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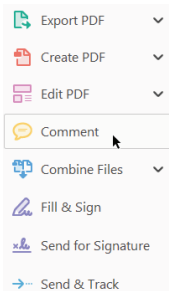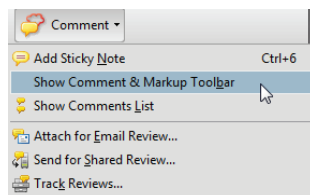
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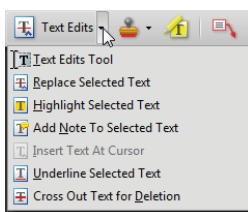
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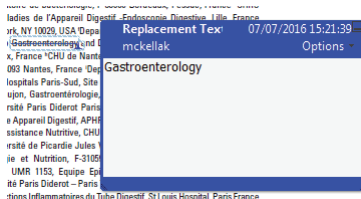
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Educational Backgrounds

The Educational Backgrounds of American Business and Government Leaders: Inter-Industry Variation in Recruitment from Elite Colleges and Graduate Programs

Steven Brint, *University of California*
Sarah R. K. Yoshikawa, *Loyola Marymount University*

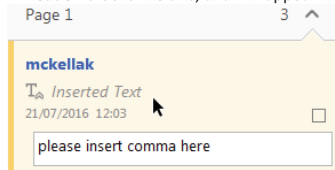The paper provides new empirical evidence on the educational backgrounds of US business and government leaders. Analyzing a sample of 3,990 senior executives drawn from 15 sectors, including government, we find significant industry variation. Industries whose products depend primarily on the manipulation of symbolic media were the most likely to recruit from elite colleges. By contrast, industries involved in the transformation of the material world recruited less often from elite colleges, and this was particularly true for industries that employed comparatively few workers with advanced degrees. We find a relatively low level of association between elite undergraduate origins and executive positions in economy and state but greater proportional concentration by graduate business or law school attended. We discuss the different selection criteria used by elite colleges looking for outstanding students and corporations looking for outstanding executives, as well as additional layers of affinity that may lie behind industry differences in recruitment to executive positions.

Over the past several decades, ambitious US high school students have shown seemingly limitless interest in gaining admission into elite colleges at a time when costs for attendance are rapidly increasing. The eight Ivy League colleges received more than 247,000 applications in 2013 and accepted just 9 percent of applicants (Hernandez College Consulting 2014). By contrast, in 1987, these colleges received approximately 89,000 applications and accepted 26 percent (Persell and Cookson 1990). Students apply to many more schools than they did in the past, but that is not the only reason for falling admission rates; many more top high school seniors are being urged to apply to selective colleges, and applicant pools now include tens of thousands of top students from outside the

United States. Published costs for tuition, room, and board now run approximately $250,000 over four years, double what they were just a decade ago (Jacobs 2014). Conversely, the average median American family earned just over $50,000 in 2013 (Noss 2014)—or about $10,000 less than the full price of attendance at a highly selective college.[1]

One reason why demand for admission to elite colleges has continued to grow despite rapidly increasing sticker prices of attendance is that many view admissions as an investment that opens the door to top positions in business and government. Indeed, sociologists and political scientists associated with the tradition of elite theory have long posited high concentrations of graduates from elite colleges in these leading positions in society (Baltzell 1964; Bourdieu 1996; Bourdieu and Passeron 1977; Domhoff 1970, 2006; Dye 1976, 1990; Mills 1956; Stanworth and Giddens 1974).

However, higher education and industry in the United States are distinctive in ways that may limit the degree to which graduates of elite colleges occupy top positions in business and government. The United States, for example, is distinctive in both the size and heterogeneity of its higher education system, which now includes more than 2,300 baccalaureate-granting colleges and universities and more than 5,000 institutions altogether (Carnegie Foundation 2014). It is also distinctive in the number of large corporations that populate its economy and the cultural and political variability of the regions in which these corporations reside. These characteristics may lead to greater openness and more variation among industrial sectors than social scientists that adhere to elite theory purport.

The primary intent of this study is to shed light on the role of sectoral and regional differences in the recruitment of top executives and to investigate the extent to which this recruitment is influenced by the growth of graduate degrees, the rise of public research universities, and the development of a global class of executives. We find sizable variation in recruitment across industries. The primary sources of industry variation, we will argue, have to do with the extent to which an industry is located in the "knowledge sector" of the economy, employing a comparatively high proportion of people with advanced degrees and, within that sector, whether work primarily involves the creation and manipulation of symbols or the transformation of the material world. We find that recruitment from elite colleges is highest in industries like entertainment and finance, which produce and manipulate symbolic media and employ comparatively high proportions of people with advanced degrees. It is lowest in industries like food production and construction, which transform the material world and employ relatively few people with advanced degrees. We also find significant regional effects; firms whose headquarters are located along the Eastern seaboard are more likely to recruit top executives with elite undergraduate origins.

We do not find that top positions in the US economy and state are numerically dominated by graduates of elite colleges. Less than one-fifth of our sample of executives graduated from an elite undergraduate college, and less than one-third graduated from *either* an elite undergraduate college or an elite business or law graduate program. Although concentrations of graduates from the country's most prestigious higher education institutions are lower than may be expected

based on the premises of elite theory, it is equally true that attending an elite college greatly improves one's chances of attaining a top position in business or government relative to what we would expect from chance. Attendance at an elite college provided a five- to six-fold advantage relative to a random distribution for attainment of a top position in business or government. The elite business and law school advantage was greater. In addition, the advantage of an elite education was largest among individuals holding the highest positions in business and the government. We find greater concentration of elite college graduates among CEOs than among those in lower-level executive positions, and we find greater concentrations among government officials when we exclude members of the more populist House of Representatives.

Previous Literature

Studies of the Educational Origins of Business and Political Leaders

Beginning with the work of Mills (1956), Baltzell (1964), and Domhoff (1970), analyses by American sociologists emphasized the connection between upper-class families, elite schooling, and attainment of leading positions in American society. These sociologists focused on the advantages that children from elite families held in admission to elite colleges and the pathways from these colleges into top positions in American society. They emphasized that members of the elite recognized and sponsored one another based on family connections and common modes of self-presentation, as well as through the common culture produced by similar educational experiences. These early studies were not systematically empirical and were based instead on examples of prominent individuals and illustrations of mechanisms of recruitment and training.

More recently, the work of Pierre Bourdieu and his colleagues has been central to the elaboration and theorization of the social power tradition as it relates to elite recruitment. For Bourdieu, family advantages influence the amount of and rate at which the several forms of exchangeable "capital" (most importantly, culturally valuable knowledge and socially valuable connections) are accumulated (Bourdieu 1986). These forms of capital are recognized and legitimated by schools, at the highest level by elite secondary schools and higher education institutions. Students' accumulation of valuable forms of capital, together with the schools' legitimating imprimatur, as indicated by degrees awarded, provide decisive competitive advantages for graduates, which can be later converted into economic benefits and qualifications for top positions in business and government. In this way, students from upper-class origins are able to reproduce themselves in a system that appears to emphasize its meritocratic openness to talent drawn from throughout society.

Qualitative studies have focused on the mechanisms used by elite boarding schools (Cookson and Persell 1985; Khan 2011) and elite undergraduate colleges (Karabel 2005; Soares 2007; Stevens 2007) to prepare adolescents and young adults for top positions in American society. These include: institutional emphases on rigor and competition in and outside the classroom; student clubs

Q2

and residence halls that foster long-term social relationships that can be valuable in career advancement; visits from distinguished alumni and others to provide practical advice and to serve as role models of accomplishment; opportunities for impressive internships and travel experiences; and degrees that carry symbolic value in the labor market. Drawing on French data, Bourdieu showed that judgments of merit in elite secondary schools are highly dependent on students' social class backgrounds, albeit with some variation from subject to subject. He also provided evidence that schools "consecrate" the advantages that students bring with them from their families of origin, and that this consecration underlies the close connection between education in the French *grandes ecoles* and leading positions in French corporate and political life (see Bourdieu [1996]).

Bourdieu (1996) found that half of chief executive officers in the top 100 French companies in 1972 had graduated from one of the leading educational institutions, the *grandes ecoles*, a trend toward academic legitimacy that had gradually replaced reproduction based primarily on family business ownership (p. 323). British sociologists and historians established similar upper bounds for the strength of relationships between elite colleges and leading positions in society. Using data from the early 1970s, Wakeford and Wakeford (1974) found that half of 793 elite members of the civil service and senior managers of British firms, as well as leaders of British cultural institutions, were educated at either Oxford or Cambridge. Focusing on senior executives at 200 business and financial institutions, Stanworth and Giddens (1974) showed an increasing concentration of Oxbridge-educated individuals in top positions over time, with 42 percent representation for the most recent cohort in their study.

