The Face of Risk: CEOs' Masculinity and Firm Risk

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Abstract

This study examines whether the CEO's facial masculinity—measured by facial width-to-height ratio—can predict the riskiness of his firm's financial and investment policy. Our sample consists of the male CEOs in Execucomp in 2007~2009. Our results suggest that the CEO's facial width-to-height ratio is positively associated with (i) stock return volatility, (ii) leverage ratio, (iii) the frequency of undertaking acquisitions and (iv) the amount spent on acquisitions. Overall, our findings suggest that a CEO's personal/physical traits can be a key predictor of the riskiness of corporate financial and investment policy.

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Key words: masculinity, CEO, risk, leverage, M&A, vega, fWHR

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I. INTRODUCTION

Testosterone, a steroid hormone secreted mainly by the testicles of males, shapes a person's neural circuit which regulates his/her behaviors. The level of testosterone is thought to be associated with the person's behaviors through neural mechanisms (Dabbs and Morris, 1990; and Mehta and Beer, 2009). Studies have uncovered that a set of related behavioral characteristics are associated with the testosterone levels. Those include aggression (e.g., Ancher, 2006), sensation seeking (e.g., Roberti, 2004), hostility (Hartgens and Kuipers, 2004), dominance (Mazur and Booth, 1998), egocentrism (e.g., Eisenegger, Naef, Snozzi, Heinrichs, and Fehr, 2010), and risk seeking (e.g., Apicella, Dreber, Campbell, Gray, Hoffman, and Little, 2008).[2]

In upper echelon of corporate management, the literature stemming from Bertrand and Schoar (2003) finds significant impact of the traits of the CEO on firm decision making. On the behavioral front, the association between CEO overconfidence and corporate behavior and performance has been widely studied. For example, the impact of CEO overconfidence or self-attribution bias on corporate investment (Malmendier and Tate, 2005); acquisitions (Kim, 2013; Malmendier and Tate, 2005); and innovation (Hirshleifer, Low, and Teoh, 2012) have been examined. Wong and Ormiston (2012) find that CEOs with high fWHR deliver better firm performance. Mayew, Parsons, and Venkatachalam (2013) find that CEOs with lower voice pitch tend to manage larger firms. Extending the literature, we study whether the CEOs with high testosterone level make the firm more risky, given their tendency of risk seeking.

The importance of our study is highlighted by the criticism from the general public that the testosterone-driven corporate culture was one of the important causes of the recent global financial crisis in 2008 (Sherman, 2012).[3] Our argument is different from proposing more gender diversity as in Adams and Ragunathan (2012) or Faccio, Marchica, and Mura (2014). Instead, our argument is whether, within the same gender (specifically male) group, the different level of testosterone of the CEO would be driving the firm to be systematically different in terms

[2]Other studies include Mehta, Jones, and Josephes (2008), Pound, Penton-Voak, and Surridge (2009), and Zuckerman and Kuhlman (2000) for risky behavior; Wright, Bahrami, Johnson, Di Malta, Rees, Frith, and Dolan (2012) for egocentric behavior. Other studies include Van Honk and Schutter (2007), Wirth and Schultheiss (2007), Josephes, Sellers, Newman, and Mehta (2006).

[3] Some people in the Wall Street Journal pointed out that Lehman Brothers may have been safer if it was Lehman Sisters or Lehman Brothers and Sisters (Kristoff, 2009).

of risk. A recent report by Perman (2012) reveals that testosterone therapy is becoming popular among Wall Street traders and some corporate CEOs. Therefore, it is imperative to study the impact of the testosterone of the CEO on the risk of the firm.

Ideally, the most precise measurement of testosterone levels of the CEOs could be done by collecting saliva-assay of the CEOs. However, it is next to impossible to implement such experiments for a large sample of CEOs of the public firms in the US. Yet, we use an alternative way of gauging the relative cross-sectional variation in testosterone level among the male CEOs that is easy to implement for any researchers. A person's adolescent testosterone not only affects the development of neural circuit but also affects the bone growth, including craniofacial growth. Moreover, an individual's facial width to height ratio (fWHR, hereafter) does not change significantly over time (Jia, van Lent, and Zeng, 2014), and Lefevre et al. (2013) find that fWHR is significantly positively correlated with both the levels of baseline (circulating) and reactive testosterone. Penton-Voak and Chen (2004) find that male with facial masculinity have higher testosterone level in his saliva. These findings validate CEO's facial features as a measure to infer his testosterone exposure during puberty and development of the neural circuits which regulate a person's aggression and risk takings (Lindberg, Vandenput, Movèrare Skrtic, Vanderschueren, Boonen, Bouillon, and Ohlsson, 2005; Thornhill and Gangestad, 1999; