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Renée Adams, Matti Keloharju and Samuli Knüpfer

Research Institute of Industrial Economics
P.O. Box 55665
SE-102 15 Stockholm, Sweden
info@ifn.se
www.ifn.se

Match Made at Birth?
What Traits of a Million Swedes Tell Us about CEOs*

Renée Adams

University of New South Wales, ECGI, and FIRN

Matti Keloharju

Aalto University School of Business, CEPR, and IFN

Samuli Knüpfer

London Business School, CEPR, and IFN

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Abstract

This paper analyzes the role three personal traits—cognitive and non-cognitive ability, and height—play in the market for CEOs. We merge data on the traits of more than one million Swedish males, measured at age 18 in a mandatory military enlistment test, with comprehensive data on their income, education, profession, and service as a CEO of *any* Swedish company. We find that the traits of large-company CEOs are at par or higher than those of other high-caliber professions. For example, large-company CEOs have about the same cognitive ability, and about one-half of a standard deviation higher non-cognitive ability and height than medical doctors. Their traits compare even more favorably with those of lawyers. The traits contribute to pay in two ways. First, higher-caliber CEOs are assigned to larger companies, which tend to pay more. Second, the traits contribute to pay over and above that driven by firm size. We estimate that 27−58% of the effect of traits on pay comes from CEO's assignment to larger companies. Our results are consistent with models where the labor market allocates higher-caliber CEOs to more productive positions.

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1. Introduction

How do the personal traits of Chief Executive Officers (CEOs) differ from the population and from other high-prestige professionals? Which traits matter most in becoming a CEO? To what extent do the traits explain CEO pay, both relative to the population and relative to one another? How do labor market rewards to CEOs' traits differ from those of other high-prestige professionals? How much of the link between traits and pay is explained by higher-caliber CEOs' assignment to larger companies?

Addressing these questions is important for two reasons. First, as perhaps the most influential and visible corporate professionals, CEOs matter. They personify the companies they lead and their appointments and compensation attract immense public attention. This attention partly reflects the public's admiration for the high status and demands that come with the job, but it is also often mixed with feelings of envy or even outrage on compensation.[1] Analyzing the traits of CEOs helps in understanding how the labor market for CEOs operates and, more generally, what types of individuals make it to the top. These analyses also make it possible to empirically evaluate theories that attempt to explain patterns in CEO compensation.

Second, the existing literature has little to say about these questions, particularly when it comes to comparing CEOs to other high-caliber professionals or to the population. This is largely due to the lack of data: key trait variables such as cognitive and non-cognitive ability are highly

[1] See Bertrand (2009) for a review of the literature on CEOs, and Edmans and Gabaix (2009), Frydman and Jenter (2010), and Murphy (2012) for reviews of the CEO compensation literature. Fernandes et al. (2012) report comparative evidence on CEO compensation in 14 countries.

sensitive and therefore generally not available to researchers.[2] Perhaps the most promising trait proxy used in existing research is the average SAT score of the college attended by the CEO (see, e.g., Graham, Harvey, and Puri, 2013), but even this variable is likely to be correlated not only with intrinsic ability but also with effort, connections, and the quality of training (Chevalier and Ellison, 1999). Availability of education-based proxies is also necessarily confined to the subset of CEOs for whom bibliographic data can be found in the public domain. Such analyses inevitably exclude the CEOs of private companies, which account for the bulk of economic activity (Asker, Farre-Mensa, and Ljungqvist, 2013), let alone the public in general.

This paper analyzes the role three personal traits—cognitive and non-cognitive ability, and height—play in the market for CEOs. A large literature on rank-and-file employees finds these variables to significantly predict labor market outcomes.[3] Our sample covers almost the entire population of Swedish males born between 1952 and 1978. We merge the data on their traits, measured at age 18 in a mandatory military enlistment test, with comprehensive register-based data on their income, education, profession, and service as a CEO of *any* Swedish company, whether public or private. Our sample includes 1.3 million men, of whom about 41,000 served as CEOs in the 2004−10 period. Our empirical tests include controls for enlistment year, which allows us to account for changes in testing procedures and secular trends in the trait measures.[4]

[2] Kaplan, Klebanov, and Sorensen (2012) is a rare exception to this norm. They analyze the personal characteristics of 316 candidates considered for CEO positions in firms involved in private equity transactions.

[3] A large literature on the role of education and labor market outcomes uses cognitive skills as the sole proxy for ability (e.g. Herrnstein and Murray, 1996 and Schmidt and Hunter, 1998). Others argue that non-cognitive skills are also important for predicting labor market outcomes (e.g. Heckman, 1995 and Heckman, Stixrud and Urzua, 2006) Yet another sizeable literature documents that height is related to labor market outcomes and leadership (e.g. Steckel, 1995, 2009; Persico, Postlewhite, and Silverman, 2004; Case and Paxson, 2008; and Lindqvist, 2012). Bolton, Brunnermeier, and Veldkamp (2010) offer a tentative economic analysis on the elements of effective leadership.

[4] Floud, Wachter, and Gregory (1990) document a systematic increase in the height of British military recruits between 1750 and 1980. Flynn (1984) reports a systematic increase in measured cognitive ability over time.

Our findings can be summarized as follows:

1. The traits of large-company CEOs (defined here as having at least SEK 10 billion or USD 1.5 billion in total assets) are at par or higher than those for other high-profile professions. For example, large-company CEOs have almost as high cognitive ability, and about one-half of a standard deviation higher non-cognitive ability and height, than medical doctors. Their caliber compares even more favorably with trial lawyers.
2. CEOs differ more from the population in the combination of traits than in any individual trait. However, the difference between the combination and the best individual trait is usually relatively small. The median large-company CEO dominates about nine tenths of the population in the three traits.
3. Non-cognitive ability is the best predictor of appointment to a CEO position, followed by cognitive ability. CEOs also differ from their siblings most in non-cognitive ability. Among cognitive ability subcomponents, the component measuring induction (including problem solving and numerical ability) has the most predictive power for CEO appointment decisions.
4. CEOs' traits are related to the level and variation in their pay. The three traits alone account for 10−23% of the pay premium CEOs enjoy relative to the population. One-standard deviation increases in cognitive ability, non-cognitive ability, and height are associated with 10%, 11%, and 4% higher CEO pay, respectively. These trait gradients are 1−2 percentage points higher than the corresponding gradients for lawyers, and 4−8 percentage points higher than those for medical doctors.
5. The caliber of CEOs increases almost monotonically with firm size. Large-company CEOs have more than one-half of a standard deviation higher cognitive ability and

height than the CEOs of small companies (defined here as having at most SEK 100 million or USD 15 million in total assets). The difference in their non-cognitive ability is even greater.

6. A higher value in a trait is positively associated with the appointment decision of a CEO regardless of firm size. The link between cognitive ability and CEO appointment is strongest for small firms and weakest for large firms. The opposite applies for non-cognitive ability and height. These results are consistent with the idea that large firms give less weight to cognitive ability in their CEO appointment decisions than small firms.
7. The traits contribute to CEO pay in two ways. First, higher-caliber individuals are assigned to larger companies, which tend to pay more. Second, the traits contribute to pay over and above that driven by firm size. We estimate that 27%−58% of the effect of traits on pay comes from CEO's assignment to larger companies.

Do our results on CEO appointments generalize to other countries, including those with large and sophisticated companies? We believe they do. Sweden has had many world-class companies since the late 19th century (Olsson, 1993); on a per capita basis, there were above 50% more Swedish companies in the 2013 Forbes Global 2000 list than US or UK corporations. Few large Swedish companies are government-owned (Faccio and Lang, 2002), and the managing practices of mid-sized Swedish companies are among the best in the world (Bloom and van Reenen, 2010). We thus expect Swedish CEOs to be selected at least as carefully as their peers in most other industrialized countries.

We also have a good reason to expect that our results on the association between traits and pay are at least as strong in other developed markets as they are in Sweden. Income is more evenly distributed in Sweden than in any other country in the world (CIA World Factbook). The high level of income equality is reflected in the paychecks of CEOs: Fernandes et al. (2012) report that the level of CEO pay in Sweden is among the lowest in Western countries. Hanushek et al. (2013) find that the returns to skills are in Sweden only about a half of what they are in the U.S., and generally lower than in other industrialized countries. This means that our results should, if anything, be considered as conservative estimates on the effect of traits on pay.

Our paper is related to three strands of literature. First, it is related to a large management literature[5] and a wide array of recent economics and finance studies that analyze the effect of CEOs on various firm outcomes. Bertrand and Schoar (2003) and Graham, Li, and Qiu (2012) document that CEO-level fixed effects matter for corporate policies and firm performance. To find out what accounts for these fixed effects, researchers have looked into observable CEO characteristics, collected usually from bibliographic data[6] or surveys[7]. In some studies, CEO ability or characteristics are inferred from stock price reactions or operating performance[8] or from personal portfolio decisions[9]. We focus on trait measures that are considerably more generic in nature than those analyzed in the literature[10], measured before the future CEOs have specialized professionally or have had a chance to gain any significant leadership experience. The timing of

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[5] See, for example, Lieberson and O'Conner, 1972; Hambrick and Mason, 1984; Thomas, 1988; Finkelstein, Hambrick, and Cannella, 2009; and Hiller et al., 2011. As pointed out by Bertrand and Schoar (2003), the focus of this literature and the methodological approach it follows differ substantially from that in the economics and finance papers.

[6] Adams, Almeida, and Ferreira, 2005; Malmendier and Tate, 2009; Schoar and Zuo, 2011; Benmelech and Frydman, 2012; Falato, Li, and Milbourn, 2012; Custódio, Ferreira, and Matos, 2013; Custódio and Metzger, 2013; and Graham, Harvey, and Puri, 2013.

[7] Graham, Harvey, and Puri, 2013; Mullins and Schoar, 2013; and Bandiera et al., 2014.

[8] Johnson et al., 1985; Pérez-González, 2006; Bennedsen et al., 2007; Bennedsen, Pérez-González, and Wolfenzon, 2010; Bennedsen, Pérez-González, and Wolfenzon, 2012; and Chang, Dasgupta, and Hilary, 2010.

[9] Malmendier and Tate 2005, 2008; Malmendier, Tate, and Yan, 2011; and Hirshleifer, Low and Teoh, 2013.

[10] Murphy and Zábojník (2004, 2007) and Frydman (2007) argue that general managerial skills (i.e., skills transferable across companies, or even industries) have become relatively more important for the CEO job in the past decades.

the measurement of the test scores helps us rule out the possibility that professional choice or leadership experience influences the test scores, making it meaningful to compare the traits of future CEOs with those of other high-profile professionals and the public in general.

Second, we contribute to the literature that studies how competitive markets assign CEOs to firms. There are two related outcomes in this literature: who becomes a CEO, and who makes it to the top of the largest companies. Terviö (2008) and Gabaix and Landier (2008) build models where one-dimensional CEO talent is matched to firms of different size. Eisfeldt and Kuhnen (2013) model CEOs as multidimensional skill bundles and allow heterogeneity in how different firms value each dimension of skill. Edmans and Gabaix (2011) study multidimensional firms. Terviö (2009) analyzes how labor market imperfections make entry to the CEO market difficult in the first place. To our knowledge, we are the first to test assignment models' key prediction that higher-ability individuals get to work as CEOs of larger companies. Our results are consistent with this prediction and the general idea that the labor market allocates higher-caliber individuals to more productive positions.