American quantitative studies have suggested lower and declining concentrations of elite college graduates in top positions in business and government than the British and French studies. Estimates from the late 1970s found that nearly 30 percent of executives had graduated from the top 11 undergraduate colleges and another 20 percent from the leading 11 business or nine law schools (Useem and Karabel 1986), for a combined total of 50 percent. Using data from 1980–1981 and combining undergraduate and graduate degrees, Dye (1990) found a similar proportion of top corporate leaders (54 percent) and a slightly lower proportion of top government leaders (42 percent) graduating from one of 12 well-endowed and highly selective private universities. More recent studies find declining concentrations from elite institutions, with estimates for elite undergraduate colleges in the range of 10 to 15 percent for CEOs (Cappelli and Hamori 2004; Cappelli, Hamori, and Bonet 2014) and at a similar level for senior managers, identified as vice presidents and above (Ott 2011). In these studies, estimates of combined undergraduate and graduate degree holders are in the range of 30 to 40 percent (Cappelli, Hamori, and Bonet 2014; Ott 2011; Wai 2013).

Inter-Industry and Regional Variation

Neither the European nor the American literature has explored the topic of inter-industry variation in depth. Bourdieu (1996) distinguished between

family-based firms, which largely bypass elite higher education for purposes of recruiting executives, and publicly traded companies that recruit heavily from the *grandes ecoles*. Stanworth and Giddens (1974, 101) minimized the importance of sector divisions, while acknowledging that banking remained more elite than other sectors. Similarly, Ingham (1984, 30–31) cited evidence that London-based financial elites were more likely to come from Oxford or Cambridge than the Northern manufacturing elites. A similar finding emerged from Useem and Karabel (1986), with bankers more often having elite educational backgrounds than manufacturers.

Rivera (2012) and Binder, Davis, and Bloom (2016) showed high levels of recruitment from elite private colleges and universities into entry-level positions in investment banking, management consulting, and law firms. Both studies leave open the question of the extent to which firms and industries other than finance, management consulting, and law may show different priorities and preferences in recruitment. Using a wider range of industrial sectors, Wai (2013) provided evidence on sector variation among billionaires, with billionaires from consumer product industries showing low levels of attendance at elite colleges, and billionaires in technology and financial industries showing higher levels of attendance at these colleges. While Wai's emphasis on a wide range of industrial sectors represents a valuable extension of the literature, his focus on the educational backgrounds of billionaires alone is limiting.

The literature on regional variation is extremely limited; the focus of previous writers on elite educational institutions is consistent with the notion that students educated at elite institutions fan out to cover all major firms regardless of regional location. Rivera (2012), however, notes that the propinquity of elite colleges to Eastern seaboard finance, management consulting, and law firms encourages more intensive recruitment activities at the entry level than might be expected if these firms were more widely dispersed across the country. Regional variation in recruitment is also briefly mentioned by Dye (1990, 279–80) as dividing Sunbelt from Eastern seaboard elites, but he does not report analyses of recruitment at either the firm or industry level.

Methodological Limitations of Previous Studies

In addition to these conceptual lacunae, methodological limitations of the previous studies encourage further investigation of the links between elite educational institutions and top positions in the US economy and state. Important limitations include:

1. The industry divisions used in the studies reflect an outdated view of the American economy as divided between manufacturing, retail and wholesale trade, transportation, utilities, and financial services. These divisions reflect the standard industrial codes used by the federal government prior to 1997. The new industrial codes (see U.S. Bureau of the Census [2012]) focus on more specific industries, such as entertainment, finance, and energy. This classification reflects the heightened consciousness of contributions made by

specific industrial sectors to the health of the American economy (see, e.g., Moretti [2013]).

2. Previous research, with few exceptions (see, e.g., Dye [1990]; Stanworth and Giddens [1974]; Wai [2013]), has focused exclusively on business leaders. A more complete examination should include recruitment into top leadership positions in government as well. Although government is, in many respects, dependent on private business in a capitalist economy, it also sets the terms under which private business operates and shapes at least to an equal degree the conditions of life for workers and citizens (see, e.g., Poggi [1990]). Top leaders in government, consequently, clearly qualify as part of the leadership stratum of American society.

3. Given that baccalaureate attainment is far more common than graduate degree attainment, the decision to ascribe a similar number of undergraduate colleges and graduate professional schools in business and law as elite leads to an over-weighting of elite graduate degrees relative to undergraduate degrees. To reflect the distribution of graduates of these degree programs nationally, undergraduate colleges should be represented in proportion to the population of college students and graduate and professional schools in proportion to the population of graduate business and law students, leading to a larger number of undergraduate colleges than graduate professional schools identified as elite.

4. The existing studies do not select their lists of elite institutions based on the span of years in which executives were enrolled in college; instead, they choose rankings from one year only. This procedure all but assures that executives whose colleges vary in rank from year to year will not be properly categorized.

Hypotheses

One primary line of division is between industries whose production is based on the manipulation of symbolic media and those whose production is based on the manipulation of the material world, as suggested by the empirical findings of Wai (2014). We define "symbol-manipulating industries" as those whose primary activities involve the construction and trade of products in text, images, quantitative data, or computer code. The mass media, finance, and Internet services are examples of symbol-manipulating industries. We define industries that "manipulate the material-world" as those whose primary activities involve the construction and trade of products composed of minerals, vegetables, composites, or manufactured goods made of these materials. Construction, food products, and energy are examples of industries that create products based on the manipulation of the material world. Another primary line of division is between industries that employ a relatively high proportion of workers with advanced degrees and those that employ a relatively low proportion of workers with advanced degrees, as suggested by Brint (2001, 2014).

We justify these analytical distinctions theoretically by the level of intellectuality involved in the work of the industry. Symbol-producing industries are more intellectually oriented than material production industries and therefore would

have an incentive to draw more often from the most intellectually demanding schools. Similarly, industries employing larger proportions of workers with advanced degrees are more dependent on knowledge workers and therefore would have an incentive to draw more often from the most intellectually demanding schools.

H1 **Inter-Industry Variation**: The proportion of top executives recruited from elite colleges and graduate programs will be highest in sectors primarily involved in the creation and manipulation of symbolic media and those that employ high proportions of workers with advanced degrees. These proportions will be lowest in sectors that treat or transform the material world and employ relatively low proportions of workers with advanced degrees.

To conceptualize regional variation, we extend Rivera's (2012) observations about propinquity- and prestige-based network connections to include recruitment into executive positions in firms located along the Eastern seaboard.

Q4

H2: The proportion of top executives recruited from elite colleges and graduate programs will be highest among firms whose headquarters are located along the Eastern seaboard where most elite colleges and graduate programs are co-located.

Previous US studies cited above suggest that graduation from an elite undergraduate college is a slowly declining influence on recruitment into top executive positions (see, e.g., Cappelli and Hamori [2004]; Cappelli, Hamori, and Bonet [2014]; Ott [2011]). Among the likely reasons for this declining level of representation are the following: (1) the growing importance of graduate degrees as a more important credential in recruitment of senior executives (see Useem and Karabel [1986]); (2) the rise of public research universities as producers of senior executives (see, e.g., Brint [2007]; Cappelli and Hamori [2004]; Cappelli, Hamori, and Bonet [2014]); and (3) the rise of global recruitment for senior executive positions (see, e.g., Marginson and van der Wende [2009]). In addition, as of 2014, foreign-born individuals comprised 16.6 percent of the total employed US labor force (U.S. Bureau of Labor Statistics 2016). These observations lead to three hypotheses:

H3 **Graduate Degree Centrality**: The proportion of top executives with elite graduate degrees will be higher than the proportion of top executives with elite undergraduate degrees.

H4 **Public Research University Competitiveness**: At the undergraduate level, public research universities will contribute as much in absolute terms as elite private colleges to recruitment into top positions in business and government.

H5 **Global Recruitment**: The proportion of executives educated abroad will be as high as the proportion of foreign-born employees in the US labor force.

Data and Methods

Sample

Our business executives sample is drawn from the 2014 *Fortune 1000*. The *Fortune 1000* is a list of the top 1,000 US-based firms produced annually by the business magazine *Fortune*. The list includes both closely held and publicly traded corporations ranked by gross revenue (after adjustments for the impact of excise taxes that companies incur).

Given the resources available for this project, coding all major industries represented in *Fortune* was not feasible. We chose instead industries that represented variation on our hypothesized sector differences in elite recruitment. Brint (2001, 2014) provides evidence on industries that employ comparatively large proportions of workers with advanced degrees. To identify industries in the "knowledge economy sector," we used Brint's (2001) cutoff of 5 percent or more of employees with master's or higher-level degrees. We further divided industries by whether they were primarily engaged in the world of symbol production or the world of material production. The distinctions yield a two-by-two table. We found no symbol-producing industries that employed comparatively low proportions of workers with advanced degrees, and consequently one of the cells in the table is empty (see table 1).

