McK5* vs. *AMPF*, respectively. The scatterplots do not reveal any outliers,

Figure 3. Scatterplots of the relations between McKinsey's inverse normalized Herfindahl-Hirschman measures of the racial/ethnic diversity of S&P 500® firms' executives *DIV_McK8* (panel A) and *DIV_McK5* (panel B) and above-median financial outperformance (*AMFP*) defined as average EBIT margin over 2015–2019 less the median Fama-French 12-industry firm performance over 2015–2019

Panel A. Above-median financial outperformance (*AMFP*, y-axis) vs. Executive diversity using eight races/ethnicities (*DIV_McK8*, x-axis), with univariate OLS regression line

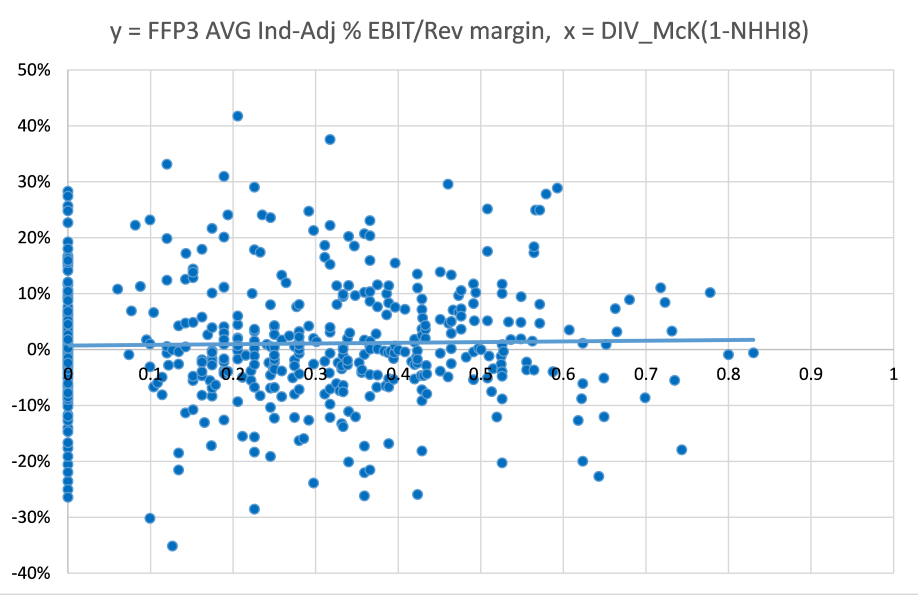
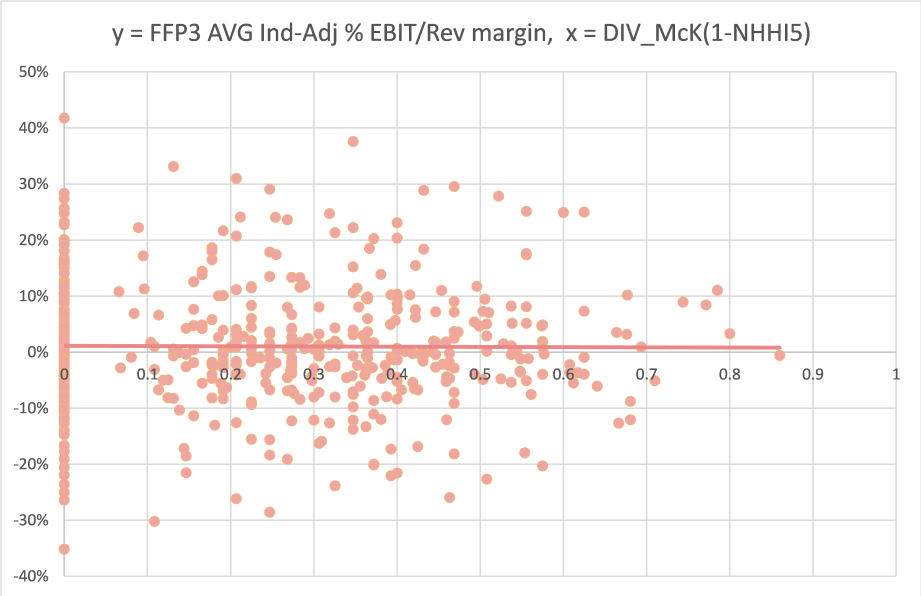