Third and finally, our paper is related to papers that analyze the characteristics or compensation of other high-caliber professionals, including lawyers (Kaplan and Rauh, 2010, 2013 and Oyer and Schaefer, 2012) and finance professionals (Kaplan and Rauh, 2010, 2013; Philippon and Resheff, 2012; and Célérier and Vallée, 2014). Perhaps the closest of these studies to ours are the ones by Lindqvist and Vestman (2011) and Lindqvist (2012), which match enlistment test data with the income of individuals in managerial positions. These individuals account for 8% of the male population and are thus on average considerably lower on the corporate ladder than CEOs. These studies also lack data on firm size, a key attribute in assignment models.

2. Data

Our data set combines information from the Military Archives, Statistics Sweden, and Swedish Companies Registration Office.[11]

Military Archives. The traits data originate from the Swedish military, which examines the health status and the cognitive, non-cognitive, and physical characteristics of all conscripts. The purpose of the data collection is to assess whether conscripts are physically and mentally fit to serve in the military and suitable for training for leadership or specialist positions. The examination spans two days and takes place at age 18. Lindqvist and Vestman (2011) offer a more comprehensive description of the testing procedure.

The data are available for Swedish males who were drafted between 1970 and 1996. Military service was mandatory in Sweden during this period, so the test pool includes virtually all Swedish men. The data record the year in which the conscript was enlisted.

The cognitive-ability test consists of four subtests designed to measure inductive reasoning (Instruction test), verbal comprehension (Synonym test), spatial ability (Metal folding test), and technical comprehension (Technical comprehension test). The subscores and their aggregation into a composite score are reported on a stanine (STAndard NINE) scale. On this scale a normal distribution is divided into nine intervals, each of which has a width of 0.5 standard deviations excluding the first and last. An individual's test score thus tells how well he performed relative to an entire cohort of test takers.

[11] The sensitive nature of the data necessitated an approval from the Ethical Review Board in Sweden and a data secrecy clearance from Statistics Sweden. The identifiers for individuals, firms, and other statistical units were replaced by anonymized identifiers and the key that links the anonymized identifier to the real identifiers was destroyed. The data are used through Microdata Online Access service provided by Statistics Sweden.

Psychologists use test results and family characteristics in combination with one-on-one semi-structured interviews to assess conscripts' psychological fitness for the military. Psychologists evaluate each conscript's social maturity, intensity, psychological energy, and emotional stability and assign a final aptitude score following the stanine scale. Conscripts obtain a higher score in the interview when they demonstrate that they have the willingness to assume responsibility, are independent, have an outgoing character, demonstrate persistence and emotional stability, and display initiative. Importantly, a strong desire for doing military service is not considered a positive attribute for military aptitude (and may even lead to a negative assessment), which means that the aptitude score can be considered a more general measure of non-cognitive ability (Lindqvist and Vestman, 2011).

To assess physical aptitude for the military, the military collects physical information about conscripts including their height. In robustness checks, we also use supplementary data from a variety of strength and fitness tests. Prior literature shows that physical fitness modifies the relationship between height and labor market outcomes (Lindqvist, 2012; Lundborg, Nystedt, and Rooth, 2014). Cardiovascular fitness is measured in a cycle ergometry test and muscle strength on a combination of knee extension, elbow flexion, and hand grip tests.

Statistics Sweden. We merge the traits data to personal characteristics obtained from Statistics Sweden. The bulk of these data comes from the LISA database that covers the whole Swedish population of individuals who are at least 16 years old and resident in Sweden at the end of each year. This database integrates information from registers held by various government authorities. We extract information on labor and total income, field and level of education, profession, and family relationships. Labor income includes all income taxed as labor income in a given year; base salaries, stock option grants, bonus payments, and benefits qualify as taxable labor income.[12] The education levels consist of five categories that vary from basic education to graduate studies. We use the fields of education to classify degrees into law, business, administration, government, natural sciences, agriculture, engineering, medicine, and other fields. We define physicians (referred to in the text as medical doctors) and trial lawyers (which include both counselors and prosecutors) based on occupation codes that follow the international ISCO-88 classification. The family records allow us to map each individual to their parents and control for family fixed effects.

Swedish Companies Registration Office. The Swedish Companies Registration Office keeps track of all companies and their top executives. The firm data are available for all corporate entities that have a limited liability structure ("aktiebolag") and that have appointed a CEO ("verkställande direktör"), excluding firms that operate as banks or insurance companies. These data record various financial statement items, including the total value of assets and the return and operating return on assets. By law, each firm has to supply this information to the registration office within seven months from the end of the fiscal year. Financial penalties and the threat of forced liquidation discourage late filing. The 40 industries in our data are based on the international NACE Rev.1.1 classification. The information on service as CEO tells us, at the end of each year, the identification number of each firm and the individual who serves as its CEO.

Our sample encompasses about 9 million person-years and 41,000 unique CEOs. Given the sample size, almost all of our results are highly significant. Therefore, our reporting generally focuses on coefficient values and patterns rather than on their statistical significance.

[12] Tax authorities deem the taxable income to occur in the year when an employee or executive exercises his stock options or purchases his company's shares at a price that is less than their fair value.

3. How Do the Personal Traits of CEOs Differ from the Population?

3.1. Distributions of Traits for CEOs and the Population

In Table 1 Panel A, we report descriptive statistics of the traits, education, and income for the population and the CEOs, classified according to the size of their company. Future CEOs differ from the population in all measures we consider. The average member of the population has a cognitive ability score of 5.2., a non-cognitive ability score of 5.1, and is 179.1 cm tall. The corresponding traits for the CEOs of small companies, defined here as companies with less than SEK 100 million in total assets (1 SEK ≈ 0.15 USD), and accounting for about 90% of the firm population, are 6.0, 6.1, and 180.2 cm, respectively. Small-company CEOs thus have about one-half of a standard deviation higher cognitive and non-cognitive ability, and about one-fifth of a standard deviation higher height than the population on average. CEOs are also better educated than the population in general. For example, about one-half of the small-company CEOs have a post-high-school degree (generally a college degree or equivalent), whereas the corresponding fraction for the population is about one-third.

The values of all the traits increase as a function of firm size. For example, the average cognitive ability of the CEO increases from 6.0 to 7.2, i.e. about one-half of a standard deviation, when we move from small to large companies (defined here as having at least SEK 10 billion in total assets). The corresponding increase for non-cognitive ability is from 6.1 to 7.3 and for height from 180.2 cm to 183.2 cm. The average CEO pay increases from SEK 661 thousand to about SEK 6 million. CEOs working for large companies are also better educated: 94% of them have at least a post-high-school degree. They are also on average five years older.

Among the cognitive-ability subcomponents, induction (which measures logical ability and numeracy) and verbal ability increase most as a function of firm size. The average induction score increases from 5.9 to 7.1 from small to large companies. The corresponding increase for verbal ability is from 5.7 to 7.0. CEOs' average scores for the cognitive-ability components that are less generic in nature differ less from the population and increase less with firm size. For example, spatial ability increases from 5.9 to 6.5 when we move from small to large companies, and technical ability from 5.6 to 6.1. This is consistent with the idea that the CEO market values most such traits that are generic in nature.[13]

Figure 1 graphs the distribution of the three key traits, both for the population and for the CEOs of small and large companies. It illustrates that the difference in the average scores between the population and CEOs does not arise from a preponderance of any one stanine in any of the groups. There are relatively fewer CEO participants in every below-average trait group and relatively more in every above-average trait group. Table 1 Panel B reports the distribution of the traits more formally. Perhaps the most striking differences between the three groups can be observed among individuals attaining the highest scores in the trait measures, reported in the right-most column. Consistent with the military's goal of fitting the measured cognitive ability of conscripts to the stanine distribution (which assigns the highest score to the top 4% of test takers), 4.2% of the population attain the highest cognitive-ability score. The corresponding fraction among small-company CEOs is 7.4% and among large-company CEOs 16.1%. In other words, the highest cognitive-ability score is about twice as common among the CEOs of the largest companies as it is among the CEOs of the smallest companies, and about four times as common as it is in the population. CEOs single out even more in terms of non-cognitive ability. The fraction of large-firm CEOs with the highest non-cognitive ability score (21.9%) is about four times as high as the corresponding fraction among small-company CEOs (5.2%), and about 12 times as

[13] See Frydman (2007) and Custódio, Ferreira, and Matos (2013) for related empirical evidence.

high as in the population (1.8%). The fraction on large-company CEOs who are at least 190 cm tall (16.7%) is more than twice the corresponding fraction among small-company CEOs (7.0%), and about three times the corresponding fraction in the population (5.7%).

Table 2 Panel A reports the proportion of the population that is dominated by the small-company CEOs in individual traits. Given that the traits attain discrete values, we smooth our results by interpolating them at one-percent intervals of the CEO distribution. For example, Table 1 Panel A shows that the median CEO of a firm with more than 10 billion in assets has a cognitive-ability score of 7. Table 1 Panel B finds that the cognitive ability of this CEO falls between the sixth and seventh stanines; the cumulative shares of CEOs representing stanines 1−6 and 1−7 are 30% and 61%, respectively. The corresponding population shares are 75% and 88%, respectively. Therefore, the cumulative share of the population increases by (88% − 75%) / (61% − 30%) = 0.42 for each percent increase in the CEO population. Because the median is 50% − 30% = 20% away from the lowest point of the sixth stanine, the median CEO dominates 75% + 20×0.42% = 83% of the population. Table 2 Panel A reports this and other percentiles obtained from the interpolation.

The median small-company CEO is above 67% of the population in cognitive ability, above 71% in non-cognitive ability, and above 56% in height. The corresponding fractions of the population dominated by large-company CEOs are 83%, 92%, and 72%, respectively. These results suggest that CEOs and large-company CEOs in particular have considerably higher trait measures than the population as a whole. At the same time, their traits do not appear to be exceptional, at least when analyzed one at the time. For example, 17% of the population have a higher cognitive ability than the median large-firm CEO.

Our results are consistent with the idea that leadership ability is not one-dimensional (see, e.g., Heckman, 1995). CEOs score better on all attributes we consider. It is therefore worthwhile to study whether the combination of traits CEOs possess is exceptional. We investigate this by first expressing each trait of each individual in terms of its standardized value. We then estimate the joint distribution of traits in the population and among CEOs. We assume that all traits are equally important and add up the standardized scores into a combination variable which we use to rank individuals (see e.g. Rosenthal 1978). For comparison purposes, we divide the distribution of each CEO trait and their combination into quintiles. The right tail of the trait distribution is analyzed in even greater detail. The results are reported in Figure 2 Panel A and B, and more formally in Table 2 Panel B.

The results indicate that CEOs differ more from the population in the combination of traits than in any individual trait. This result can be most easily seen in Figure 2 Panel A and B, where the curve indicating the combination of traits is above the curves indicating individual traits. However, the difference between the combination and the best individual trait is relatively small, except for the bottom third of the CEOs of the largest companies. The median (top quartile) small-company CEO dominates 73% (89%) of the population in these traits. Among large companies, the median (top quartile) CEO dominates 93% (98%) of the population.

There are many potential ways of combining information from individual traits. In the three first columns of Table 2 Panel C, we relax the assumption of equal weights for the traits. We assign each trait in turn a value of zero, with the two remaining traits attaining equal weights. In the fourth column, we calculate the product instead of the sum of the standardized traits. In the fifth column, we calculate the smallest standardized value of the three traits to identify the "Achilles heel" of each individual. If companies prefer well-rounded CEOs, we would expect them to hire CEOs without any apparent weaknesses.

Table 2 Panel C shows that the extent to which CEOs dominate the population in the combination of their traits is not sensitive to how the information about individual traits is combined. For example, the fraction of population dominated by the median small-company CEO is 73.3% in Panel B, whereas in Panel C's five different specification this fraction ranges from 67.9% to 73.8%. The results are also similar for other parts of the trait distribution, as well as for other firm-size classes. Table IA1 reports Panel C's results for other firm-size categories.

Figure 2 Panel C illustrates how the proportion of the population dominated by the CEOs changes as a function of firm size. As in Table 2 Panel B, we perform the analysis based on the combination of the three equally weighted traits. There is a sizeable difference in the caliber between small-company CEOs and those of firms whose total assets range from SEK 100 million to 1 billion. The trait differences between the CEOs belonging to the other firm-size categories are smaller, particularly among the higher-caliber CEOs.

3.2. Regressions of Traits and Service as a CEO

Table 3 regresses traits against indicators for various professions. The key regressors are dummies for CEOs of firms of different size. To gain more perspective on the caliber of CEOs compared with other high-prestige professionals, we also include dummies for medical doctors and lawyers. Finally, to assess how the traits of CEOs and other professionals differ within groups of people who share a common set of characteristics, we include a battery of other attributes. Adding these variables helps us evaluate the extent to which the trait differences between CEOs and the population can be attributed to differences in some of their other characteristics.

Each column in the table corresponds to a regression whose unit of observation is an individual in a given year. Columns 1−4 report regressions of the standardized value of cognitive ability on sets of controls that gradually add variables. The dummies for each enlistment year in the first column address the possibility that test procedures have changed or that the average measured cognitive ability and height have increased over time. The dummies for each year in that column control for potential changes in the number of firms and their size composition. The next two specifications add dummies for the level and field of education, which capture any education-related differences in the traits of CEOs. The last specification identifies the CEO trait premium from variation within a single family. This analysis helps us address the possibility that some of our trait measures capture differences in family backgrounds rather than in intrinsic skills. Given that the trait scores are available only for men, the analysis effectively compares the traits of CEOs with those of their brothers. Columns 5−8 and 9−12 follow the same structure in estimating the CEO trait premiums for non-cognitive ability and height, respectively. The *t*-values reported in parentheses are based on standard errors that allow clustering in the annual observations for each individual. In the specifications incorporating family fixed effects, clustering is at the level of the family.

Column 1 finds large-firm CEOs to have cognitive ability scores that are 1.08 standard deviations above the mean. Their cognitive ability is thus close to that of medical doctors, whose cognitive ability is 1.23 standard deviations above the mean. Large-firm CEOs have an even higher non-cognitive ability, which at 1.34 standard deviations above the mean is more than half a standard deviation higher than that of medical doctors (0.77 sd above the mean) and lawyers (0.54 sd above the mean). The non-cognitive ability and height of medical doctors and lawyers are roughly comparable with those of small-firm CEOs.

Column 2 controls for the level of education. This decreases especially the coefficients for cognitive ability, which are highly correlated with the level of education. For example, the large-company CEO coefficient estimate decreases from 1.08 to 0.42 and the medical-doctor coefficient estimate from 1.23 to 0.44. However, even the non-cognitive ability and height estimates, reported in columns 6 and 10, drop. For example, the large-company CEO estimate for non-cognitive ability drops from 1.34 to 0.94 and the height estimate from 0.69 to 0.54. Controlling for the level of education also influences the comparison of CEOs and other high-caliber professions, which consist only of highly educated individuals. As a result, small-company CEOs display a higher non-cognitive ability and height in columns 6 and 10 than medical doctors and lawyers on average.

Adding the field of education to controls in Column 3 drops the coefficient estimates further, but the change is less dramatic than when the level of education is controlled for. For example, large-company CEOs' cognitive-ability coefficient drops from 0.42 to 0.35, and their non-cognitive ability estimate from 0.94 to 0.86. Given that medical doctors and lawyers are specialists in their chosen fields of education, we do not include dummies for these professions in column 3.

Finally, column 4 adds family fixed effects to the regression. This generates another large drop to the coefficients. For example, the cognitive-ability coefficient for large-company CEOs drops from 0.42 in column 2 to 0.18. The corresponding coefficients for non-cognitive ability and height drop even more, from 0.94 to 0.28 and from 0.54 to 0.14 standard deviations, respectively. CEOs (along with medical doctors and lawyers) thus have more impressive traits than their equally well educated brothers, but the difference is not economically large.

The regressions above do not allow evaluating the importance of each trait for attaining a CEO position. Table 4 Panel A addresses this question with a series of linear probability models that explain the dummy for CEOs with the three traits and the set of control variables used in Table 3. Columns 1−3 add each trait separately whereas columns 4−7 include all the three traits with varying sets of control variables. As a general rule, we cluster standard errors at the level of an individual. In the specifications incorporating family fixed effects, however, we cluster at the level of a family.

All three traits are significantly positively associated with attaining a CEO position. When analyzed alone, the coefficient for non-cognitive ability is 1.11, whereas the corresponding coefficients for cognitive ability and height are 0.91 and 0.37, respectively. Adding all trait variables simultaneously in the regression in column 4 decreases their coefficients, but their relative importance remains: non-cognitive ability has most predictive power on CEO appointments. This result persists also in columns 5 and 6 which control for educational attainment. In column 6, for example, the non-cognitive ability coefficient (0.82) is almost twice as large as the cognitive ability coefficient (0.43) and more than five times as large as the coefficient for height (0.15). The non-cognitive ability coefficient remains the largest also in column 7 where family fixed effects are controlled for.

We next analyze whether the effect of traits on CEO appointments varies as a function of firm size. We split the CEO sample into ten equally large groups based on the total assets of the firm, and run the regression in Table 4 Panel A column 6 separately for each group. Figure 3 Panel A plots the trait coefficients, and Table IA2 Panel A reports them more formally. All trait coefficients are positive in all size categories. Non-cognitive ability and height coefficients increase monotonically in firm size, whereas the cognitive ability coefficient decreases monotonically in firm size. For small firms, the cognitive and non-cognitive ability coefficients are about equally large, about five times as large as height. For large firms, the non-cognitive ability coefficient is about four times as large as the cognitive ability and height coefficients. These results are consistent with the idea that the relative importance of cognitive ability for attaining a CEO position decreases as a function of firm size.

Table 4 Panel B analyzes how the components of cognitive ability explain appointments to a CEO position. Columns 1−4 report the results using only one of the components at the time. Induction, which captures logical ability and numeracy, attains the largest coefficient, followed by verbal ability, technical ability, and spatial ability. This ranking remains the same also in remaining columns which add controls, with one exception: technical ability is the most important cognitive ability attribute in column 7 which controls for the level and field of education, and the second-most important in column 8 which controls for family fixed effects.

Finally, we analyze whether the effect of cognitive-ability components on CEO appointments varies as a function of firm size. Building on the regression specification reported in Table 4 Panel B column 7, Figure 3 Panel B repeats the analysis of Figure 3 Panel A for ten firm-size groups. Table IA2 Panel B reports the results more formally. The results suggest that the relative importance of all four cognitive-ability components changes markedly as a function of firm size. In the bottom-two firm deciles, technical and spatial ability are the two most important cognitive-ability traits. Their relative and absolute importance declines in firm size, and they are the two least important cognitive-ability components in the top-two firm deciles. On the other hand, induction and verbal ability, the two most generic cognitive-ability components, become both relatively and absolutely more important for larger companies. This is consistent with the idea that the CEO market values most such traits that are generic in nature.

4. To What Extent Do the Traits Explain CEO Pay?

4.1. Pay Premium of CEOs Compared to Population and Other Professionals

Table 5 estimates the pay premium CEOs enjoy compared to the population and to other high-prestige professionals. The dependent variable is the logged taxable labor income that captures base salaries, bonus payments, stock option grants, and benefits awarded to an individual in a given year. Individuals with no taxable labor income are not included in the regression.

Panel A Column 1 reports results from a specification that includes dummies of CEOs of various-sized companies, dummies for medical doctors and lawyers, and controls for year and enlistment year. The coefficient estimates for CEOs increase monotonically with size, ranging from 0.37 for the small-firm CEOs to 2.48 for large-firm CEOs. This means that small-firm CEOs earn about 1.4 times as much as the population ($e^{0.37} = 1.4$) and large-firm CEOs about 12 times as much as the population. Medical doctors earn 2.2 times and lawyers 1.7 times as much as the population.

Column 2 adds controls for the three traits. This allows us to estimate how much of the CEO pay premium can be attributed to the returns to the three traits. The coefficient for large-firm CEOs drops from 2.48 to 2.22, suggesting that large-firm CEOs earn 9.2 times as much as the population on average when the traits are controlled for. This means that the three traits account for about 23% of the pay premium of large-company CEOs. This fraction increases monotonically as a function of firm size; it is 10% for small-firm companies and 16-19% for the intermediate firm size categories. It is 19% for medical doctors and 12% for lawyers.

Columns 3−5 control for education and family fixed effects. Column 4 drops the medical doctor and lawyer dummies because the field of education is controlled for. In Column 5 the coefficients for CEOs, particularly for large-company CEOs, drop markedly, whereas the corresponding coefficients for medical doctors and lawyers drop much less if at all. As a result, for example, large-company CEOs make no more than 2.6 times as much as their equally well educated brothers. This suggests that CEOs, and particularly large-company CEOs, come from families in which also other siblings are very well paid.

Table 5 Panel B performs similar analyses as Panel A except that it replaces cognitive ability with its subcategories. The specification in column 1 serves as the benchmark regression that other columns build on. Here, none of the trait variables are controlled for. The sample is smaller than in Panel A because subcategory scores are not available for all individuals.

Column 2 adds the ability scores. Among cognitive ability subscores, induction is by far the most important trait, followed by verbal and technical ability. Spatial ability is clearly the least important trait. This is a similar result as the one reported in Table 4 Panel B which studies the likelihood to become CEO. As in Table 4, the relative importance of technical ability increases when we control for education (in columns 3 and 4) and family fixed effects (in column 5). However, induction attains clearly the largest coefficient value in all specifications.

4.2. Variation in Pay within CEOs and Other Professionals

Figure 4 Panel A sorts the sample of CEOs into 250 quantiles based on pay and plots, for each quantile, the logged average CEO pay on the horizontal axis and the mean standardized traits on the vertical axis. It also fits linear regressions that explain each trait with logged CEO pay.

The patterns are largely monotonic and close to linear. Non-cognitive ability has the largest slope, followed by cognitive ability and height. This suggests that non-cognitive ability has the largest influence, and cognitive ability the second-largest influence, on CEO pay. The largest deviation from linearity applies for cognitive ability: in the bottom range of pay, the relationship between pay and cognitive ability is negative, not positive. We can only speculate what drives this result. One possibility is that the low-pay segment of the sample includes many small boutique-type firms (such as advisory services) whose success hinges on the expertise of their CEOs. Alternatively, it may consist of many start-up firms with excellent growth prospects but severe financial constraints on pay. Both types of firms would be expected to attract CEOs with high cognitive ability.

Table 6 Panel A analyzes the contribution of traits to pay for CEOs and other professionals. Columns 1−6 include observations in which an individual served as a CEO in a given year. The samples in columns 7 and 8 consist of medical doctors and lawyers, respectively. These within-profession regressions reveal how variation in compensation is linked to variation in traits.

Columns 1−3 show that each trait commands a pay premium in the market for CEOs. Column 4, which includes all three traits simultaneously, shows that one-standard deviation increases in cognitive ability, non-cognitive ability, and height are associated with 10.3%, 11.3%, and 4.1% higher pay, respectively. These trait gradients are 1−2 percentage points higher than the corresponding gradients for lawyers, and 4−8 percentage points higher than those for medical doctors. All trait gradients are highly significant, except that taller medical doctors do not earn significantly higher salaries than shorter ones. These results are not sensitive to the definition of income. Table IA3 shows that our results remain very similar if we use total income in lieu of labor income.