We chose five industries from each of the occupied cells. We did not choose these industries randomly, but rather based on a substantive judgment of industries that clearly fit in each of the relevant cells. From among the knowledge-sector industries primarily involved in manipulation of symbolic media, we chose the following: (1) computer software, (2) entertainment/media, (3) finance, and (4) Internet services. We also included (5) government in this group, given that the creation and implementation of law and policy lies primarily in this realm. From among the knowledge sector industries involved primarily in

Table 1. Theorized Dimensions of Inter-Industry Variation in Recruitment

	High proportion workers with advanced degrees	Low proportion workers with advanced degrees
Symbol production	Computer software	
	Entertainment/Media	
	Finance	
	Government	
	Internet services	
Material production	Aerospace/Defense	Apparel
	Energy	Chemicals
	Health care	Construction
	Pharmaceuticals	Food products
	Telecommunications	Motor vehicles

Table 2. Sample Characteristics

Industrial sector	Executives	Firms
Apparel	88	11
Automotive	221	19
Aerospace/Defense	267	23
Chemicals	279	25
Computer software/hardware	323	25
Construction/Real estate	229	24
Energy	280	25
Entertainment/Media	188	19
Finance	338	25
Food consumer products	254	16
Health care	308	25
Internet services and retailing	123	12
Pharmaceuticals	194	18
Telecommunications	275	25
US government officials	623	NA
Total	3,990	293

creating products through the manipulation of the material world, we chose the following: (1) aerospace, (2) energy, (3) health care, (4) pharmaceuticals, and (5) telecommunications. From among the industries outside the knowledge sector and involved primarily in creating products through manipulation of the material world, we chose the following: (1) apparel, (2) chemicals, (3) construction, (4) food products, and (5) motor vehicles. We included up to 25 ranked firms in each of the 14 industries studied. The firms in our sample include most of the largest corporations in the United States, such as Apple, Exxon Mobile, Disney, and JP Morgan Chase. (A list of firms in each sector is included as appendix A.) For government, we included the president and his cabinet, the Supreme Court, the Senate, the House of Representatives, and the governors of the 50 states. Table 2 summarizes the industries, including government, and the number of firms and executives coded in each.

Coding of Variables

We identified the college and graduate schools from which each executive received his or her baccalaureate and higher-level degrees. We found information about degrees attained from a wide variety of sources. Biographies on firm websites were the most common source of information. We also consulted the following websites aggregating information about business executives: Bloomberg, Forbes, LinkedIn, and Reuters.

Because we are interested in sectoral and regional variation, we did not focus exclusively on chief executive officers or directors, as some students of elites have done (see, e.g., Cappelli and Hamori [2004]; Dye [1990, 10–11]; cf. Useem and Karabel [1986]). A singular focus on chief executive officers or directors does not allow for a large enough sample to determine whether inter-industry and regional variation in recruitment of top executives is or is not statistically significant. We therefore included a wider range of senior leadership, including chief operating officers, chief financial officer, chief legal counsel, and other senior corporate officers at or above the level of senior vice president. We also included top government officials beyond chief executive officers and their immediate subordinates, such as members of Congress.

This sampling strategy creates a notable difference between our work and that of writers who are primarily interested in assessing the validity of elite theory in the Millsian tradition. These latter writers are interested in the people they construe as having the greatest positional power in society (see, e.g., Dye [1990, pp. 9–13]). Our findings are relevant to versions of elite theory, like those of Useem and Karabel (1986) and Cappelli and Hamori (2004), that have a less restrictive conception of top positions, but our analyses cannot be considered a test of elite theory in the Millsian tradition because of differences in our sampling strategy.

We allowed the firms to define their executive leadership teams. We found this information on websites for the firms, under "executive leadership," "corporate management," "corporate leadership," and related terms. The mean size of self-identified executive teams was 11.3, and the standard deviation was 5.5. The lowest offices included by any firm as members of executive leadership were senior or executive vice presidents. Although this procedure biases the sample in favor of firms that mention many executives as members of their leadership teams, this bias is mitigated by the correlation between rank in the *Fortune 1000* and the size of self-reported executive teams: $r(292) = -0.30$. An alternative procedure, including the 10 highest-ranking executives on firms' organizational charts (Cappelli and Hamori 2004), introduces the opposite bias, adding weight to the smaller firms by counting an equal number of executives in larger and smaller firms.

We consider it likely that firms located in the region with the heaviest concentration of elite colleges—that is, the East Coast—will recruit more heavily from elite colleges and graduate programs. It is also possible that colleges and universities located in other regions contribute significantly to elite recruitment. A relatively high number of elite colleges and universities, for example, are also located on the West Coast. We used six categories to code the region in which the firm's headquarters was located: (1) East Coast, (2) South, (3) Industrial Midwest, (4) Farm Midwest, (5) Mountain States, and (6) West Coast.

We coded four types of positions within firms: (1) chief executive officer (CEO), (2) financial officers (typically chief financial officers, or CFOs), (3) legal officers (typically general counsels), and (4) all other positions. For government officials, we coded the following categories: (1) Cabinet and Cabinet-level officials (including the president and vice president), (2) US Senators, (3) US House

Representatives, (4) state governors, and (5) Supreme Court Justices. We identify the uppermost governing stratum of executive positions as consisting of CEOs, CFOs, and general counsels in corporations, and president and vice president, Cabinet officers, and state governors in government.

We coded both undergraduate and graduate degrees as either "elite" or "non-elite." (See discussion below.) We identified executives holding degrees from abroad with the designation "non-US." We coded graduate degrees as "business," "law," or "other." When an individual held two or more of these different graduate degree types, we coded the business degree.

We considered it possible that women need credentials from elite institutions more than men in order to succeed in corporate business and government. We coded the gender of executives on the assumption that elite higher education might be more important for women than men. Using a similar logic, it is also possible that members of racial-ethnic minorities and those with lower socio-economic origins may require elite credentials more than those who come from majority racial-ethnic or upper-SES backgrounds. However, we were unable to identify the racial-ethnic or socio-economic backgrounds of a sufficient number of executives in our sample from published materials, and therefore did not code these variables.

Identifying Elite Colleges and Graduate Schools

In our sample, 3,653 out of 3,990 individuals (92 percent) could be identified conclusively as having attained at least a baccalaureate degree. Of those with college degrees, just over 66 percent (2,425) had also obtained graduate degrees. Of those who had obtained graduate degrees, more than half (51 percent) held graduate business degrees, and more than one-quarter (29 percent) held law degrees. To keep strict proportionality given the distribution of undergraduate to graduate business and law degrees in our sample, we would have needed to maintain a ratio of 10:5:3 between undergraduate, graduate business, and graduate law schools—or, for example, four undergraduate colleges to two business schools to 1.2 law schools.

Based on subsample counts in several industries, we estimated that well over 90 percent of the executives in our sample were aged 35 to 65. We assumed that the great majority of executives were residential college students who attended college immediately following high school graduation. Given that most such students graduate college between the ages of 21 and 22, we can say that the majority of executives in the sample obtained their undergraduate degrees between the years 1970 and 2000. Using the same reasoning, the relevant span for graduation from business or law school for the majority of executives in this sample would be 1972 through 2003.

No single source identifies the elite undergraduate colleges or graduate professional schools during the entire period that the executives in this sample attended college and graduate school. We chose to use *US News and World Report* (*USNWR*) as our primary source for ranking. Because *USNWR* is highly correlated with the academic qualifications of incoming freshmen classes (Kuh

and Pascarella 2004), it provides a good guide to college and graduate professional school selectivity. The most selective higher education institutions in the United States divide between the undergraduate colleges of prestigious research universities, such as Harvard and Stanford, and the most selective private liberal arts colleges, such as Amherst, Swarthmore, and Williams. *USNWR* began to rank the Top 25 national research universities in 1988, and it began to rank the Top 25 national liberal arts colleges in 1990. Our sample of the top undergraduate colleges includes every national research university and every national liberal arts college that was ranked by *USNWR* as a Top 25 college in *every* year the Top 25 rankings were published. This procedure yielded a group of 19 research universities whose undergraduate colleges were consistently on the *USNWR* list of national universities and 20 liberal arts colleges that were consistently on the *USNWR* list of national liberal arts colleges. Together, these 39 institutions form our elite undergraduate colleges list. (They are listed in table 4 below.)

Although *USNWR* is an acceptable source for our purposes from the late 1980s on, it does not cover the earlier years (1970 through 1988) during which the older executives in our sample would have graduated. Our reliance on *USNWR* is, in this respect, a limitation of the study. We chose not to mix ranking systems because different ranking systems use very different (and sometimes opaque) criteria. Nevertheless, a review of these sources indicates that *USNWR* rankings overlap considerably with earlier rankings.[2]

To contextualize our understanding of the role of these elite schools in producing top leadership, we also looked at the top 37 schools, elite and non-elite, that produced the largest number of executives in our sample. (Ties in the total number of executives produced by school prevented us from matching the *USNWR* list exactly to an empirically derived Top 37 list.) This empirically derived Top 37 list allows us to discuss similarities and differences between the schools that actually produced the most senior executives and those defined by *USNWR* as elite undergraduate institutions.