Figure 3 (cont'd). *Panel B.* Above-median financial outperformance (*AMFP*, y-axis) vs. Executive diversity using five races/ethnicities (*DIV_McK5*, x-axis), with univariate OLS regression line



Notes: *DIV_McK8* uses the eight different racial/ethnic groups delineated in McKinsey (2015, 2), while *DIV_McK5* uses the five racial/ethnic groups delineated in McKinsey (2018, 37; 2020, 49).

and the univariate regression lines appear visually sound and robust. Sixth, in columns 3–7 of Table 6, panels B and C, we examine five additional measures of firm financial performance: sales growth, gross margin, ROA, ROE, and TSR, all on an industry-adjusted basis. For each, we repeat the tests done for industry-adjusted EBIT margin. This yields 40 non-independent z-statistics or t-statistics testing the null hypothesis that there is no relation between firm financial performance and McKinsey's metric for executive racial/ethnic diversity in US S&P 500® firms. We find that 37 of the 40 test statistics are insignificant, one is reliably positive, and two reliably negative.

Lastly, in column 8 of panels B and C we calculate the simple average of the corresponding cells in columns 2–7. Once again, we find no evidence of any statistically significant positive relations between the financial performance of S&P 500® firms and McKinsey's measures of the racial/ethnic diversity of their executives.

The totality of the results we report in Table 6 suggest that despite the imprimatur given to McKinsey's (2015; 2018; 2020) studies, substantial caution is warranted in relying on their findings to support the view that US publicly traded firms can deliver improved financial performance if they increase the racial/ethnic

diversity of their executives. Hewing closely to McKinsey's approach using a sample of large US public firms, in our quasi-replication we do not find evidence that is consistent with McKinsey's results for firms that were in the US S&P 500® at 12/31/19, using average annual financial performance over 2015–2019 and executive race/ethnicity measured in mid-2020.

Discussion

In this section we provide additional critiques of McKinsey's studies. We first appraise McKinsey's inverse normalized Herfindahl-Hirschman measure of racial/ethnic diversity, highlighting its strengths and weaknesses. We then discuss McKinsey's views of what the positive correlations it reports between executive racial/ethnic diversity and firm financial performance say about causality. Lastly, we report on work that has sought to carefully identify and measure the presence, sign, and magnitude of causal relations between executive racial/ethnic diversity and firm financial performance.

Strengths and weaknesses of McKinsey's measure of executive team diversity

Despite its careful, albeit varied, delineation in academic research (e.g., Williams and O'Reilly 1998; Harrison and Klein 2007; Lu, Naik, and Teo 2024), the word *diversity* is rarely defined in a careful manner in either the business or common vernacular. In contrast, a strength of McKinsey's studies is that McKinsey clearly and algebraically defines their diversity measure in all three of their 2015, 2018, and 2020 reports. This feature notwithstanding, McKinsey's *HNNI* inverse normalized Herfindahl-Hirschman definition of executive racial/ethnic diversity has three weaknesses.

First, McKinsey's *HNNI* diversity metric is maximized when there are equal numbers or densities of executives from all N races/ethnicities in a given firm. This is problematic because neither the US population nor the US labor force contains equal numbers of each race/ethnicity. From a real-world point of view, McKinsey's measure of executive racial/ethnic diversity can therefore likely only be at its maximum in a subset of US firms, not in all US firms.

