

Internet Appendix for
“Climbing the Corporate Ladder: Whom Do
Highly Skilled CEOs Work For?”

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ABSTRACT

This document provides a detailed description of the construction and validation of the measure of cumulative excess managerial talent used in the paper, “Climbing the Corporate Ladder: Whom Do Highly Skilled CEOs work for?”.

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I. Construction of Talent Measures

Our measures of talent are based on résumé data contained in the U.S. version of the BoardEx database from 2000-2012. BoardEx collects biographical data on board members and senior executives from approximately 18,000 companies worldwide. Although our database begins in the year 2000, we can observe employment at companies many decades prior to that and at far more companies than BoardEx analyzes because BoardEx attempts to collect a complete career history for each individual in the database. This history includes the name of the company that the individual worked for, the role of the individual within that company, and beginning and ending dates for each role. In the version of the data that we use, there are 79,313 individuals with work or board experience at 215,961 unique companies; the earliest job begins in 1928, while the median individual's first recorded job begins in 1984. Across the data, the median (mean) individual has work and/or board experience at 7 (8.9) different companies. Importantly, BoardEx verifies all of this historical information using multiple sources before publishing it in their database; consequently, the available career history of each individual is likely to be reasonably accurate.

To create our measures of talent, we need the complete career history, including dates of all job changes, for each individual in our sample. Consequently, we throw out all observations that are missing either the starting or ending date for a role. If the date variable only includes the year, we assume that the role started (ended) on January 1 (December 31) of that year. Similarly, if the date only contains the month-year, we assign the starting (ending) date to be the beginning (end) of the month. This credits the individual with the maximum possible experience. We also limit the sample to individuals that have no more than an 18-month gap between jobs. This restriction allows for some transition time between jobs, but helps alleviate the possibility that we include

individuals in the sample with missing career history. After applying these two filters, we are left with 78,829 individuals with work experience at 132,705 unique companies.

A. Measuring Managerial Talent

For each individual in this sample, we collect all current and past job titles (*Role*). There are 5,135 different job titles, which can be modified with a description (*Role Description*) for a total of 120,040 unique combinations. We manually classify every job title that appears more than 200 times on a hierarchical scale from 0 to 6 with 0 representing no management responsibilities and 6 representing the chief executive officer (see Table I in the main paper). This hand classification represents only about 5% of the job titles, but nearly 85% of the sample.

Some job titles are straightforward to rank, e.g. “Chief Financial Officer.” Other job titles are more obscure, e.g. “Officer.” For obscure titles, we examine the most commonly used descriptions of the role and use this additional information to assign the most likely rank for the title. For example, in the case of “Officer”, the most common descriptions are “Loan Officer” and “Lending Officer” so we assign “Officer” a rank of 0 (no management experience). We also omit the very common tile of “Various Positions.” Because we are unable to determine either exact dates or position types for “Various Positions”, we assign missing values to the hierarchy measure for this role.

We use this hand-classified sample of job titles to develop an algorithm to classify the rank of all job titles in BoardEx. We first assign all jobs that are not at either quoted or private firms a managerial rank of 0. These jobs include academic and government jobs, military experience, and charitable organizations and represent about 10% of the sample (see Table IAI). Since these jobs are not primarily focused on profit maximization, the experience gained through these roles is not

directly comparable to experience in managerial jobs at public and private for-profit firms.¹ For the remaining 90% of the sample, we use our hand-classified rankings for those job titles that have an exact match, but we modify these rankings based on the contextual information available in the role description. For instance, we rank the title “President” a level 5 (“Second-in-command”) in our hand classification. In our algorithm, however, we lower that ranking to a level 3 (“Senior managers”) if the role description contains information about a division, region, or group since the president of the company is clearly a more senior role than the president of a division.

Finally, we assign a rank to each of the other job titles based on their similarity to our hand-classified sample and accounting for the relevant information in the role description. We then subtract one from the rank of any title that is modified by the qualifiers “acting”, “interim”, or “assistant” to reflect the idea that these positions do not carry the same extent of signal about managerial ability as a full-time, permanent position.