USNWR began to rank the Top 25 graduate business and law programs in 1990. To maintain proportionality, we examined Top 25 institutions for business schools and Top 20 institutions for law schools. Eighteen graduate business schools appeared on the *USNWR* Top 25 list in every year between 1990 and 2002.[3] Fourteen law schools appeared in the *USNWR* Top 20 in every year between 1987 and 2003.[4] These schools comprised our list of elite business and law schools. Again, *USNWR* business and law school rankings overlap significantly with earlier rankings by other sources.[5]

Compared to the procedures used by Dye (1990), Useem and Karabel (1986), and Ott (2011), ours is a more inclusive approach for forming the elite stratum of undergraduate colleges; it yields more than three times as many undergraduate institutions. Our approach is also much more inclusive than that used by Cappelli and his associates (Cappelli and Hamori 2004; Cappelli, Hamori, and Bonet 2014), who focused solely on Ivy League colleges and graduate schools as constituting the elite stratum. A broad definition of the elite college stratum is more likely to identify a high absolute concentration of elite college graduates. In this sense, it represents a conservative test of the proposition that elite college

graduates are highly concentrated among those who hold leading positions in business and government. Our ratio of four undergraduate colleges to two business schools to 1.8 law schools is a much better representation of the distribution of undergraduate to graduate enrollments than those used in previous studies, with only slightly more law schools than would be desirable given ratios of attendance in the sample.

Results

Undergraduate Degrees

The top 39 undergraduate colleges produced 18 percent of the executives in our sample. We found significant inter-industry variation, ranging from elite undergraduate representation of just 8 percent in the motor vehicles industry to 32 percent in Internet services. The industries were divided, for the most part, as we predicted, with between 22 and 32 percent of executives in symbol-producing industries in the knowledge economy sector holding degrees from elite undergraduate colleges, as compared to between 14 and 21 percent for material production industries in the knowledge economy sector, and 8 to 20 percent for material production industries outside the knowledge economy sector. If the anomalous case of apparel is excluded from the tabulation, the remaining sectors line up perfectly with expectations based solely on the objects of production (symbolic or material) and proportion of highly educated labor employed in the industry (knowledge economy sector or not) (see table 3).

Pairwise chi-square *p*-values showed a pattern of significant differences at the adjusted critical probability of $p < 0.00048$.[6] These significant differences separated the industries listed above with relatively low elite college representation (15 percent and below) from those with higher (27 percent and above) elite college representation, with the exception that elite college graduates were not statistically less common in the aerospace/defense industry than in the entertainment industry.

A comparison between the *USNWR* elite institutions and the empirically derived top producers of executives reveals notable similarities, particularly among the schools that produced the largest number of executives, but it also illustrates the importance of non-elite public universities. As indicated in table 3, the empirically derived top 37 colleges and universities educated 32 percent of the executives in our sample, compared to the 18 percent educated by the top 39 drawn from *USNWR* rankings. The empirical top 37 included 20 public universities and 17 private universities. Fourteen universities appear on both lists, and seven of the top eight on each list are identical. Only two public universities appeared on both lists, the University of Michigan and the University of Virginia. Among the private universities that ranked in the empirical top 37, six were doctoral-granting and research universities that did not place on the *USNWR* Top 39 list. Strikingly, liberal arts colleges were entirely absent from the empirically derived top 37 colleges and universities.

The strong representation of public research universities among the leading producers of business and government leaders does not fit conventional views of

Table 3. Comparison of *USNWR* Top 39 Colleges and Empirically Derived Top 37 Undergraduate Colleges (by percentage contribution to the production of senior executives)

USNWR Top 39	% of Top executives	Empirical Top 37	% of Top executives	
Harvard Univ.	1.97	Harvard Univ.	1.97	5
Univ. of Michigan	1.61	Univ. of Michigan	1.61	
Stanford Univ.	1.37	Stanford Univ.	1.37	
Cornell Univ.	1.34	Cornell University	1.34	
Yale Univ.	1.20	Univ. of Illinois	1.40	10
Princeton Univ.	1.18	Yale Univ.	1.20	
Univ. of Pennsylvania	1.18	Princeton Univ.	1.18	
Brown Univ.	0.85	Univ. of Pennsylvania	1.18	
Duke Univ.	0.77	Univ. of Notre Dame	1.07	15
Dartmouth Coll.	0.71	Georgetown Univ.	1.04	
Columbia Univ.	0.60	Univ. of Texas, Austin	0.98	
MIT	0.60	Pennsylvania State Univ.	0.90	
Univ. of Virginia	0.55	Texas A&M	0.90	20
Northwestern Univ.	0.52	Brown Univ.	0.85	
Colgate Univ.	0.41	Purdue Univ.	0.85	
Smith Coll.	0.25	UC Berkeley	0.82	
Wesleyan Univ.	0.25	Michigan State Univ.	0.79	25
Johns Hopkins Univ.	0.22	Duke Univ.	0.77	
Rice Univ.	0.22	Boston Coll.	0.74	
Amherst Coll.	0.19	Dartmouth Coll.	0.71	
Claremont McKenna Coll.	0.19	Univ. of Florida	0.71	30
Swarthmore Coll.	0.19	UNC, Chapel Hill	0.71	
Washington & Lee Coll.	0.19	Univ. of Wisconsin, Madison	0.68	
Colby Coll.	0.16	Iowa State Univ.	0.66	
Middlebury Coll.	0.16	UCLA	0.66	
Williams Coll.	0.16	Univ. of Maryland	0.66	35
Pomona Coll.	0.14	Univ. of Minnesota	0.63	
Univ. of Chicago	0.14	Columbia Univ.	0.60	
Bowdoin Coll.	0.11	MIT	0.60	
Oberlin Coll.	0.11	Miami Univ.	0.60	40
Washington Univ. St. Louis	0.11	Indiana Univ., Bloomington	0.57	
Wellesley Coll.	0.11	US Military Academy	0.57	
Davidson Coll.	0.08	Univ. of Virginia	0.55	
Grinnell Coll.	0.08	Brigham Young Univ.	0.52	45

(*Continued*)

Table 3. *continued*

USNWR Top 39	% of Top executives	Empirical Top 37	% of Top executives
Carleton Coll.	0.05	Georgia Institute of Tech.	0.52
Cal Tech.	0.03	Northwestern Univ.	0.52
Haverford Coll.	0.03	Ohio State Univ.	0.52
Vassar Coll.	0.03		
Bryn Mawr Coll.	0.00		

the constitution of the elite stratum of American colleges. At the same time, it is important to emphasize that public universities are not comparable to the top private universities as *per capita* producers of business and government leaders. During the 1970 to 2000 period, when executives in our sample received their baccalaureate degrees, the public universities on the empirically derived Top 37 list had average graduating classes of approximately 5,000 students, while the private universities on the list had average graduating classes of approximately 1,750 students. Based on these figures, public universities on the empirically derived Top 37 list would have needed to produce nearly three times as many leaders as the private colleges and universities to be considered equally prolific producers of business and government leaders on a *per capita* basis.[7] Instead, the 20 public universities on the empirically derived list produced slightly more business and government leaders (593) than the 16 private colleges and universities on the list (572). Nevertheless, if one attends only to the absolute numbers of executives produced, these findings provide significant support for the hypothesis of public research university competitiveness.[8]

Graduate Degrees

More than 90 percent of executives in our sample held baccalaureate degrees, but only about 66 percent held graduate degrees. At the same time, we found a larger number of executives with either elite business or law degrees (806) than with elite undergraduate degrees (660). Elite graduate degrees in business or law were, in this respect, more central to the accession of senior executives than were elite undergraduate degrees. This finding supports the graduate degree centrality hypothesis.