Second, McKinsey's measure of executive racial/ethnic diversity yields the result that any set of executive racial/ethnic densities (RAEDs) that differs from equal densities is less diverse than one with equal densities. We suggest that this runs counter to the intuition that a firm whose executive RAEDs are equal to those of the US population is more racially/ethnically diverse than a firm whose

executive RAEDs are equal across all races/ethnicities.[22]

Third, McKinsey's diversity metric yields what we propose is the counterintuitive outcome that firm ABC that has the same executive racial/ethnic densities of the US population is as equally diverse as firm XYZ that has the same race/ethnicity densities as the US population except that the race/ethnicity densities are spread out "oppositely" or in some other way different from those of the US population. For example, the 2019 US population RAEDs are American Indian/Alaska Native = 1.0%, Asian/Pacific Islander = 6.4%, Black = 13.0%, Hispanic = 18.5%, and White = 61.2% (Green and Hand 2021, appendix C). One can readily calculate that *HNNI*_(aian, api, b, h, w) = *HNNI*_(1.0%, 6.4%, 13.0%, 18.5%, 61.2%) = 0.77 = *HNNI*_(61.2%, 18.5%, 13.0%, 6.4%, 1.0%) = *HNNI*_(6.4%, 18.5%, 61.2%, 13.0%, 1.0%). However, we propose that it is unlikely that most business leaders and employees will view a firm whose executive team is 61.2% American Indian/Alaska Native, 18.5% Asian/Pacific Islander, 13.0% Black, 6.4% Hispanic and 1.0% White (exactly the inverse of the 2019 US population RAED percentages) to be as equally racially/ethnically diverse as a firm whose executive team is 1.0% American Indian/Alaska Native, 6.4% Asian/Pacific Islander, 13.0% Black, 18.5% Hispanic and 61.2% White (the 2019 US population RAEDs).

Causality: Testing for the presence, sign, and magnitude of causal relations between executive racial/ethnic diversity and firm financial performance

Given the business and societal importance of determining whether greater racial/ethnic diversity in corporate executives does or does not cause or drive higher firm financial performance in a statistically reliable way, we believe it is crucial to highlight that even if our results had agreed with McKinsey's, McKinsey's interpretation of their results, namely that US publicly traded firms can deliver improved financial performance if they increase the racial/ethnic diversity of their executives, is flawed because their tests are structured so as to evaluate the exact opposite direction of causality, namely that higher firm financial performance leads to greater executive racial/ethnic diversity. McKinsey measures firm financial performance over the four or five years leading up to the year in which they measure the race/ethnicity of the firm's executives, making the default direction

22. While executive RAEDs that are equal to the US population are more representative of the US population, they might still be seen by some as less diverse than RAEDs that are equal across all *N* races/ethnicities. Such ambiguities and differences are unfortunately inevitable when there is not a uniquely accepted definition of racial/ethnic diversity.

of causality captured in their correlations that of better firm financial performance causing companies to diversify the racial/ethnic composition of their executives, not the reverse. In this regard, we make three points.

First, McKinsey notes the reverse causal nature of their tests. In all three of their studies, McKinsey states that their positive relation between executive racial/ethnic diversity and EBIT margin is a correlation, and not a causal link that shows that higher racial/ethnic diversity of executives causes higher firm financial performance.[23] McKinsey also notes that better firm financial performance may lead companies to diversify as defined by their measures of diversity.[24]

Second, despite this, McKinsey has not emphasized the nature of their tests in their public statements concerning their 2015, 2018, 2020, and 2023 studies. They have also not sought to estimate the directionally correct causal relations between their measures of diversity in executive race/ethnicity and firm financial performance, instead arguing, "As with many levers of business performance, particularly at such a high level, this [a causal link] would be challenging to demonstrate, likely requiring detailed longitudinal studies" (2020, 51).[25]

Third, the longitudinal and causally oriented analyses that McKinsey has not done have nevertheless been done, in our work with Sekou Bermiss, for S&P 500® firms (Bermiss, Green, and Hand 2024). That study gathered data on the race/ethnicity of the individuals defined to be executives of S&P 500® firms on the leadership pages of these firms' websites as of mid-2011, 2014, 2017, 2020, and 2021. The study then empirically assessed whether any of nine different measures of executives' racial/ethnic diversity reliably predict cross-sectional variation in any of six measures of firm financial performance over the next fiscal year and find that they do not, neither over the full 11-year span of the data, nor in the period of America's 'awakening' to systemic racism after the George Floyd murder in 2020.