After completing this ranking process, we check to see if the resulting hierarchy is consistent. At the firm-year level, we expect a roughly triangular shaped structure: a large number of lower level managers, a smaller number of senior managers, and a single chief executive officer. After the first pass of the algorithm, this process revealed some clear outliers.² We adjust the algorithm to account for the problematic titles and report the results in Table IAI. Two important things emerge from this table: first, the classification scheme we employ results in a roughly triangular shaped firm-hierarchy. In an average firm-year, we observe 6 mid-level managers, 3 senior managers, 2 members of the executive suite, 1 second-in-command (such as the CFO), and 1 CEO,

¹ We use experience at these other types of firms to create various measures of professional skills.

² For example, the maximum number of CEOs in a firm-year was over 100. In this case, the culprit was the “Managing Director” title which is often used by firms as an alternative to the CEO title. However, it is also used by some investment companies to represent a much lower role equivalent to a senior manager. We altered our algorithm to classify “Managing Director” as a level 3, rather than a level 6, if there is another CEO title present in that company’s history.

which suggests that the classification scheme is reasonable. Second, we observe very few line managers (level=1). This result reflects both that early job history is underreported and the fact that our algorithm struggles to differentiate between level 1 and level 2 jobs. Importantly, all of the results in our paper are robust to combining level 1 and 2 jobs into a single category.

Table I AII also reveals that for most firm-years we observe only 1 employee in any specific managerial level. This sparsity is expected because most of these firms are not specifically analyzed by Boardex; consequently, they appear only to the extent that they are in the past working history of an individual in Boardex's database. Reassuringly, though, the triangular firm hierarchy persists across the entire upper half of the distribution where we observe many more individuals in any given employee-year. Note also that there appears to be relatively little noise in the automated assignment of executive positions. At most, the algorithm assigns 3 chief executive officers to a firm-year, which is possible due to co-CEO positions and overlapping dates (we verify these observations by hand).

Clearly, the managerial experience gained in a given job title varies across firm size. For example, a division president at a very large firm (such as General Electric) might be functionally similar to CEO at a smaller firm. To account for this, we scale the rank measures by firm size. In each year, we sort firms into quartiles based on total assets.³ We add one to the hierarchy measure for firms in the top quartile, and subtract one for firms in the bottom quartile.⁴ We only adjust rankings for job titles that are at or above senior manager positions (level 4 or higher), since it

³ We assign private firms to the lowest quartile, but the results in our paper are robust to assigning private firms to the middle two quartiles.

⁴ Our results are robust to scaling based on market capitalization instead of assets, and for using multiplicative, rather than additive, adjustments.

seems less likely that lower level managerial positions provide differing levels of managerial experience based on firm size.⁵

After accounting for differences in job title based on firm size, we check to see if our ranking is consistent at the job title level by examining promotions. The Boardex database sometimes has multiple observations per individual at any given time. Most frequently this is because an individual is both currently working as an executive and serving as a non-executive board member at one or more firms. Sometimes, though, an individual simultaneously holds multiple jobs. In either case, we assign the highest managerial rank across all the individual's current roles as of December 31 to be the individual's managerial rank for that calendar year. There are 2,011,557 individual-year observations in our data. We examine promotions and demotions for each individual from year to year by looking at the change in managerial rank. Promotions are defined as an increase in managerial rank, while demotions are defined as a decrease in managerial rank.

Note that in this context, demotion does not necessarily have a negative connotation. For example, we might observe a decrease in managerial rank because a CEO retires and then serves as an advisor to the firm, or leaves the firm to found a new start-up or work in a government position. Similarly, we are not able to measure promotions in the typical sense. We capture circumstances where an individual both changes titles and increases in managerial rank. As a result, an individual that moves from one CFO position to a different CFO position at a similarly-sized firm will not be counted as a promotion for this exercise.⁶

While it is possible for any individual to be promoted from a low managerial level to a high level, if our algorithm does a reasonable job of assigning managerial ranks we expect to see

⁵ Our results are robust, though, to adjusting for firm size for all positions or not adjusting for firm size at all.

⁶ These strict definitions mean that we observe relatively few promotions/demotions in the data. Over 1.5 million of our individual-year observations have no change in managerial rank.

relatively few cases of large jumps in rank from year to year. The data confirms that this is the case. In Table IAIII, we summarize the distribution of changes in managerial rank by the starting job rank. Panel A reports the results for promotions, while Panel B shows the distribution for demotions. On average, we observe promotions (demotions) result in an increase (decrease) in managerial rank of between 1-2 levels. The only exception is individuals with no managerial experience (rank=0), which on average receive promotions of 3 ranks. This is driven by individuals in non-managerial positions (lawyers, accountants, engineers, professors, etc.) who are appointed as independent members of the board of directors (rank=3).

While the distributions reported in Table IAIII show that there are relatively few cases of large jumps in managerial rank, the maximum increase in rank shown in Panel A implies that there is at least one individual promoted as CEO directly from each rank-level.⁷ This suggests that there are at least some instances where our algorithm does a poor job of classifying managerial rank.

To get a sense if this is driven by misclassification of any particular job title, we examine each starting job title where an individual receives a promotion of more than 2 rank-levels. The 25 most-frequent of these job titles are reported in Table IAIV. The top 5 most frequently observed titles are Partner, Employee, Consultant, Principal, and Founder. Our algorithm classifies each of these titles as having no managerial experience (rank=0). Generally, this classification seems reasonable: the first four titles do not clearly have a managerial role, and while a founder might also be a manager, a hand-check of a random sample of this title reveals both founders that have an executive role in the firm and founders that are primarily providing capital. There is no automated way to distinguish this in the data, so we take the conservative approach of assigning no managerial experience. Most of the other titles in the list are also assigned no or low levels of

⁷ The maximum increase in rank plus the existing rank is always equal to 7, implying that there is at least one promotion from that rank-level to a CEO of a large firm.

managerial experience for similar reasons. As a whole, though, none of the titles jumps out as a particularly implausible title to receive a promotion to a senior executive or CEO position.

Table IAV examines the 25 most-frequently observed ending job titles after receiving a demotion of more than 2 managerial ranks. This table suggests that most large drops in managerial rank reflect partial retirements as CEOs leave to take jobs with titles of Consultant, Partner, Principal, Chairman, Independent Director, and Advisor. There also appears to be a number of executives who become entrepreneurs with titles like Founder, Co-Founder, and Owner. Overall, the titles in Table IAV are mostly consistent with the type of work that one would expect former executives to do.

Comparing both Table IAIV and IAV, one set of titles stands out as likely to be misclassified: Officer, Executive Officer, and Executive. These are titles that probably don't experience large promotions and they are not likely to be the end title after a large demotion. As a result, we adjust these titles so that at the individual level the change in job rank is no more than 2.⁸

Together, the results in this appendix show that despite the noise inherent in our rank classification algorithm, there are no obvious cases of systematic misclassification. At the company-year level the ranking results in a triangular firm hierarchy and at the individual-year level the rankings result in average promotions and demotions that are around 2-rank levels or less.

Having established that our ranking algorithm is reasonable, we use this measure of managerial rank to create a measure of managerial talent at the individual year level. As described in Section I of the main paper, for each individual-year we subtract the average managerial rank of all individuals born in the same decade from the highest managerial rank that an individual has as of December 31 of that year. We then take the piece-wise integral of this measure over all prior years

⁸ Note that our results in the main paper are robust to ignoring this correction.

and refer to this measure as managerial talent. In tables III and IV of the main paper, we show that this measure of managerial talent predicts out of sample career progression, becoming a CEO, individual awards, and service as an independent director.

B. Measuring Professional Talent

Our measure of managerial talent is designed to reflect an individual's experience and success in the managerial career track. Of course, there are many other dimensions of talent. We try to capture some of these other dimensions by tracking professional work experience. We define 8 types of professional experience: military, academic, government, medical, finance, law, STEM, and entrepreneurial. Using the same sample described previously, we flag each individual-year where an individual has experience in these areas. We then create an excess measure of experience by subtracting out the average amount of experience across that individual's decade-cohort for that year. We sum this excess experience over all prior years to create an index of professional experience in each dimension.

Military experience is defined as any job where the company type is "Air Force," "Armed Forces," "Army", or "Navy." Academic experience is any job where the company type is "Universities" or where the job title is "Professor."⁹ Government experience is any job where the company type is "Government." Medical experience is defined as any job where the company type is "Medical." Finance experience is any job where the job title includes any of the following terms or their derivatives: analyst, accountant, investment banker, auditor, financial analyst, economist, trader, and stockbroker. Law experience is any job title that includes the terms attorney, lawyer, counsel, and judge. STEM experience is defined as job titles that include engineer, scientist, geologist, scientific advisor, geophysicist, and chemist. Entrepreneurial

⁹ Or any of its derivatives, e.g., Assistant Professor, Associate Professor, etc.

experience includes anyone that mentioned founder, owner, or entrepreneur in either the job title or the role description.

In the main paper, we add all 8 of these indices together to create a measure of professional talent. In figures 1 and 2, we graph the average professional experience by age for each of these dimensions of professional talent. Figure 1 shows the average experience for finance, STEM, law, medical and military, while Figure 2 shows the average experience for government, academic, entrepreneurial experience and our overall professional index.

Experience in government, academics, entrepreneurial work, law, medical and military increases more or less linearly over an individual's life, suggesting that these career paths are orthogonal to managerial jobs. Most of these individuals end up in the BoardEx database because they serve as independent directors and not because they have any managerial experience. In contrast, finance and STEM experience increases over the early part of the individual's life, but slowly decreases beginning in the mid-30s. This is driven by many of these individuals moving into the managerial track after beginning their career in other fields.

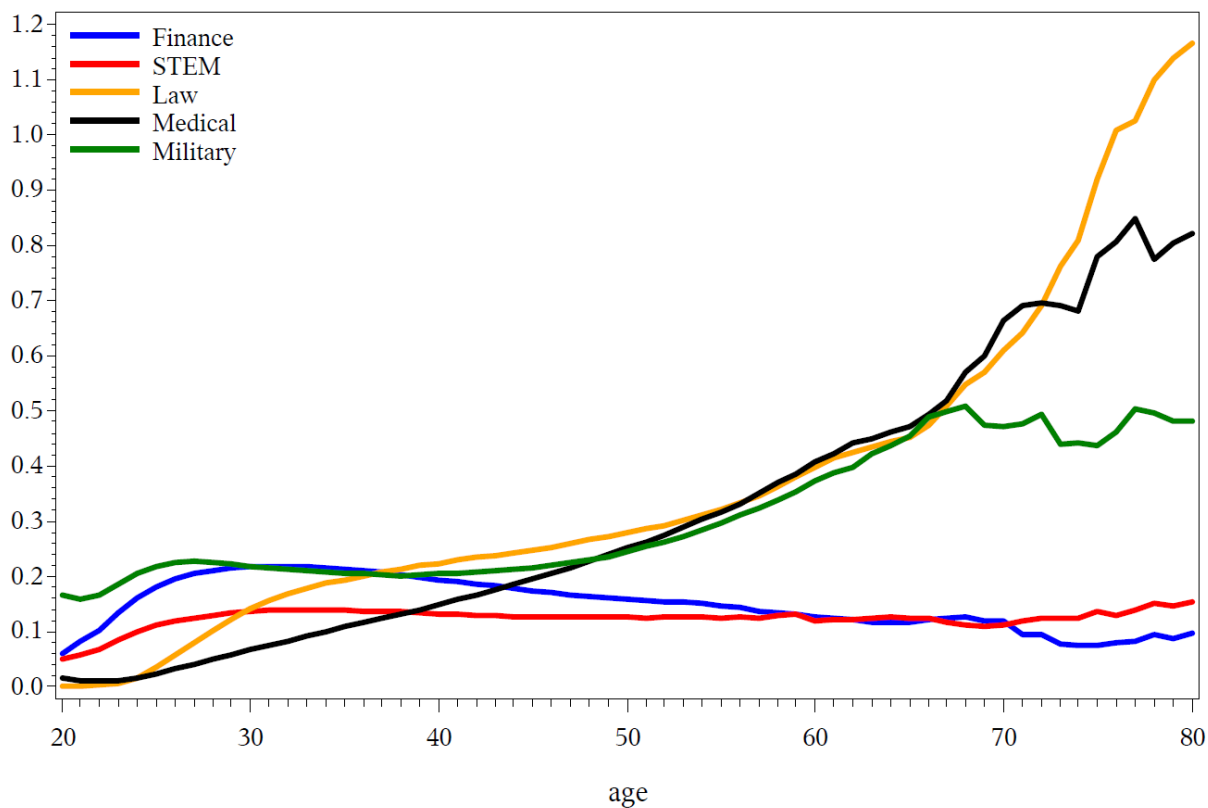


Figure 1. Professional Experience by Age. This figure displays the average professional experience by age, split into cohorts based on birth decade. In each year, we take the cumulative sum of all previous job experience in finance, STEM, law, medical and military fields. The data is based on employment history for U.S. executives, senior managers, and directors found in the BoardEx database.

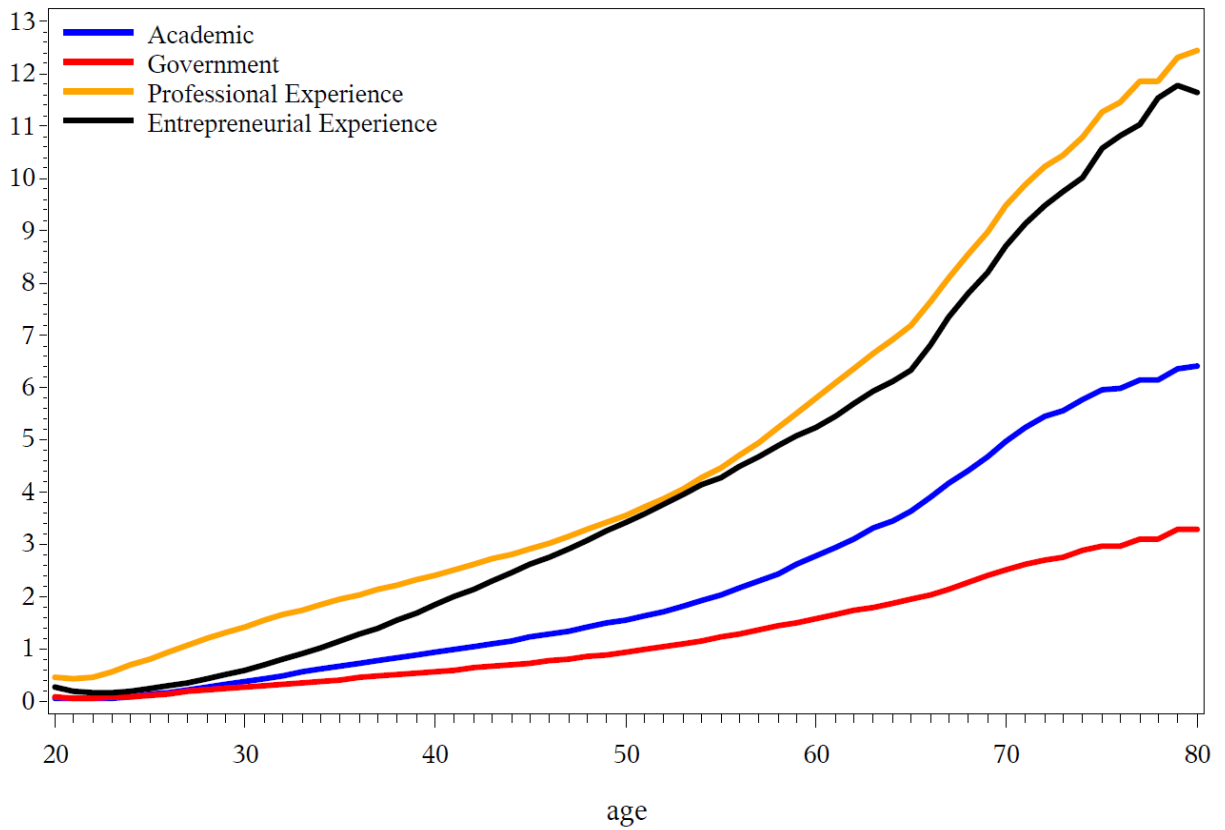


Figure 2. Professional Experience by Age. This figure displays the average professional experience by age. In each year, we take the cumulative sum of all previous job experience Academic, Government, and Entrepreneurial jobs. The professional index is the sum of these plus experience in finance, STEM, law, medical and military fields. The data is based on employment history for U.S. executives, senior managers, and directors found in the BoardEx database.

Table IAI
Company Types in BoardEx

This table summarizes the frequency and percent of distinct companies that appear in the résumé data of the BoardEx database sorted by company type. We only assign managerial experience to jobs that are at public (quoted) or private firms. We use experience at other types of organizations to create various other measures of professional experience.

Company Type	Frequency	Percent
Air Force	1,773	0.5
Armed Forces	304	0.1
Army	1,536	0.4
Charities	1,392	0.4
Clubs	769	0.2
Government	14,469	3.6
Medical	2,350	0.6
Navy	1,381	0.4
Private	203,767	51.3
Quoted	153,596	38.7
Sporting	245	0.1
Universities	15,416	3.9

Table IAI
Managerial Ranking Distribution by Company-Year

This table summarizes the distribution of managerial roles at the firm-year level based on the résumé data of individuals in the BoardEx database. We sort job titles into a managerial hierarchy ranging from level 1 to 6 and then count the number of each type of managers for each firm-year and report the distribution.

Level	Type	Mean	Min	25%	Median	75%	99%	Max
1	Line managers	2.0	1	1	1	1	17	28
2	Mid-level Managers	5.9	1	3	5	8	16	38
3	Senior Managers	3.4	1	1	1	3	30	52
4	Executive Suite	1.8	1	1	1	2	9	19
5	Second-in-Command	1.2	1	1	1	1	3	5
6	CEO	1.0	1	1	1	1	2	3

Table I AIII
Distribution of Promotions and Demotions by Managerial Rank

This table summarizes the distribution of promotions (defined as an increase in managerial rank from the prior year) and demotions (defined as a decrease in managerial rank from the prior year) by the rank level of the prior year job. Managerial rank is defined by job title and adjusted for firm size and ranges from 0 to 7. Promotions and demotions are measured at the individual level and we discard any individual with gaps in career history that are greater than 18 months; there are a total of 2,011,557 individual-year observations. For each starting level of managerial rank, we count the number of promotions (demotions) and report the distribution of the change in managerial rank. Panel A reports the distribution of rank-level increases for promotions, while Panel B reports the distribution for demotions. Note that in this table demotion does not mean that an individual is fired, but only that the individual took a job with a lower managerial rank. In addition to job dismissal, this can occur when an individual partially retires and takes a role as an advisor or board member or when an individual leaves management to pursue an alternative career path (entrepreneurship, government work, philanthropy, etc.).

Panel A: Managerial Rank Increases for Promotions

Level	# of Promotions	Mean	Min	25%	Median	75%	Max
0	27,680	3.6	1	3	4	4	7
1	5,293	2.4	1	2	2	3	6
2	4,493	1.6	1	1	1	2	5
3	34,529	1.4	1	1	1	2	4
4	21,205	1.1	1	1	1	1	3
5	7,619	1.1	1	1	1	1	2
6	1,490	1.0	1	1	1	1	1

Panel B: Managerial Rank Decreases for Demotions

Level	# of Demotions	Mean	Min	25%	Median	75%	Max
1	743	-1.0	-1	-1	-1	-1	-1
2	556	-1.7	-2	-2	-2	-1	-1
3	4,512	-2.4	-3	-3	-3	-2	-1
4	16,881	-2.1	-4	-4	-1	-1	-1
5	24,075	-1.5	-5	-2	-1	-1	-1
6	6,275	-1.8	-6	-2	-2	-1	-1
7	1,581	-2.3	-7	-3	-3	-1	-1

Table IAIV
Large Promotions by Job Title

This table summarizes the 25 most frequently observed starting job titles where an individual receives a promotion greater than 2-rank levels. We report the number of promotions observed, the mean and median increase in rank for this promotion, and the maximum observed increase in rank (max values of 6 or 7 imply that the individual was promoted from this job title into the role of CEO).

Job Title	# of Promotions	Mean Increase in Rank	Median Increase in Rank	Max Increase in Rank
PARTNER	1,525	3.75	4	7
EMPLOYEE	826	3.55	3	7
CONSULTANT	676	3.90	4	6
PRINCIPAL	565	3.76	3	6
FOUNDER	473	4.26	4	6
ASSOCIATE	392	3.26	3	5
CO-FOUNDER	310	4.08	4	6
MANAGER	241	3.43	3	5
ATTORNEY	233	3.37	3	5
OFFICER	212	3.60	3	6
ANALYST	207	3.30	3	5
EXECUTIVE OFFICER	204	4.05	4	6
GENERAL PARTNER	188	3.76	3	6
MANAGING PARTNER	179	3.54	3	6
EXECUTIVE	169	3.80	3	6
ENGINEER	162	3.35	3	6
DIVISION PRESIDENT	146	3.16	3	4
OWNER	144	4.13	4	6
GENERAL MANAGER	139	3.03	3	4
SENIOR PARTNER	128	3.85	4	5
ADVISOR	124	3.99	4	7
ACCOUNTANT	120	3.39	3	5
ASSISTANT	120	3.33	3	5
COUNSEL	109	3.59	3	6
VICE CHAIRMAN	98	3.32	3	4

Table IAV
Large Demotions by Job Title

This table summarizes the 25 most frequently observed ending job titles where an individual experiences a demotion greater than 2-rank levels. We report the number of demotions observed, the mean and median decrease in rank for this demotion, and the maximum observed fall in rank (max values of -6 or -7 imply that the individual's previous job was CEO). Note that in this table demotion does not mean that an individual is fired, but only that the individual took a job with a lower managerial rank. In addition to job dismissal, this can occur when an individual partially retires and takes a role as an advisor or board member or when an individual leaves management to pursue an alternative career path (entrepreneurship, government work, philanthropy, etc.).

Job Title	# of Demotions	Mean Drop in Rank	Median Drop in Rank	Max Drop in Rank
CONSULTANT	739	-4.2	-4	-7
PARTNER	596	-3.7	-3	-6
PRINCIPAL	377	-3.7	-3	-6
EMPLOYEE	248	-4.3	-4	-7
CHAIRMAN	207	-3.0	-3	-3
INDEPENDENT DIRECTOR	204	-3.0	-3	-3
ADVISOR	200	-4.3	-4	-7
FOUNDER	192	-3.9	-4	-7
DIRECTOR - SD	164	-3.0	-3	-3
GENERAL PARTNER	158	-3.8	-3	-7
SENIOR ADVISOR	114	-4.2	-4	-7
EXECUTIVE OFFICER	106	-3.9	-4	-7
MANAGING PARTNER	100	-3.6	-4	-5
VICE CHAIRMAN	96	-3.1	-3	-4
CO-FOUNDER	85	-3.8	-3	-7
OWNER	83	-3.8	-4	-6
EXECUTIVE	80	-3.7	-3	-5
SENIOR PARTNER	74	-3.7	-3	-6
CHAIRMAN EMERITUS	64	-4.6	-5	-7
OFFICER	58	-3.7	-3.5	-5
INDEPENDENT CONSULTANT	50	-4.0	-4	-7
MANAGER	46	-3.2	-3	-5
ATTORNEY	41	-3.5	-3	-6
DIVISION PRESIDENT	37	-3.1	-3	-4
DIRECTOR - ED	34	-3.2	-3	-4