Business Degrees

Q5

Graduate business degrees were more concentrated than undergraduate degrees among elite schools; 44 percent of those who had obtained graduate business degrees graduated from one of the top 18 business schools. This level of concentration is impressive, in terms of absolute numbers, especially given the growth in non-elite graduate business enrollments since 1970. In 1971, 23 percent of graduate business degrees were produced by our 18 elite programs. By 2004, this

proportion was down to 10 percent. In relative terms, the over-representation of graduates of elite business programs is somewhat less impressive. This over-representation can be calculated at between two and four times what we would expect by chance, which is lower than the over-representation of elite undergraduate colleges.   5

The inter-industry gaps for elite business programs were larger than those found for elite undergraduate colleges, ranging from 73 percent in Internet services to 31 percent in telecommunications. Still, the findings show a pattern of inter-industry variation similar in some respects to that which we found for undergraduate colleges. We found the highest proportion of elite business degrees (defined here as more than 55 percent) in the Internet services, entertainment, and finance sectors, the same sectors that produced the highest proportion of executives educated at elite undergraduate institutions. However, among the four industrial sectors with the fewest elite college graduates (chemicals, construction, food products, and motor vehicles), only the motor vehicle industry also showed a markedly low proportion of graduates from elite business schools (defined here as fewer than 35 percent). The other three were near or above the average for all industries included in the study. Conversely, some knowledge economy sector industries engaged in material production, such as aerospace/defense, energy, and telecommunications, showed comparatively low levels of recruitment from top business schools (see table 4).   10 ... 15 ... 20

Law Degrees

Graduate law degrees were nearly as concentrated among elite schools in our sample as graduate business degrees; 37 percent of those who had obtained law degrees graduated from one of the Top 14 law schools. As in the case of business degrees, this level of concentration is impressive in terms of absolute numbers, especially given the declining share of law degrees produced by our 14 elite law schools since 1970. In 1971, 21 percent of law degrees were produced by these institutions. By 2004, the proportion was 11 percent. Nevertheless, the over-representation in relative terms is less impressive when compared to the over-representation of elite undergraduate schools. This over-representation can be calculated at between approximately 1.5 and 3.5 times what we would expect by chance.   25 ... 30

Again, inter-industry variation was much wider than that found for elite undergraduate colleges, ranging from 77 percent in Internet services to 12 percent in motor vehicles. We also found the now-familiar pattern of sector variation among those sectors most likely to recruit from elite colleges and universities; among those with law degrees, the highest proportions with elite law degrees (defined here as more than 50 percent) were located in Internet services, entertainment, and finance. We found the lowest proportion of elite law degrees (defined here as less than 33 percent) in motor vehicles, food products, energy, and aerospace/defense. The executive teams in these industries were also not heavily recruited from among graduates of elite undergraduate colleges (see table 4). In government, the sector where law degrees were most common, we found a higher level of concentration of graduates of elite law schools,   35 ... 40 ... 45

Table 4. Elite College and Graduate School Representation by Industry

Bachelor's degrees	Business degrees % (*N*)	Law degrees % (*N*)	% (*N*)
A. Symbol production			
Knowledge sector			
Internet services	32% (36)	73% (30)	79% (11)
Entertainment/Media	28% (45)	59% (29)	56% (19)
Finance	28% (84)	57% (73)	53% (23)
Computer Software	22% (65)	49% (63)	48% (15)
Government	21% (123)	34% (10)	31% (86)
B. Material production			
Knowledge sector			
Pharmaceuticals	21% (39)	48% (34)	48% (15)
Telecommunications	18% (45)	31% (30)	45% (17)
Aerospace/Security	15% (38)	32% (36)	32% (10)
Health care	14% (40)	39% (48)	41% (16)
Energy	14% (36)	35% (30)	31% (15)
C. Material production			
Outside knowledge sector			
Apparel	20% (14)	52% (11)	33% (4)
Chemicals	13% (34)	50% (57)	36% (12)
Construction	12% (23)	39% (22)	38% (12)
Food products	9% (22)	45% (42)	25% (5)
Motor vehicles	8% (16)	32% (29)	12% (2)

Q6

43 percent, when we excluded members of the more populist House of Representatives than when we included members of the House, 31 percent.

Educational Pathways into Executive Positions

For the executives in our sample, the most common pathway into top positions was to have attended a non-elite undergraduate institution and to have obtained no graduate degree. Executives who took this pathway represented more than one-quarter of the sample (27 percent). Nearly another quarter (24 percent) graduated from a non-elite undergraduate institution and subsequently from a non-elite business or law school. Thus, more than half of the sample had no experience, whether at the undergraduate or graduate level, in obtaining an undergraduate, graduate business, or law degree from an elite higher education institution located in the United States. Those who attended either an elite undergraduate college or an elite graduate business or law school (or both) constituted 31 percent of the sample, with the remainder made up of foreign

Table 5. Educational Pathways into Top Positions in US Business and Government[a]

Pathway	Sample proportion (N)
1. Non-elite college/No graduate school	27.3% (997)
2. Non-elite college/Non-elite graduate degree	23.7% (867)
3. Non-elite college/Elite business or law degree	11.4% (418)
4. Elite college/Elite business or law degree	9.2% (337)
5. Non-elite college/Other graduate degree[2]	7.8% (286)
6. Non-US college/No graduate degree	4.0% (147)
7. Elite college/No graduate degree	3.8% (140)
8. Elite college/Non-elite business or law degree	2.8% (102)
9. Non-US college/Non-US business or law degree	2.8% (101)
10. Non-US college/Other graduate degree[2]	2.3% (84)
11. Elite college/Other graduate degree[b]	2.2% (80)
12. Non-US college/Elite US business or law degree	1.2% (44)
13. Non-US college/Non-elite US business or law degree	0.9% (34)

Source: U.S. News & World Report College Rankings, 1988–2003.
[a]Pathways with five or fewer sampled individuals are not included. These include pathways in which individuals received US baccalaureates and non-US graduate degrees.
[b]Among "other graduate degrees," medical degrees, doctoral degrees in arts or sciences, and public policy/public administration degrees were most prominent.

institutions and/or graduate programs other than business or law. This evidence suggests that recruitment into top positions in business and government is less concentrated in the United States among graduates of elite institutions, counting both the undergraduate and graduate level, than it may be in countries like England and France. The full pathway analysis is presented in table 5.

Multivariate Analysis

We used telecommunications as the reference category in logistic regressions predicting elite undergraduate origins because telecommunications executives fell in the middle of the industry distribution with respect to the proportion of top executives with elite baccalaureate degrees. As shown in table 6, the regressions substantiate the distinctiveness of Internet services, entertainment, and government as destinations for those with elite undergraduate educations. Finance was marginally significant at $p < 0.10$. Similarly, they substantiate the distinctiveness of automotive and food products industries as locations that are significantly less likely to recruit from elite colleges. Using food consumer products as the baseline group, due to its centrality in the distribution, the regressions indicated that the Internet services industry was disproportionately populated by those with elite graduate business degrees, while automotive, aerospace/defense, and telecommunications had relatively fewer leaders with elite business degree

Table 6. Predictors of Elite Educational Backgrounds

A. Elite undergraduate				
	Odds ratio	**Std. err.**	**z**	**P > z**
Sector (Baseline: Telecommunications)				
Apparel	1.063	0.369	0.18	0.859
Automotive	0.501	0.165	−2.10	0.036
Aerospace/Defense	0.817	0.201	−0.83	0.409
Chemicals	0.754	0.193	−1.10	0.270
Computer software/hardware	1.255	0.280	1.02	0.310
Construction/Real estate	0.680	0.191	−1.37	0.170
Energy	0.936	0.235	−0.26	0.793
Entertainment/Media	1.633	0.401	2.00	0.046
Finance	1.482	0.317	1.84	0.066
Food consumer products	0.528	0.152	−2.22	0.027
Health care	0.824	0.200	−0.80	0.425
Internet services and retailing	2.025	0.548	2.61	0.009
Pharmaceuticals	0.974	0.244	−0.11	0.916
US government officials	1.565	0.312	2.24	0.025
Top position (top = 1)	1.740	0.164	5.89	0.000
Region (Baseline: East Coast)				
South	0.419	0.055	−6.63	0.000
Industrial Midwest	0.506	0.068	−5.07	0.000
Farm Midwest	0.169	0.080	−3.77	0.000
Mountain states	0.411	0.115	−3.19	0.001
West Coast	0.679	0.092	−2.85	0.004
Sex (male = 1)	0.899	0.102	−0.94	0.345
Constant	0.296	0.059	−6.07	0.000
$N = 3{,}650$; chi-square (21) = 199.10, $p < 0.001$; Pseudo $R^2 = 0.0577$				
B. Elite business				
	Odds ratio	**Std. err.**	**z**	**P > z**
Sector (Baseline: Food consumer products)				
Apparel	1.518	0.773	0.82	0.412
Automotive	0.583	0.185	−1.70	0.090
Aerospace/Defense	0.546	0.168	−1.97	0.049
Chemicals	1.114	0.321	0.38	0.707
Computer software/hardware	1.125	0.339	0.39	0.697

(Continued)

Table 6. *continued*

B. Elite business

		Odds ratio	Std. err.	z	P > z
	Construction/Real estate	0.734	0.268	−0.85	0.398
	Energy	0.686	0.230	−1.12	0.262
	Entertainment/Media	1.761	0.656	1.52	0.129
	Finance	1.391	0.401	1.14	0.253
	Health care	0.818	0.236	−0.70	0.485
	Internet services and retailing	3.199	1.396	2.66	0.008
	Pharmaceuticals	0.873	0.289	−0.41	0.682
	Telecommunications	0.540	0.173	−1.92	0.055
	US government officials	0.753	0.349	−0.61	0.541
Top position	(top = 1)	2.035	0.261	5.55	0.000
Region (Baseline: East Coast)					
	South	0.516	0.096	−3.56	0.000
	Industrial Midwest	0.698	0.120	−2.08	0.037
	Farm Midwest	0.366	0.175	−2.10	0.035
	Mountain states	0.654	0.270	−1.03	0.304
	West Coast	0.752	0.154	−1.39	0.164
Sex	(male = 1)	1.166	0.194	0.93	0.354
Constant		0.813	0.220	−0.76	0.446

$N = 1{,}238$; chi-square (21) = 106.03, $p < 0.001$; Pseudo $R^2 = 0.0624$

C. Elite law

		Odds ratio	Std. err.	z	P > z
Sector (Baseline: Chemicals)					
Sector	Apparel	0.816	0.597	−0.28	0.781
	Automotive	0.259	0.220	−1.59	0.112
	Aerospace/Defense	0.828	0.456	−0.34	0.732
	Computer software/hardware	1.493	0.804	0.74	0.457
	Construction/Real estate	1.110	0.589	0.20	0.845
	Energy	1.083	0.542	0.16	0.874
	Entertainment/Media	1.835	0.959	1.16	0.245
	Finance	1.599	0.788	0.95	0.341
	Food consumer products	0.547	0.352	−0.94	0.348
	Health care	1.382	0.696	0.64	0.520
	Internet services and retailing	5.545	4.242	2.24	0.025

(Continued)

Table 6. *continued*

C. Elite law		Odds ratio	Std. err.	z	$P > z$
	Pharmaceuticals	1.190	0.623	0.33	0.739
	Telecommunications	1.284	0.653	0.49	0.623
	US government officials	0.988	0.416	−0.03	0.977
Top position	(top = 1)	1.265	0.257	1.16	0.247
Region (Baseline: East Coast)					
	South	0.293	0.066	−5.44	0.000
	Industrial Midwest	0.497	0.122	−2.85	0.004
	Farm Midwest	0.243	0.140	−2.45	0.014
	Mountain states	0.304	0.143	−2.53	0.011
	West Coast	0.675	0.184	−1.44	0.149
Sex	(male = 1)	0.988	0.200	−0.06	0.951
Constant		0.858	0.381	−0.34	0.730

N = 701; chi-square (21) = 75.81, *p* < 0.001; Pseudo R^2 = 0.0818

backgrounds. (Automotive and telecommunications were only marginally significant at $p < 0.10$.) We found fewer significant sectoral relationships when we examined the smaller population of executives with law degrees. Relative to chemicals, only Internet services showed a statistically significant propensity to hire executives with degrees from the leading law schools.

Net of sector and position, top business executives whose firms were located in the East Coast region were more likely to come from an elite undergraduate college than were those located in any other region. Similarly, the likelihood of having an elite graduate business or law degree was significantly higher among those whose firms were located in the East Coast or West Coast than those in other regions.[9] These regional effects may result from a number of factors, including propinquity to many of the most prestigious colleges in the country, social networks connecting executives with one another and with new recruits, and the salience of prestigious colleges in evaluations of quality among those living in coastal regions. These results highlight the importance of considering both sector and region effects.

The regressions showed that uppermost governing positions (i.e., CEOs, CFOs, and general counsels in corporations, and president and vice president, Cabinet officers, and state governors in government) were also associated, net of industrial sector, with acquisition of an elite undergraduate and elite graduate business degree. As these findings suggest, the very top leaders had educational backgrounds more concentrated in elite institutions than the total sample. Additional exploration into this finding showed that 42 percent of CEOs in the sample had elite college and/or graduate school origins, compared to the 32 percent of

business and government leaders as a whole. (They had only a slightly higher attendance at elite undergraduate institutions, 23 percent compared to 18 percent of the total sample.) The CEOs of the 100 highest-ranking firms in our sample showed still higher levels of concentration; 48 percent had attended an elite institution either as an undergraduate, as a graduate student, or both. Thus, the executives in this sample with the most positional power were significantly more likely to have held at least one degree from an elite institution.

Gender was not significantly associated in our sample with graduating from either an elite undergraduate institution or an elite graduate business or law school, net of other covariates in the model. Thus, women in top positions were not more or less likely than men in similar positions to have come from elite educational backgrounds.

Discussion

These results provide support for hypothesis 1 (inter-industry variation) as well as for the theoretical framework we used to array industries. Indeed, the most important contribution of this study may be the support we find for a categorization of industries based on two dimensions of intellectuality: (1) educational composition of the labor force; and (2) symbolic or material production focus. In addition, firms located along the Eastern seaboard were more likely to recruit top executives from elite colleges and graduate programs. Our findings are therefore supportive of hypothesis 2. (Firms located on the West Coast were also more likely to recruit top executives from elite graduate programs.) Although our analyses do not examine specific reasons for regional variation, previous research suggests that propinquity, social networks, and prestige salience may account for these relationships (see Dye [1990, pp. 233–34; Rivera [2012]).

Our findings indicate that elite graduate degrees in business or law were more central to the ascension to top executive positions than were elite undergraduate degrees, supporting hypothesis 3 (graduate school centrality). The findings indicated that public research universities contribute considerably to the preparation of business and government leaders, supporting hypothesis 4 (public research university competitiveness). Senior executives of US-based companies who were educated abroad represent a smaller proportion than the share of foreign-born individuals employed in the US labor force. These findings consequently do not provide support for hypothesis 5 (global recruitment).

Whether one considers the concentrations we found of elite college graduates to be "high," "moderate," or "low" will depend on the expectations one brings to the findings. No widely accepted cutoffs exist by which to determine whether 18 percent is a "high," "moderate," or "low" proportion of top executives with elite undergraduate degrees, or whether 32 percent is a "high," "moderate," or "low" proportion of top executives with elite undergraduate and/or elite graduate degrees. If our focus is on the absolute proportion of elite college graduates in top positions, our results do not tend to support the expectations of elite theory, particularly with regard to undergraduate educational origins. However, if we focus on the relative advantage of attending an elite college, the results

indicate that such attendance greatly improves the odds of attaining top positions compared to the distribution that would arise by chance.

In the remainder of this section, we take up two issues raised by our findings: (1) why recruitment into top executive positions is not more concentrated from among the graduates of elite undergraduate colleges; and (2) additional sources of division that may lie behind the inter-industry variation in executive recruitment we observed.

The Divergence of Selection Criteria between Higher Education and Industry

The assumption that attendance at a prestigious college or university is essential for entrée into the American business and government elite fails to take into account the very different selection principles at work in college admissions as compared to movement into top positions in business. Elite college students are selected for their capacity to master complex symbolic media, as indicated by scores on standardized admissions tests. They are also selected for their conscientiousness in their studies, as indicated by secondary school grades. They are rewarded for outstanding cultural and service accomplishments, more than for their promise as entrepreneurs and managers (Espenshade and Walton Radford 2009). Moreover, a series of admissions preferences ensures that the entering class has enough athletes, musicians, thespians, minorities, and legacies to maintain campus sports, cultural institutions, and relations with valued alumni (Karabel 2005, ch. 18; Soares 2007, ch. 6; Stevens 2007, ch. 6). Existing studies suggest that the great majority of those admitted are the sons and daughters of highly educated, upper-middle-class professionals—doctors, lawyers, professors, stockbrokers, scientists, and engineers—rather than the sons and daughters of business executives (Karen 1985; Soares 2007, ch. 6).

A different, if not entirely unrelated, set of experiences and skills is relevant to exceptional success in large corporate firms. These include a strong interest in pecuniary matters; taking on and succeeding in big, visible organizational projects; creation of value in units for which one is responsible; impressing one's superiors; well-timed career moves; and careful maintenance of networks with other upwardly mobile executives (Kanter 1987; Ng et al. 2005; Polodny and Baron 1997). Personality characteristics such as extroversion and risk tolerance have been found in some studies to be correlated with success in business (Boudreau, Boswell, and Judge 2001; MacCrimmon and Wehrung 1990). Our data suggest that the "articulation gap" is particularly wide between students who graduate from selective liberal arts colleges and individuals who rise to top positions in large corporations or government (see also Zhang [2005]).

These findings raise a fundamental question: Why do American students (and their parents) compete in such a determined way to be accepted into elite colleges in spite of escalating costs, limited (Bowen and Bok 1998; Hoxby 2009; Kane 1998) or perhaps non-existent (Dale and Krueger 2002, 2011) contributions to adult earnings,[10] and connections to leading positions in American

business and government that, while considerably above what would be expected by chance, are not as strong as many imagine them to be?

In our view, highly selective private colleges and universities may be less important for their role in producing future leaders than they are for providing insurance against falling out of the upper middle class. While highly selective private colleges and universities cannot promise to promote all students into positions of leadership in American society, they can provide a high level of assurance that admitted students will at least make their way into the stratum of well-remunerated professionals and managers (see, e.g., Bowen and Bok [1998, appendix table D5.2]). Many of the advantages they offer are geared toward producing this result. For example, the great majority of admits are very able students. The campuses foster relatively strenuous academic and co-curricular competitions. They provide ample opportunities to develop interpersonal and communications skills, as well as valuable cultural capital. They open access to alumni networks, and they offer the imprimatur of a well-known and respected institution (Karabel 2005, ch. 1; Stevens 2007, ch. 8). Large public flagship universities, their nearest competitors in the production of business and government leaders, enroll two to five times as many students and, accordingly, cannot provide the same insurance of upper-middle-class status. Many who attend large public flagship universities do not complete their degrees, and many others fail to gain a stable foothold in a well-paying professional or managerial career (Armstrong and Hamilton 2013). Because of their size and lower levels of selectivity, these institutions cannot offer the same social status insurance that elite colleges can offer.

The Sources of Divisions in Recruitment between Sectors

One question that emerges from our study is why some industries employ comparatively large proportions of workers with advanced degrees while others do not. It seems probable that this circumstance may occur when one or both of the following conditions are met: (1) the industry is experiencing and is expecting to continue to experience rapid technological change; and/or (2) the industry is dependent on the capacity of professional employees to process and effectively evaluate a large volume of non-routine textual, numerical, image, or client information. Analysis of the sources of industry variation in the employment of highly educated workers is a topic that would be valuable for future researchers to explore. Our findings suggest that other types of affinity exist between higher education institutions and specific industries. Firms and government agencies located on the East Coast, for example, recruited more heavily from elite institutions, net of sector and other variables in our regression model. Moreover, firms located on both the East and West coasts were more likely to recruit from elite business and law schools.[11]

Other social divisions may play into inter-industry variation in executive recruitment. It is possible that some industries have distinctive political leanings that either encourage or discourage recruitment from elite educational institutions. For example, the entertainment industry is often characterized as

politically liberal, and the energy industry is often characterized as politically conservative. If professors and students at non-elite educational institutions are politically more conservative than those at elite institutions, as most studies find (see, e.g., Gross [2013]), an additional layer of affinity may exist between non-elite educational institutions and industries whose executives tend more often to be politically conservative. It is possible that firms or industries also vary in their levels of commitment to gender, religious, and/or racial-ethnic diversity, and that these commitments are associated with preferences for graduates of educational institutions with similar levels of commitment. These possible affinities are another topic that would be useful for future researchers to investigate.

Notes

1. Elite colleges provide varying amounts of financial aid for as many as 80 percent of their students, so the average net cost of attendance is closer to $100,000 over four years at most private elite colleges (Admissions Consultants 2013).
2. Thirteen of 19 national research universities that appeared in every year of *USNWR* also appeared in a majority of years of the Cass & Birnbaum categorization of "most selective" colleges. Each of these universities also appeared in every year of Barron's much more extensive list of "most competitive" colleges from 1970 to 1988. Half of the 18 liberal arts colleges that appeared in every year of the *USNWR* Top 25 national liberal arts colleges also appeared in a majority of years of the Cass & Birnbaum categorization of "most selective" colleges, and each one appeared in every year of Barron's from 1970–1988. All 11 institutions that appeared at the top of Coleman's (1973) prestige categories appeared in every year of the *USNWR* rankings.
3. These included the graduate business programs at the following universities: Carnegie-Mellon, Columbia, Cornell, Dartmouth, Duke, Harvard, MIT, New York University, Northwestern, Stanford, UC Berkeley, UCLA, the University of Chicago, the University of Michigan, the University of North Carolina, the University of Pennsylvania, the University of Texas, and the University of Virginia.
4. These included the law schools at the following universities: Columbia, Cornell, Duke, Georgetown, Harvard, New York University, Northwestern, Stanford, UC Berkeley, the University of Chicago, the University of Michigan, the University of Pennsylvania, the University of Virginia, and Yale University.
5. Thirteen MBA programs appeared on the *MBA* magazine list in 1975 (*MBA* 1975). All 13 appeared on the *USNWR* list of Top 18 business schools used in this study. All 18 consistently ranked business schools from the *USNWR* list also appeared on the Bloomberg Top 20 list in 1988 and in subsequent years. Each of the nine law schools that appeared on Blau and Margulies's (1974) list also appeared in the *USNWR* list of Top 14 ranked law schools used in this study.
6. For the post hoc pairwise tests for independence, we estimated the Bonferroni-adjusted critical p-value to correct for alpha inflation. Since we conducted all 105 pairwise comparisons, we adjusted the critical p-value of 0.05 to .05/105, or 0.00048. In some pairwise comparisons, the number of observations within cells was below the recommended amount of five observations. In these cases, we estimated the significance using Fisher's exact test, which is more precise with small sample sizes than a standard chi-square test (Agresti and Finlay 2009).

7. These figures are based on the average number of bachelor degrees conferred by the empirical Top 37 institutions, as computed from IPEDS data, disaggregated by control, in 1975, 1985, and 1995, and rounded to the nearest whole number.

8. It can be argued that the proportion of public university graduates should be expected to grow over time because public university enrollments have grown faster than private college and university enrollments. The proportion of undergraduates attending our elite institutions ranged from a low of 3.2 percent in 2004 to a high of 4.1 percent (through most of the 1980s). The amount of variation is not sufficient to make the case that public university enrollments have grown much faster than private elite enrollments.

9. The coastal location of new firms, such as those in Internet services, may be due, in large measure, to the concentration of venture capital in these regions (see Chen et al. [2010]).

10. The returns to elite higher education have been a hotly debated topic among economists. Most studies show small, but significant, returns to elite education, once confounding variables such as social origins, academic achievement, college major, and graduate degrees are taken into account (see, e.g., Bowen and Bok [1998]; Hoxby [2009]; Kane [1998]). Dale and Krueger (2002) argued that the existing studies have not taken into account unobserved differences in motivation and specific abilities characteristic of elite college students. They compared students who were accepted into elite colleges but declined offers against otherwise similar students who enrolled in an elite college as a way to measure these unobserved characteristics and found the elite college effect to be nil between the two groups. Dale and Krueger (2011) subsequently argued that the highest-rated college to which a student applies is more important than the college the student actually attends, because the former is indicative of the student's motivation and confidence level and the level of community support the student enjoys.

11. The regional hypothesis may help explain the apparel industry's higher-than-expected recruitment from elite higher education institutions. The industry is regionally concentrated along the Eastern seaboard and would therefore have a geographical connection with the majority of elite undergraduate institutions.

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Supplementary Material

Supplementary material is available at *Social Forces* online, http://sf.oxfordjournals.org/.

Q7 # References

Admissions Consultants. 2013. "Ivy League Financial Aid Policies." Retrieved from http://www.admissionsconsultants.com/college/ivy_league_financial_aid.asp.

Agresti, A., and B. Finlay. 2009. *Statistical Methods for the Social Sciences*, 4th ed. Upper Saddle River, NJ: Prentice Hall.

Armstrong, E. A., and L. Hamilton. 2013. *Paying for the Party: How College Maintains Inequality.* Cambridge, MA: Harvard University Press.

Baltzell, E. D. 1964. *The Protestant Establishment: Aristocracy and Caste in America.* New York: Vintage.

Binder, A. J., D. B. Davis, and N. Bloom. 2016. "Career Funneling: How Elite Students Learn to Define 'Prestigious' Jobs." *Sociology of Education* 89:20–39.

Blau, P. M., and R. Z. Margulies. 1974. "A Research Replication: The Reputations of American Professional Schools." *Change: The Magazine of Higher Learning* 6(10):42–47.

Boudreau, J. W., W. R. Boswell, and T. A. Judge. 2001. "Effects of Personality on Executive Career Success in the United States and Europe." *Journal of Vocational Behavior* 58(1):53–81.

Bourdieu, P. 1986. "The Forms of Capital." In *Handbook of Theory and Research for the Sociology of Education*, edited by J. Richardson, 241–58. Westport, CT: Greenwood.

_____. 1996. *The State Nobility: Elite Schools in the Field of Power.* Oxford: Polity Publishers.

Bourdieu, P., and J. C. Passeron. 1977. *Reproduction in Economy, Society, and Culture.* Beverly Hills, CA: Sage.

Bowen, W. G., and D. Bok. 1998. *The Shape of the River: The Long-Term Consequences of Considering Race in College and University Admissions.* Princeton, NJ: Princeton University Press.