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23. "The relationship between diversity and performance highlighted in the research is a correlation, not a causal link" (2015, 1); "correlation does not prove that the relationship is causal" (2015, 3); "correlation does not demonstrate causation" (2018, 2); "the same caveats apply to the correlation analyses reported here as did in *Why Diversity Matters*: correlation is not causation" (2018, 5). Very similar statements to those from McKinsey's 2018 study are included in their 2020 study. At the same time, however, the titles of McKinsey's studies imply in their wordings that they are taking a causal view of the evidence they present: thus, "Diversity Matters" (2015), "Delivering Through Diversity" (2018) and "Diversity Wins: How Inclusion Matters."

24. "It is theoretically possible that the better financial outperformance enables companies to achieve greater levels of diversity. Companies that perform well financially may choose to deploy more of their resources toward more advanced talent strategies, thus allowing them to attract more diverse talent, for example" (2018, 39).

25. We approached McKinsey and asked if they would share their data with us so that we could undertake a longitudinal analysis of it. They declined, citing internal policies pertaining to not releasing data that would relate to clients. The severity of this stricture meant that McKinsey would not release to us even the names of the firms in their datasets.

Of the total of 270 estimated coefficients on the nine measures of executive racial/ethnic diversity across the six measures of 1-year-ahead firm financial performance over the years 2012, 2015, 2018, 2021, and 2022, the study finds that just under 4 percent are significantly non-zero at a 2-tailed level of a *p*-value = 0.05. As such, the results of Bermiss, Green, and Hand (2024) suggest that in contrast to the titles of McKinsey's 2015 ("Diversity Matters"), 2018 ("Delivering through Diversity"), 2020 ("Diversity Wins: How Inclusion Matters") and 2023 ("Diversity Matters Even More: The Case for Holistic Impact") studies, greater racial/ethnic diversity in the executives of large US public companies does not "matter, deliver, or win," in the specific sense that greater racial/ethnic diversity in the executives of large US public companies does not on average correlate in a statistically reliable way with higher one-year-ahead firm financial performance.

Caveats

As with any study, our research comes with several caveats. First, our sole focus is on US firms. We therefore make no comments regarding McKinsey's findings on non-US firms. Second, S&P 500® firms are not a random sample of US publicly traded firms. Our results should therefore not be assumed to automatically generalize to the population of US publicly traded firms. Third, because we do not undertake in-depth biographical analysis, our method of identifying executive race/ethnicity is likely to undercount non-Whites and overcount Whites, primarily because non-White individuals' faces and/or names can sometimes appear similar to European faces and/or names, and vice-versa. While we do not believe this is likely to lead to biases in the inferences we make in our study, executive-specific information from List Service Direct Inc. (LSDI) could be used to augment our current face-plus-names approach to judging race/ethnicity. LSDI uses a person's name(s) to estimate their race/ethnicity. The strength of LSDI's approach is that it provides likely less-biased identification of Hispanics. However, the weakness of LSDI's approach is that it focuses solely on name-based information and thus sets entirely aside the value of face-based information.[26]

26. We do not adjust any other visually identified races/ethnicities using LSDI data for two reasons. First, in Green and Hand (2021) we used CEO and CFO data from Crist | Kolder Associates that allowed us to cross-check the accuracy of the visual identification method. We found that the visual identification method, which we also use in this paper, identified API and Black executives in a fairly accurate manner. Second, because many Black and White names are not distinguishable, LSDI under-identifies (over-identifies) the number of Black (White) individuals (Brochet et al. 2019; Flam et al. 2023).

Conclusions

In a series of studies that are highly influential in the business world, McKinsey (2015; 2018; 2020; 2023) report finding statistically significant positive relations between the industry-adjusted EBIT margin of global samples of large public firms and the racial/ethnic diversity of their executives. However, when we conduct a quasi-replication of McKinsey's tests using data for US S&P 500® firms as of 12/31/19, we find a not statistically significant relations between McKinsey's measures of executive racial/ethnic diversity and not only industry-adjusted EBIT margin, but also industry-adjusted sales growth, gross margin, return on assets, return on equity, and total shareholder return.