What explains the remarkably strong relation between CEO pay and traits? One of the best documented relationships in the executive compensation literature is the positive association between firm size and compensation (see e.g. Bertrand, 2009). Panel B in Figure 4 reproduces this association in our data by plotting logged CEO pay against logged firm size in each of the 250 firm size quantiles. The relationship between the two variables is remarkably close to linear; a linear regression generates a size elasticity of pay of 4.0 with an R-squared of 0.983.

Figure 4 Panel C plots traits in each firm size quintile. As in the case of compensation, non-cognitive ability attains the largest slope coefficient, followed by cognitive ability and height. The fact that larger firms appear to appoint higher-ability CEOs suggests that part of the large-firm compensation premium may be a reward for intrinsic talent.

Table 6 Panel B analyzes the relationship between traits and pay in a setup that controls for firm size. Adding firm size soaks up much of the contribution of the traits on pay. For example, the cognitive-ability coefficient drops from Panel A’s 0.103 in column 4 to 0.076 in Panel B’s corresponding column 2. The non-cognitive ability coefficient drops from 0.113 to 0.049 and the height coefficient from 0.041 to 0.017. This suggests that 27%−58% of the effects of the traits on pay are driven by the matching of higher-ability CEOs to larger firms, consistent with Figure 3 Panel C and with Gabaix and Landier (2008) and Terviö (2008). As in Panel A, the cognitive-ability coefficient drops most when we add controls for education in columns 3 and 4. Controlling for industry fixed effects in column 5 drops the cognitive-ability coefficient further from 0.029 in column 4 to 0.009; the coefficients for non-cognitive ability and height drop much less. This suggests that industry-wide differences in traits, particularly in cognitive ability, contribute to the effect of traits on pay.

Column 6 in Table 6 Panel B adds firm fixed effects to the regression. Because this regression identifies the effects from variation within firms, it effectively addresses the following question: does replacing a CEO with one with higher trait values lead to higher pay? The answer to this question is a qualified yes: a one-standard deviation increase in non-cognitive skills is associated with 2.4% higher pay (*t*-value = 2.89). Hiring a one-standard deviation taller CEO is associated with a 1.4% higher pay (*t*-value = 1.85). The coefficient for cognitive ability is negative but insignificant. These results help in ruling out the possibility that firm characteristics other than firm size and industry drive the relation between traits and pay.

To the extent that our traits measure CEO talent, our results are consistent with the idea that the cross-sectional variation in pay among CEOs reflects their marginal productivity. This conclusion is at odds with the view that attributes high CEO pay solely to powerful CEOs that have captured the pay-setting process (see, e.g., Bebchuk and Fried, 2004).

5. Conclusion

How do the personal traits of CEOs differ from the population and from other high-prestige professionals? Which traits matter most on CEO pay? How much of the link between traits and pay is explained by higher-caliber CEOs' assignment to larger companies? We address these and many other research questions by using a unique combination of registry-based data sets on the Swedish male population.

Our results suggest that CEOs possess considerably higher cognitive and non-cognitive ability and are much taller than the population on average. While even large-firm CEOs are not exceptional in any of the traits we study, they do possess a balanced trait portfolio where each trait is of the same or higher caliber than that for medical doctors and lawyers on average. Relative to cognitive ability, the importance of non-cognitive skills and height increase in firm size.

The traits contribute to CEO pay in two ways. First, higher-caliber individuals are assigned to larger companies, which tend to pay more. Second, the traits contribute to pay over and above that driven by firm size. Between one-quarter and three-fifths of the effects of each trait on CEO pay is driven by the matching of higher-ability CEOs to larger firms. Non-cognitive ability has the largest effect on pay, followed by cognitive ability and height.

Our analysis focuses on three traits that have an established role in the literature. However, we also check whether CEOs excel in other, less obvious ways. CEOs often have to endure long working hours and may need an excellent physical condition to meet the challenges in their work, so we test whether two physical-condition proxies, cardiovascular fitness and muscle condition at age 18, have predictive power for attaining a CEO position[14]. We find little evidence of this, perhaps because physical condition can change so much between the military service and appointment to a CEO position. While future CEOs are in better shape than the population (Table IA4 Panel A), the predictive power of physical condition on attaining a CEO position disappears when the other traits and education are controlled for (Table IA4 Panel B).

[14] Lindqvist (2012) and Lundborg, Nystedt, and Rooth (2014) find these variables to predict life outcomes.

Are higher trait values also associated with better firm performance? Despite of our large sample, we find no evidence in favor of this hypothesis. Table IA5 reports that none of the CEOs' trait measures are reliably positively associated with the profitability of the companies they run, measured either as the return or operating return on assets. We suspect this result is driven by the process through which CEOs are matched to firms of different size. Assignment models predict that, in equilibrium, large and complex firms end up hiring higher-caliber CEOs than small and easy-to-manage firms (Gabaix and Landier, 2008, and Terviö, 2008). While replacing a large-company CEO with a less talented small-company CEO could have a negative effect on performance, matching in the CEO market makes it difficult to observe this counterfactual. This may explain why the link between traits and performance does not show up in the data.

Why does the CEO market treasure individuals with higher trait values? The most straightforward explanation is that they allow CEOs to do their jobs better. In this scenario, the traits have intrinsic value and influence the productivity of CEOs directly. Another possibility is that the traits have instrumental value, influencing the performance of CEOs indirectly. For example, higher trait values can enable prospective executives to gain valuable experience; it is easier to notice an individual who is smart, tall, and possesses formidable people skills. Alternatively, they may increase a prospective executive's self-esteem (Persico, Postlewhite and Silverman, 2004), which may place them in a better position in their race to the top.

It is difficult to identify the direct effect of CEO traits on productivity because of the tendency of the higher-caliber CEOs to be assigned to bigger and harder-to-manage companies. Identifying the indirect effect is even more difficult, as it would require one to attribute the intermediate career steps to traits, and the CEO-appointment decisions to past career moves. Because of these concerns, it will be very difficult to quantify the relative importance of the direct and indirect channels. However, we have a good reason to expect that the indirect channel plays a more important role than the direct channel: CEO-caliber raw talent is not a scarce resource per se. About 100,000 individuals in our data possess a trait profile that dominates the trait profile of the median large-firm CEO. The fact that only a few of these individuals end up leading major corporations suggests that their success in the CEO labor market must be primarily driven by something else than their raw talent.

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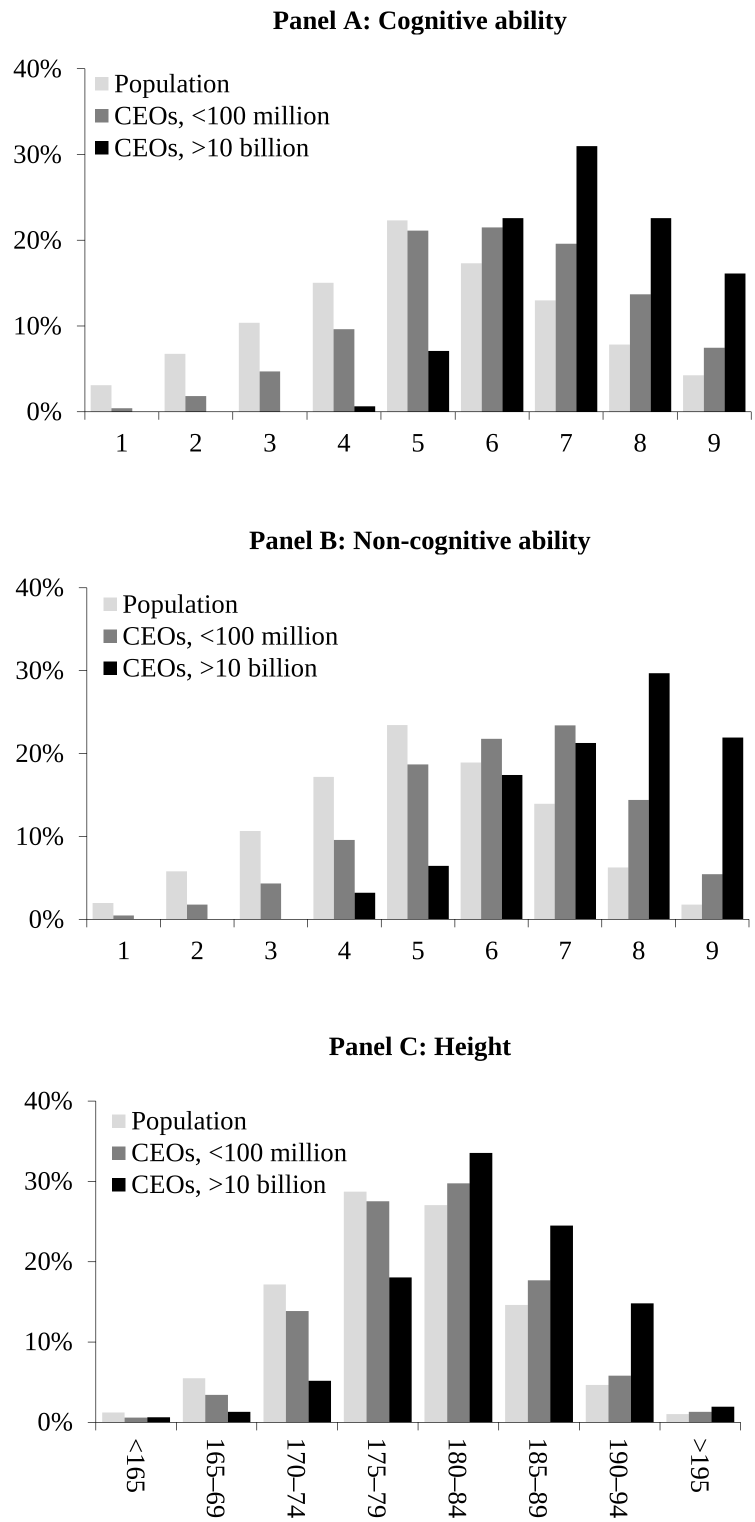
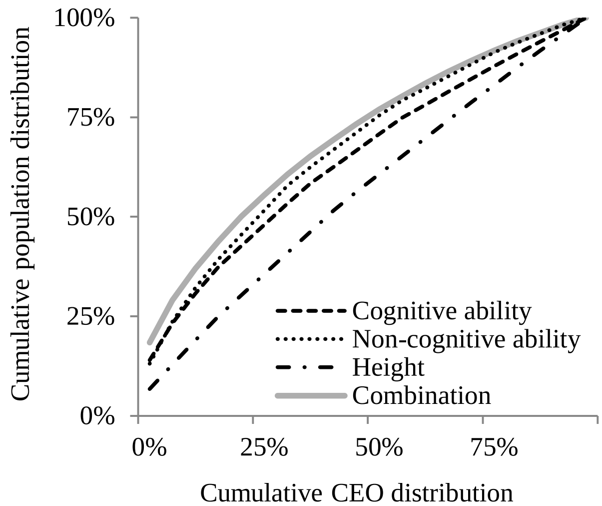
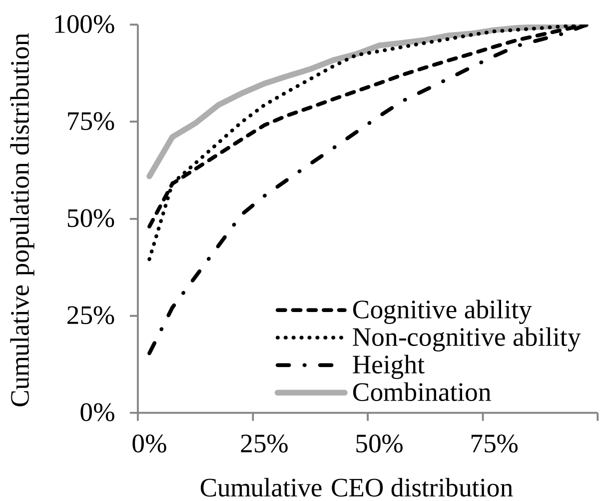


Figure 1. Distributions of personal traits of CEOs in different firm-size categories, and the population at large. The light bars indicate the population whereas the grey and black bars show the distributions for CEOs in firms with less than 100 million and more than 10 billion in total assets, respectively.

Panel A: Firms with total assets less than 100 million



Panel B: Firms with total assets more than 10 billion



Panel C: All firms, trait combination

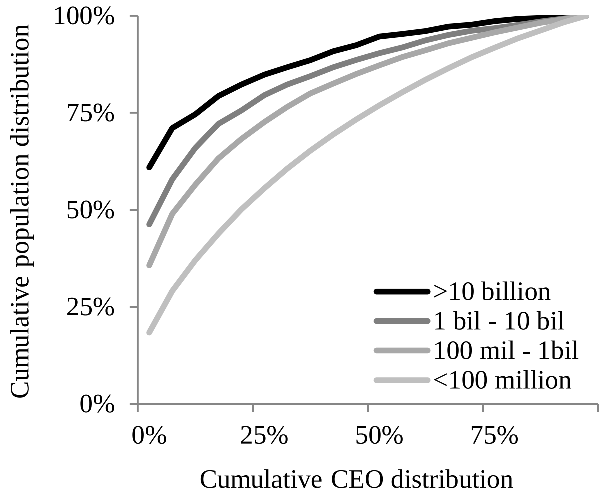
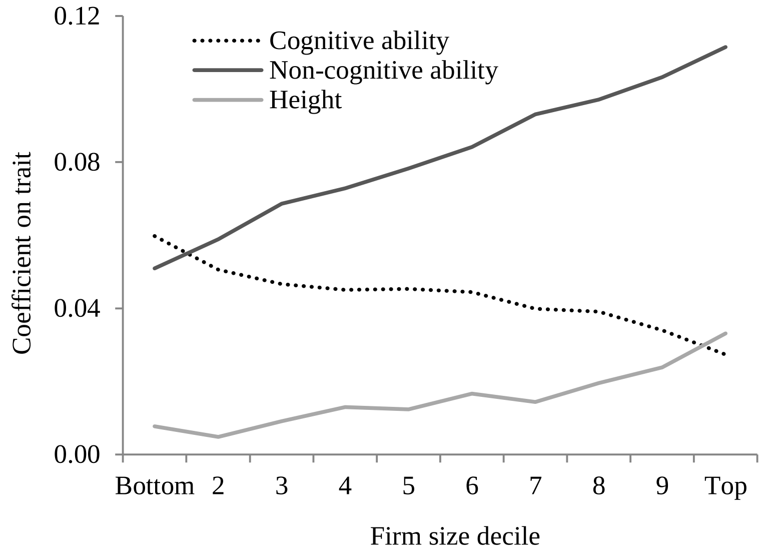


Figure 2. Cumulative distributions of CEOs' personal traits compared to the population at large as a function of firm size. For each firm size category, each point in the graphs depicts the cumulative probability of CEOs' combination of traits relative to the corresponding combination of traits in the population. The combination of traits is an additive combination where the three traits are assigned equal weights. See Table 2 for further description.

Panel A: Baseline regressions



Panel B: Components of cognitive ability

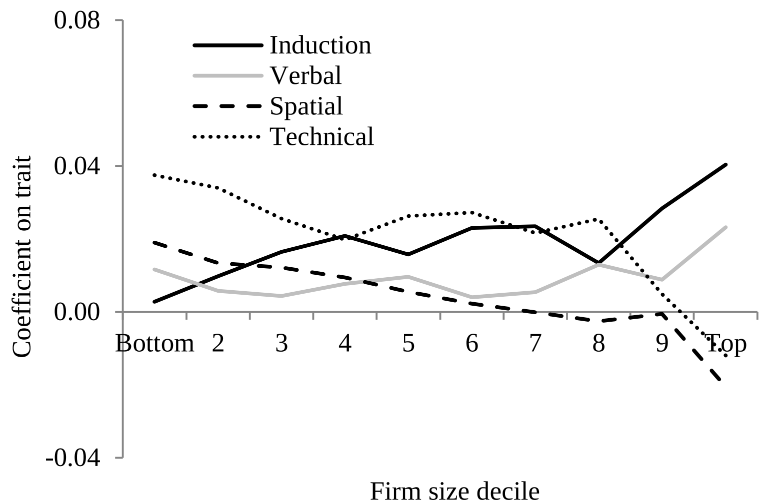


Figure 3. Coefficients on traits in firm-size categories. Panel A plots the coefficients for cognitive and non-cognitive ability, and height for ten regressions. These regressions follow the structure of column 6 of Panel A in Table 4, except that they define the dependent variable separately for CEOs in deciles based on the total assets of the firm. In each regression, the dependent variable takes the value of one if an individual is the CEO of a firm that falls into the size category, and zero otherwise. Panel B plots the coefficients for the four components of cognitive ability as a function of firm size. The coefficients come from ten regressions that follow the structure of column 7 of Panel B in Table 4.

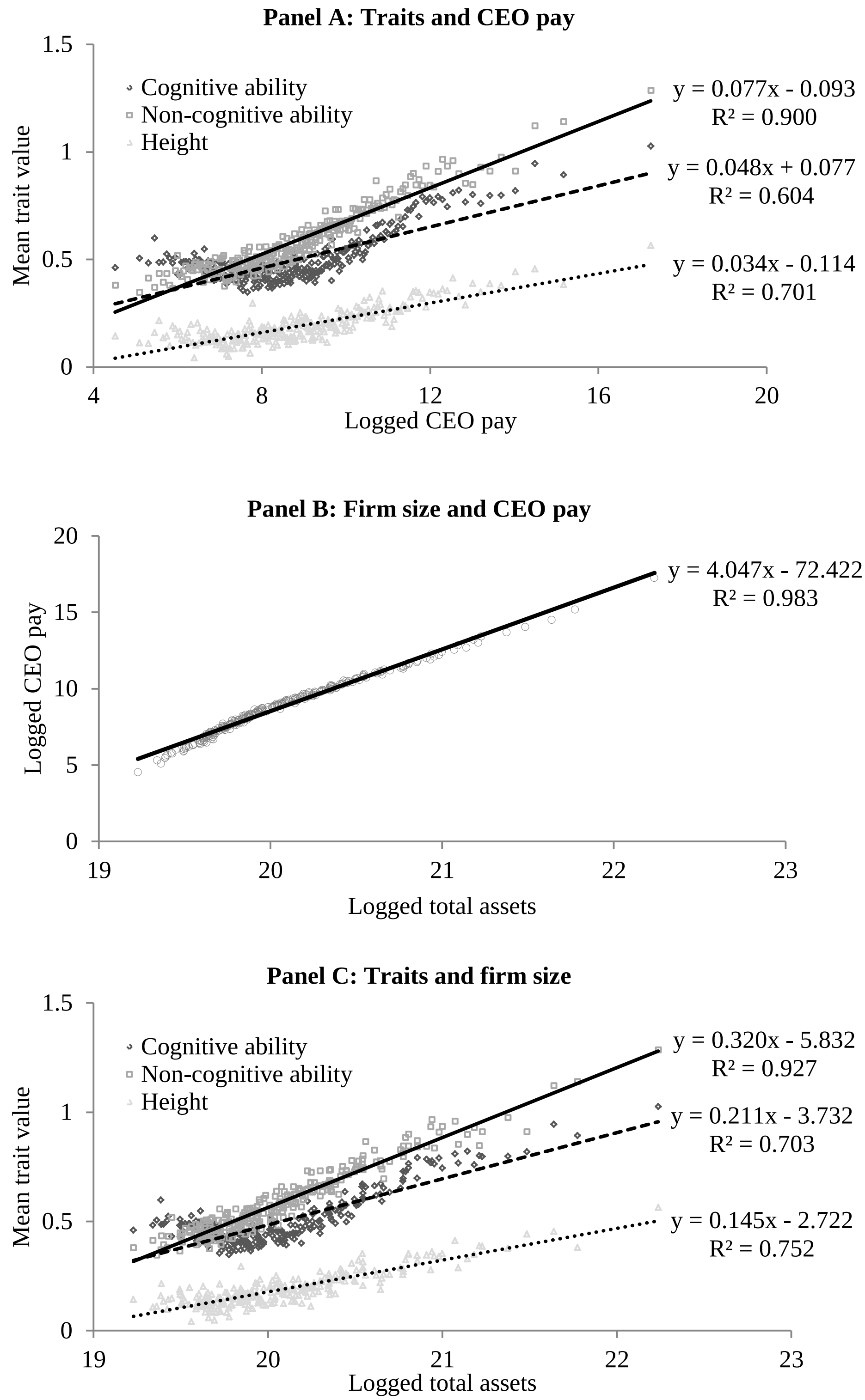


Figure 4. Relations between traits, CEO pay, and firm size. Panel A sorts the sample CEOs into 250 quantiles based on pay and plots, for each quantile, the logged average CEO pay on the horizontal axis and the mean of each standardized trait on the vertical axis. Panel B plots the traits against the logged size of the firm whereas Panel C plots the logged CEO pay against logged firm size. Each panel fits linear regressions that explain the variables on the vertical axis with the variable on the horizontal axis.

Table 1

Descriptive statistics

Panel A reports means, medians, and standard deviations of traits, the year an individual was enlisted, level of education, taxable labor income (in SEK), and, for CEOs, the total assets of the firm they manage (in SEK; 1 SEK ≈ 0.15 USD). The statistics are calculated separately for the population and for CEOs of firms with less than 100 million, 100 million to 1 billion, 1 billion to 10 billion, and more than 10 billion in total assets. Panel B reports the distribution of cognitive ability, non-cognitive ability, and height. The unit of observation is an individual. The CEOs are assigned to categories according to the largest firm they have managed during the sample period 2004−10.

Panel A: Descriptive statistics

	Population			CEOs, <100 million			CEOs, 100 million - 1 billion			CEOs, 1 billion - 10 billion			CEOs, >10 billion		
	Mean	Sd	Median	Mean	Sd	Median	Mean	Sd	Median	Mean	Sd	Median	Mean	Sd	Median
Cognitive ability	5.15	1.93	5.00	6.03	1.69	6.00	6.60	1.48	7.00	6.86	1.40	7.00	7.16	1.19	7.00
Induction	5.12	1.93	5.00	5.93	1.71	6.00	6.54	1.53	7.00	6.87	1.44	7.00	7.07	1.25	7.00
Verbal	5.01	1.82	5.00	5.71	1.62	6.00	6.30	1.49	6.00	6.64	1.46	7.00	6.97	1.25	7.00
Spatial	5.25	1.90	5.00	5.85	1.75	6.00	6.12	1.67	6.00	6.22	1.58	6.00	6.48	1.45	7.00
Technical	4.96	1.88	5.00	5.62	1.74	6.00	5.86	1.66	6.00	5.94	1.60	6.00	6.07	1.68	6.00
Non-cognitive ability	5.09	1.74	5.00	6.05	1.63	6.00	6.66	1.48	7.00	6.92	1.42	7.00	7.34	1.34	8.00
Height (cm)	179.1	6.54	179.0	180.2	6.29	180.0	181.4	6.15	181.0	181.6	5.93	182.0	183.2	6.08	183.0
Enlistment year	1983	7.69	1983	1982	7.15	1982	1980	6.33	1980	1979	5.86	1978	1977	5.28	1976
Level of education															
1	1.0%	10.1%	0.0%	0.5%	6.9%	0.0%	0.2%	4.1%	0.0%	0.0%	0.0%	0.0%	0.6%	8.0%	0.0%
2	12.2%	32.7%	0.0%	8.3%	27.6%	0.0%	2.7%	16.1%	0.0%	0.7%	8.4%	0.0%	0.0%	0.0%	0.0%
3	51.8%	50.0%	100.0%	41.1%	49.2%	0.0%	23.0%	42.1%	0.0%	12.1%	32.7%	0.0%	5.8%	23.5%	0.0%
4	33.5%	47.2%	0.0%	48.4%	50.0%	0.0%	72.1%	44.8%	100.0%	85.9%	34.8%	100.0%	85.8%	35.0%	100.0%
5	1.5%	12.0%	0.0%	1.7%	12.9%	0.0%	2.1%	14.2%	0.0%	1.3%	11.2%	0.0%	7.7%	26.8%	0.0%
Income (thousand)	400	370	358	661	576	541	1,742	1,595	1,333	3,449	3,398	2,457	6,052	5,301	4,099
Assets of the firm (million)				14.0	19.7	5.6	302	217	214	2,966	2,132	2,214	49,200	92,100	19,300
Number of individuals	1,268,176			37,094			3,536			709			155		

Panel B: Distributions of personal traits									
Ability score stanines	1	2	3	4	5	6	7	8	9
Height categories		<165cm	165–69	170–74	175–79	180–84	185–89	190–94	>195cm
Population									
Cognitive ability	3.1%	6.7%	10.4%	15.0%	22.3%	17.3%	13.0%	7.9%	4.2%
Non-cognitive ability	2.0%	5.8%	10.7%	17.2%	23.4%	18.9%	13.9%	6.3%	1.8%
Height		1.2%	5.5%	17.2%	28.7%	27.1%	14.6%	4.7%	1.0%
CEOs, <100 million									
Cognitive ability	0.4%	1.9%	4.8%	9.8%	21.3%	21.5%	19.4%	13.5%	7.4%
Non-cognitive ability	0.5%	1.9%	4.4%	9.8%	19.0%	21.9%	23.3%	14.0%	5.2%
Height		0.6%	3.5%	14.0%	27.6%	29.7%	17.5%	5.7%	1.3%
CEOs, 100 million - 1 billion									
Cognitive ability	0.1%	0.3%	1.6%	5.2%	16.4%	22.9%	24.4%	18.5%	10.6%
Non-cognitive ability	0.0%	0.8%	2.0%	5.2%	13.3%	20.1%	27.0%	22.6%	8.9%
Height		0.2%	2.0%	10.7%	26.0%	30.0%	21.8%	7.5%	1.9%
CEOs, 1 billion - 10 billion									
Cognitive ability	0.0%	0.0%	0.7%	4.4%	13.7%	18.8%	27.9%	21.2%	13.4%
Non-cognitive ability	0.0%	0.4%	1.3%	3.4%	12.0%	16.1%	30.7%	22.8%	13.3%
Height		0.3%	2.0%	9.3%	23.3%	34.6%	21.9%	7.5%	1.3%
CEOs, >10 billion									
Cognitive ability	0.0%	0.0%	0.0%	0.6%	7.1%	22.6%	31.0%	22.6%	16.1%
Non-cognitive ability	0.0%	0.0%	0.0%	3.2%	6.5%	17.4%	21.3%	29.7%	21.9%
Height		0.6%	1.3%	5.2%	18.1%	33.5%	24.5%	14.8%	1.9%

Table 2

Fraction of population dominated by CEOs

The table reports the fraction of the population that is dominated by CEOs according to their personal traits. The analysis considers each trait separately and various combinations of traits. Panel A compares, separately for small and large firms, each trait to the population by calculating the proportion of the population that is dominated by CEOs at different parts of the CEOs' trait distribution. The results have been smoothed by means of interpolation; see the text for additional details. Panel B sums the standardized trait values by giving each trait equal weights. This sum is then used to calculate the proportion of the population that is dominated by CEOs. Panel C considers alternative ways to combine the traits into a single score for small-company CEOs. The three leftmost columns assign each trait in turn a weight of zero, with the two remaining traits attaining equal weights. Cognitive ability (non-cognitive ability) attains zero weight in column 1(2). The multiplicative specification calculates the product instead of the sum of the standardized traits. We center the standardized traits to have a minimum value of one. The minimum specification uses the smallest standardized value of the three traits to rank CEOs.

Panel A: Single traits

	<100 million			>10 billion		
	Cognitive ability	Non-cognitive ability	Height	Cognitive ability	Non-cognitive ability	Height
5%	14.0%	13.1%	6.7%	48.0%	39.6%	15.3%
25%	42.7%	45.5%	30.3%	70.4%	74.9%	51.0%
50%	66.6%	71.1%	56.2%	82.9%	92.2%	72.3%
75%	84.6%	88.3%	78.8%	92.5%	97.4%	89.0%
90%	93.9%	96.0%	91.7%	97.3%	99.1%	96.2%
95%	97.0%	98.2%	95.8%	98.7%	99.6%	97.7%
100%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Panel B: Additive combination of traits

	CEOs				Medical doctors	Lawyers
	<100 mil	100 mil - 1 bil	1 bil - 10 bil	>10 bil		
5%	18.4%	35.7%	46.3%	60.9%	37.8%	27.0%
25%	50.1%	68.3%	75.6%	82.3%	73.6%	58.2%
50%	73.3%	85.0%	88.6%	92.5%	88.6%	77.6%
75%	89.3%	94.3%	96.1%	97.7%	96.3%	90.2%
90%	96.2%	98.2%	98.6%	99.5%	98.9%	96.4%
95%	98.3%	99.1%	99.3%	99.7%	99.5%	98.2%
100%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Panel C: Alternative combinations

	Combination				
	0%-50%-50%	50%-0%-50%	50%-50%-0%	Multiplicative	Minimum
5%	14.6%	15.8%	18.8%	16.2%	18.2%
25%	46.6%	44.1%	50.7%	43.7%	50.2%
50%	71.6%	67.9%	73.8%	69.0%	73.5%
75%	88.6%	85.5%	89.5%	87.5%	89.3%
90%	96.1%	94.6%	96.3%	95.2%	96.2%
95%	98.1%	97.3%	98.4%	98.0%	98.3%
100%	100.0%	100.0%	100.0%	100.0%	100.0%

Table 3

Trait premium of CEOs and other professions

This table regresses traits against indicators of various professions. Each column in the table corresponds to a regression whose unit of observation is an individual in a given year. The regressors indicate CEOs in different firm-size categories and dummies for medical doctors and lawyers. Columns 1−4 report regressions of the standardized value of cognitive ability. The first specification includes dummies for each year and each enlistment year. The second and third specifications add dummies for five levels and eight fields of education. The fourth specification includes fixed effects for brothers who are born to the same mother. Columns 5−8 and 9−12 follow the same structure for standardized values of non-cognitive ability and height, respectively. The *t*-values reported in parentheses are based on standard errors that allow for clustering at the individual level in all but the family fixed effects specifications where the clustering is at the level of the family. 65,594 observations out of the total of 8,760,402 are excluded in the family fixed effects specifications due to missing family links.

Dependent variable	Cognitive ability				Non-cognitive ability				Height			
Specification	1	2	3	4	5	6	7	8	9	10	11	12
CEO dummy, <100 mil	0.464	0.298	0.276	0.094	0.564	0.468	0.439	0.142	0.180	0.142	0.132	0.038
	(90.61)	(64.20)	(59.12)	(20.05)	(101.95)	(87.53)	(82.08)	(25.07)	(31.90)	(25.28)	(23.38)	(8.02)
…100 mil - 1 bil	0.764	0.302	0.253	0.116	0.901	0.624	0.562	0.192	0.360	0.252	0.231	0.079
	(52.88)	(21.43)	(17.81)	(9.67)	(53.95)	(37.10)	(33.17)	(13.02)	(19.72)	(13.85)	(12.69)	(6.06)
…1 bil - 10 bil	0.881	0.292	0.241	0.132	1.086	0.723	0.663	0.190	0.445	0.304	0.285	0.084
	(29.50)	(10.02)	(8.27)	(4.82)	(31.26)	(20.58)	(18.79)	(6.59)	(11.22)	(7.65)	(7.13)	(3.34)
…>10 bil	1.075	0.422	0.349	0.182	1.337	0.935	0.858	0.280	0.691	0.536	0.511	0.140
	(17.84)	(6.41)	(4.98)	(3.73)	(18.03)	(12.78)	(11.49)	(3.18)	(7.25)	(5.59)	(5.27)	(2.81)
Medical doctor dummy	1.227	0.440		0.231	0.765	0.327		0.212	0.316	0.137		0.063
	(164.33)	(56.43)		(18.07)	(73.69)	(30.94)		(12.56)	(30.69)	(13.11)		(4.72)
Lawyer dummy	0.734	0.127		0.033	0.537	0.159		0.047	0.224	0.077		0.005
	(58.89)	(10.23)		(2.64)	(35.30)	(10.41)		(2.91)	(14.37)	(4.94)		(0.34)
Controls												
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Enlistment year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Level of education	No	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Field of education	No	No	Yes	No	No	No	Yes	No	No	No	Yes	No
Family fixed effects	No	No	No	Yes	No	No	No	Yes	No	No	No	Yes
Adjusted R^2	0.018	0.269	0.273	0.866	0.012	0.105	0.112	0.819	0.004	0.017	0.018	0.865

Table 4

Contribution of traits to attaining a CEO position

This table reports results from linear probability models which explain the dummy for CEOs with standardized values of cognitive and non-cognitive ability, and height. Columns 1−3 in Panel A add each trait separately. They, along with all other specifications, also include dummies for each year and each enlistment year. Column 4 includes all traits in the regression. Columns 5 and 6 add dummies for five levels and eight fields of education. Column 7 further includes fixed effects for brothers who are born to the same mother. Panel B repeats the same structure for the four subcomponents of cognitive ability. The number of observations is smaller here because the subscores are missing for about 150,000 individuals. The *t*-values reported in parentheses are based on standard errors that allow for clustering at the individual level in all but the family fixed effects specifications where the clustering is at the level of the family. The mean dependent variable and the coefficients are multiplied by one hundred.

Panel A: Baseline regressions							
Dependent variable	CEO dummy						
Specification	1	2	3	4	5	6	7
Cognitive ability	0.911			0.549	0.466	0.432	0.422
	(88.06)			(50.91)	(38.17)	(35.29)	(13.34)
Non-cognitive ability		1.108		0.878	0.864	0.819	0.606
		(96.40)		(73.01)	(71.36)	(67.97)	(21.35)
Height			0.365	0.169	0.165	0.154	0.194
			(35.42)	(16.44)	(15.97)	(15.01)	(6.35)
Controls							
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Enlistment year	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Level of education	No	No	No	No	Yes	Yes	Yes
Field of education	No	No	No	No	No	Yes	Yes
Family fixed effects	No	No	No	No	No	No	Yes
Mean dependent variable	1.882	1.882	1.882	1.882	1.882	1.882	1.887
Adjusted R^2	0.007	0.009	0.003	0.011	0.011	0.014	0.526
Number of observations	8,760,402	8,760,402	8,760,402	8,760,402	8,760,402	8,760,402	8,694,808

Panel B. Components of cognitive ability								
Dependent variable	CEO dummy							
Specification	1	2	3	4	5	6	7	8
Induction	0.928				0.338	0.298	0.194	0.243
	(80.98)				(18.26)	(15.93)	(10.38)	(5.61)
Verbal		0.841			0.183	0.153	0.093	0.128
		(73.77)			(10.88)	(8.85)	(5.36)	(3.17)
Spatial			0.660		0.038	0.027	0.038	0.012
			(58.61)		(2.55)	(1.80)	(2.57)	(0.35)
Technical				0.761	0.144	0.120	0.210	0.172
				(66.07)	(9.25)	(7.68)	(13.33)	(4.56)
Non-cognitive ability					0.928	0.914	0.869	0.631
					(69.45)	(68.04)	(65.00)	(19.64)
Height					0.179	0.174	0.164	0.193
					(15.66)	(15.21)	(14.34)	(5.57)
Controls								
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Enlistment year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Level of education	No	No	No	No	No	Yes	Yes	Yes
Field of education	No	No	No	No	No	No	Yes	Yes
Family fixed effects	No	No	No	No	No	No	No	Yes
Mean dep. variable	2.005	2.005	2.005	2.005	2.005	2.005	2.005	2.009
Adjusted R^2	0.006	0.005	0.004	0.005	0.010	0.010	0.011	0.541
Number of observations	7,709,018	7,709,018	7,709,018	7,709,018	7,709,018	7,709,018	7,709,018	7,658,114

Table 5

Pay premium of CEOs and other professions

This table estimates the pay premiums of CEOs, medical doctors, and lawyers compared to the population. The dependent variable is the logged taxable labor income that captures base salaries, bonus payments, stock option grants, and benefits awarded to an individual in a given year. Individuals with no taxable labor income are not included in the regression. In Panel A, column 1 includes dummies for CEOs in different firm-size categories and for medical doctors and lawyers, and dummies for year and enlistment year. Column 2 adds the standardized values of cognitive and non-cognitive ability, and height whereas columns 3 and 4 add dummies for five levels and eight fields of education. Column 5 further includes fixed effects for brothers who are born to the same mother. Panel B follows the structure of Panel A, but breaks down cognitive ability into its four subcomponents. The number of observations is smaller here because the subscores are missing for about 135,000 individuals. The *t*-values reported in parentheses are based on standard errors that allow for clustering at the individual level in all but the family fixed effects specifications where the clustering is at the level of the family.

Panel A: Baseline regressions					
Dependent variable	Logged income				
Specification	1	2	3	4	5
CEO dummy, <100 mil	0.368	0.263	0.264	0.245	0.181
	(106.43)	(77.12)	(78.30)	(72.48)	(36.67)
...100 mil - 1 bil	1.363	1.185	1.151	1.096	0.585
	(125.04)	(109.51)	(107.15)	(101.03)	(40.60)
...1 bil - 10 bil	1.949	1.737	1.685	1.612	0.784
	(69.40)	(62.50)	(61.35)	(58.67)	(20.57)
...>10 bil	2.482	2.218	2.160	2.072	0.969
	(29.69)	(27.20)	(26.88)	(26.36)	(8.90)
Medical doctor dummy	0.806	0.596	0.497		0.501
	(183.74)	(129.19)	(108.39)		(38.31)
Lawyer dummy	0.519	0.386	0.313		0.214
	(61.50)	(46.83)	(38.43)		(16.30)
Cognitive ability		0.102	0.064	0.056	0.075
		(151.85)	(84.42)	(75.24)	(37.70)
Non-cognitive ability		0.112	0.101	0.103	0.075
		(158.22)	(141.59)	(145.07)	(42.34)
Height		0.022	0.019	0.020	0.017
		(35.78)	(31.56)	(32.90)	(9.10)
Controls					
Year	Yes	Yes	Yes	Yes	Yes
Enlistment year	Yes	Yes	Yes	Yes	Yes
Level of education	No	No	Yes	Yes	Yes
Field of education	No	No	No	Yes	No
Family fixed effects	No	No	No	No	Yes
Mean dependent variable	12.55	12.55	12.55	12.55	12.55
Adjusted R^2	0.031	0.070	0.077	0.090	0.526
Number of observations	7,765,917	7,765,917	7,765,917	7,765,917	7,712,679

Panel B: Components of cognitive ability					
Dependent variable	Logged income				
Specification	1	2	3	4	5
CEO dummy, <100 mil	0.370	0.261	0.260	0.241	0.176
	(102.36)	(73.47)	(74.18)	(68.58)	(33.77)
...100 mil - 1 bil	1.364	1.174	1.138	1.081	0.572
	(123.12)	(107.41)	(104.52)	(98.13)	(38.79)
...1 bil - 10 bil	1.952	1.726	1.672	1.592	0.774
	(68.20)	(61.16)	(59.79)	(56.90)	(20.22)
...>10 bil	2.480	2.203	2.144	2.050	0.956
	(29.48)	(26.84)	(26.55)	(25.95)	(8.59)
Medical doctor dummy	0.830	0.602	0.498		0.470
	(177.99)	(122.62)	(101.88)		(32.89)
Lawyer dummy	0.522	0.372	0.298		0.164
	(55.33)	(40.45)	(32.83)		(11.47)
Induction		0.077	0.057	0.052	0.052
		(77.11)	(56.32)	(51.79)	(20.72)
Verbal		0.026	0.004	0.011	0.012
		(27.72)	(4.03)	(11.45)	(5.20)
Spatial		0.007	0.003	-0.001	0.006
		(7.89)	(4.12)	(-1.77)	(2.83)
Technical		0.024	0.018	0.012	0.029
		(27.16)	(20.69)	(13.48)	(13.03)
Non-cognitive ability		0.107	0.096	0.098	0.073
		(140.12)	(125.48)	(129.08)	(36.88)
Height		0.021	0.019	0.019	0.017
		(32.48)	(28.44)	(29.56)	(7.98)
Controls					
Year	Yes	Yes	Yes	Yes	Yes
Enlistment year	Yes	Yes	Yes	Yes	Yes
Level of education	No	No	Yes	Yes	Yes
Field of education	No	No	No	Yes	No
Family fixed effects	No	No	No	No	Yes
Mean dependent variable	12.57	12.57	12.57	12.57	12.57
Adjusted R^2	0.025	0.069	0.077	0.092	0.543
Number of observations	6,815,471	6,815,471	6,815,471	6,815,471	6,774,414

Table 6

Contribution of traits to within-profession variation in pay

This table analyzes the contribution of traits to pay for CEOs and other professionals. Panel A regresses logged labor income on traits and controls for CEOs (columns 1−6), medical doctors (7), and lawyers (8). Columns 1−3 estimate the trait premiums separately for each trait whereas columns 4−8 include all the traits in the regression. The control variables expand from dummies for years and enlistment years to dummies for five levels and eight fields of education. Panel B adds the logged value of the firm's total assets. Column 5 further includes industry fixed effects whereas column 6 replaces them with firm fixed effects. The *t*-values reported in parentheses are based on standard errors that allow for clustering at the individual level in all but the firm fixed effects specification where the clustering is at the level of the firm.

Panel A: Pay for CEOs, MDs, and lawyers								
Dependent variable	Logged income							
Specification	CEOs						MDs	Lawyers
	1	2	3	4	5	6	7	8
Cognitive ability	0.145			0.103	0.030	0.030	0.025	0.090
	(34.64)			(23.90)	(6.52)	(6.40)	(4.09)	(8.05)
Non-cognitive ability		0.146		0.113	0.090	0.089	0.036	0.093
		(36.04)		(27.16)	(21.92)	(21.57)	(8.47)	(10.21)
Height			0.064	0.041	0.035	0.034	-0.001	0.023
			(16.22)	(10.60)	(9.31)	(9.13)	(-0.31)	(2.78)
Controls								
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Enlistment year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Level of education	No	No	No	No	Yes	Yes	No	No
Field of education	No	No	No	No	No	Yes	No	No
Mean dependent variable	13.03	13.03	13.03	13.03	13.03	13.03	13.35	13.05
Adjusted R^2	0.043	0.048	0.023	0.064	0.096	0.106	0.188	0.087
Number of observations	162,377	162,377	162,377	162,377	162,377	162,377	56,913	19,561

Panel B: Pay for CEOs controlling for firm characteristics						
Dependent variable	Logged income					
Specification	1	2	3	4	5	6
Cognitive ability		0.076	0.030	0.029	0.009	-0.008
		(23.09)	(8.38)	(8.13)	(2.60)	(-0.80)
Non-cognitive ability		0.049	0.036	0.037	0.031	0.024
		(15.64)	(11.54)	(11.84)	(10.36)	(2.89)
Height		0.017	0.014	0.014	0.012	0.014
		(6.01)	(5.06)	(5.05)	(4.34)	(1.85)
Total assets	0.243	0.235	0.230	0.230	0.248	0.147
	(154.22)	(149.00)	(146.74)	(146.68)	(150.80)	(29.58)
Controls						
Year	Yes	Yes	Yes	Yes	Yes	Yes
Enlistment year	Yes	Yes	Yes	Yes	Yes	Yes
Level of education	No	No	Yes	Yes	Yes	Yes
Field of education	No	No	No	Yes	Yes	Yes
Industry fixed effects	No	No	No	No	Yes	No
Firm fixed effects	No	No	No	No	No	Yes
Mean dependent variable	13.03	13.03	13.03	13.03	13.03	13.03
Adjusted R^2	0.379	0.394	0.407	0.412	0.445	0.805
Number of observations	162,377	162,377	162,377	162,377	162,377	162,377

Table IA1

Alternative trait combinations in firms of different size

This table reports the fraction of the population that is dominated by CEOs according to their personal traits. The analysis is otherwise identical to that in Table 2 Panel C except that it focuses on larger companies. Panel A reports the results for firms whose total assets range from 100 million to 1 billion, Panel B for firms whose total assets range from 1 billion to 10 billion, and Panel C for firms whose total assets exceed 10 billion. The three leftmost columns assign each trait in turn a weight of zero, with the two remaining traits attaining equal weights. Cognitive ability (non-cognitive ability) attains zero weight in column 1(2). The multiplicative specification calculates the product instead of the sum of the standardized traits. We center the standardized traits to have a minimum value of one. The minimum specification uses the smallest standardized value of the three traits to rank CEOs.

Panel A: 100 million - 1 billion

	Trait combination				
	0%-50%-50%	50%-0%-50%	50%-50%-0%	Multiplicative	Minimum
5%	28.0%	29.0%	35.8%	37.3%	31.1%
25%	63.0%	58.9%	68.8%	68.9%	62.2%
50%	83.1%	77.9%	84.6%	85.1%	78.5%
75%	93.8%	90.6%	94.5%	94.4%	92.6%
90%	97.9%	96.5%	98.2%	98.2%	97.6%
95%	99.1%	98.1%	99.2%	99.2%	98.9%
100%	100.0%	100.0%	100.0%	100.0%	100.0%

Panel B: 1 billion - 10 billion

	Trait combination				
	0%-50%-50%	50%-0%-50%	50%-50%-0%	Multiplicative	Minimum
5%	35.4%	35.6%	48.3%	47.0%	35.5%
25%	69.4%	65.9%	75.0%	75.9%	65.5%
50%	87.0%	82.1%	88.8%	88.9%	83.9%
75%	94.6%	92.4%	95.8%	96.0%	93.0%
90%	98.6%	97.2%	98.7%	98.5%	97.9%
95%	99.2%	98.5%	99.5%	99.3%	99.0%
100%	100.0%	100.0%	100.0%	100.0%	100.0%

Panel C: >10 billion

	Trait combination				
	0%-50%-50%	50%-0%-50%	50%-50%-0%	Multiplicative	Minimum
5%	45.0%	50.4%	56.4%	62.8%	39.6%
25%	78.7%	73.6%	81.5%	82.2%	72.9%
50%	90.3%	86.0%	93.7%	92.9%	90.2%
75%	97.8%	95.0%	97.9%	97.7%	95.6%
90%	99.3%	98.3%	99.5%	99.5%	99.2%
95%	99.8%	99.0%	99.7%	99.7%	99.7%
100%	100.0%	100.0%	100.0%	100.0%	100.0%

Table IA2

Coefficients on traits in firm-size categories

Panel A reports the coefficients and *t*-values for cognitive and non-cognitive ability, and height for the ten regressions depicted in Figure 3 Panel A. These regressions follow the structure of column 6 of Panel A in Table 4, except that they define the dependent variable separately for CEOs in deciles based on the total assets of the firm. In each regression, the dependent variable takes the value of one if an individual is the CEO of a firm that falls into the size category, and zero otherwise. Panel B reports the coefficients and *t*-values for the four subcomponents of cognitive ability as a function of firm size. They come from ten regressions that follow the structure of column 7 of Panel B in Table 4.

Panel A: Baseline regressions

Firm size decile	Trait					
	Cognitive ability		Non-cognitive ability		Height	
	Coeff.	*t*-value	Coeff.	*t*-value	Coeff.	*t*-value
Bottom	0.060	(17.25)	0.051	(15.84)	0.008	(2.84)
2	0.051	(16.43)	0.059	(20.17)	0.005	(1.87)
3	0.047	(14.97)	0.069	(22.99)	0.009	(3.57)
4	0.045	(14.83)	0.073	(24.68)	0.013	(5.14)
5	0.045	(14.95)	0.078	(27.06)	0.012	(4.95)
6	0.044	(14.63)	0.084	(28.63)	0.017	(6.54)
7	0.040	(13.02)	0.093	(29.92)	0.014	(5.63)
8	0.039	(12.19)	0.097	(30.85)	0.020	(7.13)
9	0.034	(10.34)	0.103	(30.63)	0.024	(8.43)
Top	0.027	(8.22)	0.112	(30.59)	0.033	(10.77)

Panel B: Components of cognitive ability

Firm size decile	Component							
	Induction		Verbal		Spatial		Technical	
	Coeff.	*t*-value	Coeff.	*t*-value	Coeff.	*t*-value	Coeff.	*t*-value
Bottom	0.003	(0.58)	0.012	(2.54)	0.019	(4.83)	0.037	(8.84)
2	0.010	(2.24)	0.006	(1.36)	0.013	(3.73)	0.034	(9.02)
3	0.016	(3.62)	0.004	(1.05)	0.012	(3.29)	0.026	(6.53)
4	0.021	(4.47)	0.008	(1.83)	0.009	(2.62)	0.020	(5.10)
5	0.016	(3.44)	0.010	(2.25)	0.006	(1.55)	0.026	(6.71)
6	0.023	(4.97)	0.004	(0.93)	0.002	(0.62)	0.027	(7.05)
7	0.023	(4.91)	0.005	(1.22)	0.000	(-0.04)	0.022	(5.50)
8	0.013	(2.71)	0.013	(2.76)	-0.003	(-0.64)	0.025	(6.09)
9	0.028	(5.35)	0.009	(1.81)	-0.001	(-0.14)	0.005	(1.11)
Top	0.040	(7.10)	0.023	(4.24)	-0.021	(-4.65)	-0.012	(-2.47)

Table IA3

Contribution of traits to variation in total CEO pay

This table analyzes the contribution of traits to total pay for CEOs. Panel A regresses logged total income on traits and controls for CEOs. Columns 1−3 estimate the trait premiums separately for each trait whereas columns 4−6 include all the traits in the regression. The control variables expand from dummies for years and enlistment years to dummies for five levels and eight fields of education. Panel B adds the logged value of the firm's total assets. Column 5 further includes industry fixed effects. The *t*-values reported in parentheses are based on standard errors that allow for clustering at the individual level.

Panel A: Pay for CEOs						
Dependent variable	Logged total income					
Specification	1	2	3	4	5	6
Cognitive ability	0.147			0.103	0.032	0.033
	(32.30)			(22.05)	(6.31)	(6.46)
Non-cognitive ability		0.152		0.119	0.096	0.093
		(34.51)		(26.32)	(21.46)	(20.74)
Height			0.068	0.044	0.038	0.037
			(16.12)	(10.69)	(9.49)	(9.23)
Controls						
Year	Yes	Yes	Yes	Yes	Yes	Yes
Enlistment year	Yes	Yes	Yes	Yes	Yes	Yes
Level of education	No	No	No	No	Yes	Yes
Field of education	No	No	No	No	No	Yes
Mean dependent variable	13.22	13.22	13.22	13.22	13.22	13.22
Adjusted R^2	0.051	0.056	0.034	0.070	0.096	0.107
Number of observations	162,377	162,377	162,377	162,377	162,377	162,377

Panel B: Pay for CEOs controlling for firm characteristics					
Dependent variable	Logged total income				
Specification	1	2	3	4	5
Cognitive ability		0.073	0.031	0.032	0.013
		(21.17)	(8.38)	(8.47)	(3.61)
Non-cognitive ability		0.048	0.036	0.036	0.030
		(14.61)	(11.07)	(10.90)	(9.37)
Height		0.018	0.015	0.015	0.012
		(6.10)	(5.25)	(5.14)	(4.42)
Total assets	0.265	0.258	0.253	0.253	0.272
	(157.23)	(151.80)	(148.23)	(147.80)	(152.04)
Controls					
Year	Yes	Yes	Yes	Yes	Yes
Enlistment year	Yes	Yes	Yes	Yes	Yes
Level of education	No	No	Yes	Yes	Yes
Field of education	No	No	No	Yes	Yes
Industry fixed effects	No	No	No	No	Yes
Mean dependent variable	13.22	13.22	13.22	13.22	13.22
Adjusted R^2	0.392	0.403	0.412	0.416	0.442
Number of observations	162,377	162,377	162,377	162,377	162,377

Table IA4

Additional traits

Panel A reports means, medians, and standard deviations of cardiovascular fitness and muscle strength for the population and for CEOs. The statistics are calculated separately for CEOs of firms with less than 100 million, 100 million to 1 billion, 1 billion to 10 billion, and more than 10 billion in total assets. Panel B builds on the regression in Table 4 Panel A by regressing the dummy for CEOs on standardized values of cardiovascular fitness, muscle strength, cognitive and non-cognitive ability, and height. The number of observations is smaller in the specifications including muscle strength because this variable is missing for about 150,000 individuals. The *t*-values reported in parentheses are based on standard errors that allow for clustering at the individual level. The mean dependent variable and the coefficients are multiplied by one hundred. Cardiovascular fitness is measured in a cycle ergometry test and muscle strength on a combination of knee extension, elbow flexion, and hand grip tests.

Panel A: Descriptive statistics

		Cardiovascular fitness	Muscle strength
Population	Mean	6.26	5.65
	Sd	1.71	1.90
	Median	6	5
CEOs, <100 million	Mean	6.71	5.95
	Sd	1.71	1.88
	Median	7	6
CEOs, 100 million - 1 billion	Mean	7.15	5.92
	Sd	1.65	1.88
	Median	7	6
CEOs, 1 billion - 10 billion	Mean	7.38	5.90
	Sd	1.64	1.87
	Median	8	6
CEOs, >10 billion	Mean	7.45	5.70
	Sd	1.58	1.83
	Median	8	5

Panel B: Regressions								
Dependent variable	CEO dummy							
Specification	1	2	3	4	5	6	7	8
Cardiovascular fitness	0.537	0.038	0.029	0.012				
	(48.18)	(3.15)	(2.45)	(1.03)				
Muscle strength					0.677	-0.019	-0.025	-0.045
					(48.70)	(-1.23)	(-1.56)	(-2.84)
Cognitive ability		0.548	0.467	0.432		0.514	0.449	0.415
		(50.78)	(38.21)	(35.31)		(45.01)	(34.68)	(31.95)
Non-cognitive ability		0.863	0.853	0.814		0.911	0.906	0.862
		(67.24)	(66.18)	(63.47)		(65.12)	(64.34)	(61.57)
Height		0.165	0.162	0.153		0.163	0.161	0.154
		(16.01)	(15.64)	(14.86)		(14.48)	(14.31)	(13.70)
Controls								
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Enlistment year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Level of education	No	No	Yes	Yes	No	No	Yes	Yes
Field of education	No	No	No	Yes	No	No	No	Yes
Mean dep. variable	1.882	1.882	1.882	1.882	1.844	1.844	1.844	1.844
Adjusted R^2	0.004	0.011	0.011	0.014	0.004	0.011	0.011	0.015
# observations	8,760,402	8,760,402	8,760,402	8,760,402	7,665,250	7,665,250	7,665,250	7,665,250

Table IA5

CEO traits and firm operating performance

This table analyzes the association of CEO traits with the operating performance of the firm. In Panel A, we regress the return on assets (net income divided by total assets, ROA) on traits and controls for CEOs. Columns 1−3 estimate the trait premiums separately for each trait whereas columns 4−7 include all the traits in the regression. The control variables expand from dummies for years, enlistment years, and industry fixed effects to dummies for five levels and eight fields of education, logged total assets, and firm fixed effects. Panel B uses the operating return on assets (operating income divided by total assets, OROA) in lieu of ROA. Outlier observations where ROA or OROA is more than 99.9% or less than -99.9% are discarded. The *t*-values reported in parentheses are based on standard errors that allow for clustering at the firm level.

Panel A: Return on assets							
Dependent variable	ROA						
Specification	1	2	3	4	5	6	7
Cognitive ability	-0.0002			0.00009	-0.0004	-0.001	0.001
	(-0.24)			(0.10)	(-0.44)	(-0.76)	(0.17)
Non-cognitive ability		-0.0008		-0.0007	-0.0005	-0.002	-0.005
		(-0.95)		(-0.85)	(-0.64)	(-2.43)	(-1.64)
Height			-0.001	-0.0007	-0.0006	-0.001	-0.0004
			(-0.97)	(-0.88)	(-0.82)	(-1.58)	(-0.16)
Total assets						0.007	0.085
						(16.07)	(32.06)
Controls							
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Enlistment year	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Level of education	No	No	No	No	Yes	Yes	Yes
Field of education	No	No	No	No	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	No
Firm fixed effects	No	No	No	No	No	No	Yes
Mean dependent variable	0.091	0.091	0.091	0.091	0.091	0.091	0.091
Adjusted R^2	0.021	0.021	0.021	0.021	0.021	0.024	0.450
Number of observations	159,928	159,928	159,928	159,928	159,928	159,928	159,928

Panel B: Operating return on assets							
Dependent variable	OROA						
Specification	1	2	3	4	5	6	7
Cognitive ability	-0.001			-0.001	-0.001	-0.001	0.0005
	(-1.44)			(-0.71)	(-0.73)	(-0.95)	(0.13)
Non-cognitive ability		-0.002		-0.002	-0.001	-0.002	-0.006
		(-2.44)		(-2.06)	(-1.60)	(-2.87)	(-1.92)
Height			-0.001	-0.001	-0.001	-0.001	-0.00004
			(-1.32)	(-1.02)	(-0.90)	(-1.44)	(-0.02)
Total assets						0.005	0.079
						(11.45)	(30.67)
Controls							
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Enlistment year	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Level of education	No	No	No	No	Yes	Yes	Yes
Field of education	No	No	No	No	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	No
Firm fixed effects	No	No	No	No	No	No	Yes
Mean dependent variable	0.079	0.079	0.079	0.079	0.079	0.079	0.079
Adjusted R^2	0.019	0.019	0.019	0.019	0.020	0.021	0.458
Number of observations	159,937	159,937	159,937	159,937	159,937	159,937	159,937