Brint, S. 2001. "Professions and the 'Knowledge Economy': Rethinking the Theory of Post-Industrial Society." *Current Sociology* 49:101–32.

_____. 2007. "Can Public Research Universities Compete?" In *The Future of American Public Research Universities*, edited by Roger L. Geiger, Carol L. Colbeck, Christian K. Anderson, and Roger L. Williams, 91–118. Rotterdam: Sense Publishers.

_____. 2014. "Professional Responsibility in an Age of Experts and Large Organizations." In *Professional Responsibility*, edited by Douglas A. Mitchell and Robert K. Ream, 89–107. London: Springer.

Cappelli, P., and M. Hamori. 2004. "The Path to the Top: Changes in the Attributes of Corporate Executives 1980 to 2001" (NBER Working Paper 10507). Cambridge, MA: National Bureau of Economic Research. Retrieved February 28, 2015, from http://www.nber.org/papers/w10507.

Cappelli, P., M. Hamori, and R. Bonet. 2014. "Who's Got Those Top Jobs?" *Harvard Business Review* 92 (3):74–77.

Carnegie Foundation for the Advancement of Teaching (Carnegie Foundation). 2014. "Carnegie Classification of Institutions of Higher Education." Retrieved from http://carnegieclassifications.iu.edu/.

Chen, H., P. Gompers, A. Kovner, and J. Lerner. 2010. "Buy Local? The Geography of Venture Capital." *Journal of Urban Economics* 67(1):90–102.

Coleman, R. 1973. *Report on College Characteristics.* Cambridge, MA: Harvard–MIT Joint Center for Urban Affairs.

Cookson, P. W., and C. H. Persell. 1985. *Preparing for Power: America's Elite Boarding Schools.* New York: Oxford University Press.

Dale, S. B., and A. B. Krueger. 2002. "Estimating the Payoff to Attending a More Selective College: An Application of Selection on Observables and Unobservables." *Quarterly Journal of Economics* 117(4):1491–1527.

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_____. 2011. "Estimating the Return to College Selectivity over the Career Using Administrative Earnings Data." National Bureau of Economics Research Working Paper No. 17159. Retrieved from http://www.nber.org/papers/w17159.pdf/.

Deresiewicz, W. 2014. *Excellent Sheep: The Miseducation of the American Elite*. New York: Free Press.

Domhoff, G. W. 1970. *The Higher Circles: The Governing Class in America*. New York: Random House.

_____. 2006. *Who Rules America? Power, Politics and Social Change*. New York: McGraw-Hill.

Dye, T. R. 1976. *Who's Running America? Institutional Leadership in the U.S.* Englewood Cliffs, NJ: Prentice-Hall.

_____. 1990. *Who's Running America? The Bush Era*. Englewood Cliffs, NJ: Prentice-Hall.

Espenshade, T. J., and A. Walton Radford. 2009. *No Longer Separate, Not Yet Equal: Race and Class in Elite College Admission and Campus Life*. Princeton, NJ: Princeton University Press.

Gross, N. 2013. *Why Are Professors Liberal—And Why Do Conservatives Care?* Cambridge, MA: Harvard University Press.

Hernandez College Consulting. 2014. "Ivy League Admission Statistics for the Class of 2018." Retrieved from http://www.hernandezcollegeconsulting.com/ivy-league-admission-statistics-overall-2018/.

Hoxby, C. M. 2009. "The Changing Selectivity of American Colleges." National Bureau of Economics Research Working Paper No. 15546. Retrieved from http://www.nber.org/papers/w15446/.

Ingham, G. K. 1984. *Capitalism Divided? The City and Industry in British Social Development*. Basingstoke, Hampshire: Macmillan Publishers Limited.

Jacobs, P. 2014. "There Are Now 50 Colleges That Charge More Than $60,000 per Year." *Business Insider*, July 10. Retrieved from http://www.businessinsider.com/50-colleges-charge-60000-dollars-2014–7.

Kane, T. 1998. "Racial and Ethnic Preferences in College Admission." In *The Black-White Test Score Gap*, edited by C. Jencks and M. Phillips, 431–56. Washington, DC: Brookings Institution Press.

Kanter, R. M. 1987. *Men and Women of the Corporation*. New York: Basic Books.

Karabel, J. 2005. *The Chosen: The Hidden History of Admission and Exclusion at Harvard, Yale, and Princeton*. New York: Houghton-Mifflin.

Karen, D. 1985. "Who Gets into Harvard? Selection and Exclusion at an Elite College." Unpublished doctoral dissertation, Harvard University.

Khan, S. 2011. *Privilege: The Making of an Adolescent Elite at St. Paul's School*. Princeton, NJ: Princeton University Press.

Kuh, G. D., and E. T. Pascarella. 2004. "What Does Institutional Selectivity Tell Us about Educational Quality?" *Change: The Magazine of Higher Learning* 36(5):52–58.

MacCrimmon, K. R., and D. A. Wehrung. 1990. "Characteristics of Risk Taking Executives." *Management Science* 36(4):422–35.

Marginson, S., and M. van der Wende. 2009. "The New Global Landscape of Nations and Institutions." In *Higher Education 2030*. Paris: OECD Publishing.

MBA. 1975. "The *MBA* Survey of Graduate Business Schools: The Top 15." *MBA* 9(11):33–37.

Mills, C. W. 1956. *The Power Elite*. New York: Oxford University Press.

Moretti, E. 2013. *The New Geography of Jobs*. New York: Houghton Mifflin.

Ng, T. W., L. T. Eby, K. L. Sorensen, and D. C. Feldman. 2005. "Predictors of Objective and Subjective Career Success: A Meta-Analysis." *Personnel Psychology* 58:367–408.

Noss, A. 2014. "Household Income 2013: American Community Survey Briefs." Retrieved from http://www.census.gov/content/dam/Census/library/publications/2014/acs/acsbr13-02.pdf.

Ott, M. 2011. "Pathways to Power: How Did the Relationship between Postsecondary Attainment and Membership in the Corporate Elite Change from 1977 to 2010?" Paper presented at the Annual Meeting of the Association for the Study of Higher Education, Charlotte, NC, USA.

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Q10 Persell, C. H., and P. W. Cookson. 1990. In *The High Status Track: Studies of Elite Schools and Stratification*, edited by P. W. Kingston and L. S. Lewis, 25–49. Albany: State University of New York Press.

Poggi, G. 1990. *The State: Its Nature, Development, and Prospects*. Stanford, CA: Stanford University Press.

Polodny, J. M., and J. N. Baron. 1997. "Resources and Relationships: Social Networks and Mobility in the Workplace." *American Sociological Review* 62(5):673–93.

Rivera, L. A. 2012. "Hiring as Cultural Matching: The Case of Elite Professional Service Firms." *American Sociological Review* 77(6):999–1022.

Soares, J. A. 2007. *The Power of Privilege: Yale and America's Elite Colleges*. Stanford, CA: Stanford University Press.

Stanworth, P., and A. Giddens. 1974. "An Economic Elite: A Demographic Profile of Company Chairmen." In *Elites and Power in British Society*, edited by P. Stanworth and A. Giddens, 81–101. London: Cambridge University Press.

Stevens, M. L. 2007. *Creating a Class: College Admissions and the Education of Elites*. Cambridge, MA: Harvard University Press.

U.S. Bureau of the Census. 2012. "North American Industry Classification System." Retrieved from http://www.census.gov/cgi-bin/sssd/naics/naicsrch?chart=2012.

U.S. Bureau of Labor Statistics. 2016. "Foreign-Born Workers: Labor Force Characteristics–2015." Retrieved from http://www.bls.gov/news.release/pdf/forbrn.pdf.

U.S. Department of Education, National Center for Education Statistics. 1975. "Higher Education Information Survey: Degrees and Other Formal Awards Conferred." Retrieved from http://www.icpsr.umich.edu/icpsrweb/ICPSR/series/30/studies/2142?archive=ICPSR&sortBy=7&paging.startRow=26.

———. 1985. "IPEDS Completions Survey." Retrieved from http://nces.ed.gov/ipeds/datacenter/DataFiles.aspx.

———. 1995. "IPEDS Completions Survey." Retrieved from http://nces.ed.gov/ipeds/datacenter/DataFiles.aspx.

Useem, M., and J. Karabel. 1986. "Pathways to Top Corporate Management." *American Sociological Review* 51(2):184–200.

Wai, J. 2013. "Investigating America's Elite: Cognitive Ability, Education, and Sex Differences." *Intelligence* 41:203–11.

Wakeford, F., and J. Wakeford. 1974. "Universities and the Study of Elites." In *Elites and Power in British Society*, edited by P. Stanworth and A. Giddens, 185–97. London: Cambridge University Press.

Zhang, L. 2005. "Do Measures of College Quality Matter? The Effect of College Quality on Graduates' Earnings." *Review of Higher Education* 28(4):571–96.

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