Our findings lead us to two main conclusions and an emphasis. First, we conclude that caution is warranted in relying on McKinsey's findings to support the view that US publicly traded firms can deliver improved financial performance if they increase the racial/ethnic diversity of their executives—not only because we are unable to replicate the same statistically reliable association between firm financial performance and executive race/ethnic diversity as they report, but also because the structure of McKinsey's tests are such that by measuring firm financial performance over the four or five years leading up to the year in which they judge the race/ethnicity of firms' executives, the default direction of causality that McKinsey capture in the positive correlation they report is that better firm financial performance causes firms to diversify the racial/ethnic composition of their executives, not the reverse.

Second, we conclude that in light of the prominence of the connections between firm financial performance and the racial/ethnic composition of their employees, not just in the US but around the world, there is great value in future research that would seek to empirically test for the presence, sign, magnitude, and direction of any causal relations that exist. Such longitudinal and causality-oriented studies may also help bring into sharper focus the identities and sizes of the costs and benefits, as well as the risks and returns, that are associated with higher or lower racial/ethnic diversity, not only in firms' executives, but in their Boards of Directors and rank-and-file employees. In this regard, we believe that our own work, published in a separate paper to this (Bermiss, Green, and Hand 2024), represents a useful beginning.

Lastly, we emphasize that in light of the challenging nature of matters to do with race/ethnicity in the US, our findings, like those of McKinsey, are limited. While our results do speak to the lack of robustness of McKinsey's studies vis-à-vis large public US firms, they do not speak to the connections between racial/ethnic diversity in employees and/or boards and either firm financial performance or non-financial firm goals, nor to intrafirm activities. Nor do they speak to any

social or moral contributions that racial/ethnic diversity in US executives provides. Such research is worthwhile and important, and we hope that it will be undertaken and well so by business scholars.

Data and code

While EJW has a policy of making data and code immediately available (as stated **here**), EJW has agreed to letting us depart from that policy here; we are not posting our data and code just yet because the data constitute an excerpt of research that is currently in progress. However, at this time, data and code may be available from the corresponding author (John Hand) upon reasonable request. Furthermore, we commit to posting the data and code by 31 December 2026.

Appendix

This appendix presents screenshots of the raw firm and executive data items for two example firms in the S&P 500® dataset, along with an explanation of what each data item means, how it was collected, and how it was coded. Not all the data items shown in Figure A1 and Figure A2 are used in this study.

Figure A1. Items 1–19

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
SP Firm ID	SP Company Name	SP Webpg 1	SP Webpg 2	SP Webpg 3	SP Webpg 4	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	SP Photo Source	Gender
1	CITRIX SYSTEMS INC	About Us	Executives			1	Henshall	David	J	CEO	President	CEO-PRES				y	Website	m
1	CITRIX SYSTEMS INC					2	Shenkman	Arlen		CFO		Finance	EVP	EVP		y	Website	m
1	CITRIX SYSTEMS INC					3	Gomes	Tony		GC		Legal	EVP	EVP		y	Website	m
1	CITRIX SYSTEMS INC					4	Ferrer	Mark		Chief Revenue Officer		Revenue	EVP	EVP		y	Website	m
1	CITRIX SYSTEMS INC					5	Hough	PJ		Chief Product Officer		Product	EVP	EVP		y	Website	m
1	CITRIX SYSTEMS INC					6	Kimmel	Donna		Chief People Officer		HR	EVP	EVP		y	Website	f
1	CITRIX SYSTEMS INC					7	Minahan	Tim		Chief Marketing Officer		Marketing	EVP	EVP	Business St	y	Website	m
1	CITRIX SYSTEMS INC					8	Schmitz	Mark	J	COO		Operations	EVP	EVP		y	Website	m
1	CITRIX SYSTEMS INC					9	van Rotterd	Jeroen		Chief Information Secu		IT	EVP	EVP	Engineering	y	Website	m
2	PARKER-HANNIFIN CORP	About Us	Leadership			1	Williams	Thomas	L	CEO		CEO-PRES				y	Website	m
2	PARKER-HANNIFIN CORP					2	Banks	Lee	C	COO	President	Operations				y	Website	m
2	PARKER-HANNIFIN CORP					3	Suever	Catherine	A	CFO		Finance	EVP	EVP	Finance & A	y	Website	f
2	PARKER-HANNIFIN CORP					4	Hart	Mark	J				EVP	EVP	HR & Extern	y	Website	m
2	PARKER-HANNIFIN CORP					5	Bowman	William					VP	VP	Instrument	y	Website	m
2	PARKER-HANNIFIN CORP					6	Davenport	Robin	J				VP	VP	Corporate I	y	Website	f
2	PARKER-HANNIFIN CORP					7	Gentile	Thomas	C				VP	VP	Global Supp	y	Website	m
2	PARKER-HANNIFIN CORP					8	Guhe	Joachim					President	BU-CEO-PR	EMEA Grou	y	Website	m
2	PARKER-HANNIFIN CORP					9	Leombrunc	Todd	M				VP	VP	Controller	y	Website	m
2	PARKER-HANNIFIN CORP					10	Leonti	Joseph	R	CS	GC	Legal	VP	VP		y	Website	m
2	PARKER-HANNIFIN CORP					11	Lima	Candido					VP	VP	Latin Ameri	y	Website	m
2	PARKER-HANNIFIN CORP					12	Malone	Robert	E				VP	VP	Filtration G	y	Website	m
2	PARKER-HANNIFIN CORP					13	Maxwell	Craig	M				VP	VP	Technology	y	Website	m
2	PARKER-HANNIFIN CORP					14	O'Hara	Michael	J				VP	VP	Global Sale	y	Website	m
2	PARKER-HANNIFIN CORP					15	Parel	Dinu	J	Chief Information Secu		IT	VP	VP		y	Website	m
2	PARKER-HANNIFIN CORP					16	Parmentier	Jennifer	A				VP	VP	Motion Sys	y	Website	f
2	PARKER-HANNIFIN CORP					17	Ross	Andrew	D				VP	VP	Fluid Conne	y	Website	m
2	PARKER-HANNIFIN CORP					18	Sherrard	Roger	S				VP	VP	Aerospace	y	Website	m
2	PARKER-HANNIFIN CORP					19	Wee	Michael					President	BU-CEO-PR	Asia Pacific	y	Website	m
2	PARKER-HANNIFIN CORP					20	Meeks	Andrew	M				VP	VP	Engineered	y	Website	m

Item 1: Firm ID.
Item 2: Firm name per Compustat.
Item 3: Webpg 1 = First level in firm's website address identifying the page with the executive on it.
Item 4: Webpg 2 = Second level in firm's website address identifying the page with the executive on it.
Item 5: Webpg 3 = Third level in firm's website address identifying the page with the

executive on it.
Item 6: Webpg 4 = Fourth level in firm's website address identifying the page with the executive on it.
Item 7: Executive #, coded in the order shown on firm's website (if in a row, order taken is left to right).
Item 8: Last name(s) of executive.
Item 9: First name(s) of executive.
Item 10: Middle initial(s) of executive.
Item 11: Chief or Officer 1 = First of a maximum of two Chief or Officer positions ascribed to the executive.
Item 12: Chief or Officer 2 = Second of a maximum of two Chief or Officer positions ascribed to the executive.
Item 13: Chief or Officer Domain = category covering one or more Chief or Officer 1 or 2 positions.
Item 14: Rank or Title = rank or title of executive, outside of Chief and Officer 1 or 2.
Item 15: Rank or Title Domain = category covering one or more Ranks or Titles.
Item 16: Area = area of business responsibility covered by the executive, as judged by the authors based on the text provided about the executive on firm's website.
Item 17: 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).
Item 18: Photo source. If photo = *y*, photo source = firm's website, LIN, BB or OTH.
Item 19: Gender: Male or female, based on the executive's photo and/or bio, where available.

Figure A2. Items 20–32

	20	*21*	*22*	*23*	*24*	*25*	*26*	*27*	*28*	*29*	*30*	*31*	*32*
SP Firm ID	McK 2015 race/ethnicity aa,eur,ne,ea, sa,lat,na,pi,an	McK 2018 US + NCES IPEDS race/ethnicity w,b,h,api,aian	SP Visual est age	SP Formal attire?	SP Jacket?	SP Tie?	SP Smile (1-10)	SP Pay ($M) Yahoo! Finance	SP Year Born Yahoo! Finance	SP True Age @ Feb-20	Visual est age if E True Age	True age if E Visual est age	SP True age - Vis est age
1	eur	w	55	y	y	n	6	$ 3.03	1968	52	55	52	-3
1	eur	w	55	y	y	n	4	$ 0.83	1971	49	55	49	-6
1	lat	h	55	y	y	n	7	$ 1.14	1966	54	55	54	-1
1	eur	w	60	y	y	y	6	$ 1.33	1960	60	60	60	0
1	eur	w	55	n	n	n	8						
1	eur	w	45	y	y	n	9						
1	eur	w	45	y	y	n	7						
1	eur	w	40	y	y	n	8						
1	eur	w	50	y	n	n	6						
2	eur	w	60	y	y	y	5	$ 4.56	1959	61	60	61	1
2	eur	w	60	y	y	y	7	$ 2.97	1963	57	60	57	-3
2	eur	w	50	y	y	n	8	$ 1.97	1958	62	50	62	12
2	eur	w	65	y	y	y	8						
2	eur	w	60	y	y	y	6						
2	eur	w	50	y	y	n	8						
2	eur	w	60	y	y	y	9						
2	eur	w	60	y	y	y	7						
2	eur	w	45	y	y	y	8						
2	eur	w	40	y	y	y	5						
2	lat	h	55	y	y	y	6						
2	aa	b	45	y	y	y	7	$ 2.09	1963	57	45	57	12
2	eur	w	55	y	y	y	8						
2	eur	w	50	y	y	y	5						
2	sa	api	45	y	y	y	3						
2	eur	w	40	y	y	n	7	$ 1.73	1967	53	40	53	13
2	eur	w	55	y	y	y	7						
2	eur	w	50	y	y	y	4						
2	ea	api	45	y	y	y	3						
2	eur	w	55	y	y	y	4						

Item 20: McK 2015 race/ethnicity: We classified an executive's race/ethnicity by visually examining their photo and first and last names. All classifications were done by the same coauthor. The most granular racial/ethnic categories we employ are those of McKinsey (Hunt, Layton, and Prince, 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 (ai) 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).

Item 21: NCES IPEDS race/ethnicity. NCES IPEDS specifies the following 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 with the NCES IPEDS race/ethnicity categories by defining b = aa, w = eur + ne, api = ea + sa + pi, h = lat, aian = na + an (see item 23 for McK category descriptor tags). NCES IPEDS' race/ethnicity categories match closely with those used for US executives in McKinsey's 2018 and 2020 studies.

Item 22: Visual est. age: Age of the executive as judged by the same coauthor from the executive's photo, assigned into one of the following point estimates: 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90.

Item 23: Formal attire? = *y* if executive was wearing formal attire as judged from the executive's photo by the same coauthor (sometimes not possible if photo was only of the executive's face).

Item 24: Jacket? = *y* if executive was wearing a jacket as judged from their photo by the same coauthor (sometimes not possible if photo was only of the executive's face).

Item 25: Tie? = *y* if executive was wearing a tie as judged from the executive's photo by the same coauthor (sometimes not possible if photo was only of the executive's face).

Item 26: Smile (1–10). Degree of genuine smile on the executive's face as judged from the executive's photo by the same coauthor, where 1 = not at all smiling/"very grumpy" and 10 = very wide, "joyous" smile.

Item 27: 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 28: 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 29: True Age @ Feb-20. If Year Born is available, True Age @ Feb-20 is the age of the executive to the nearest one year as of February 2020.

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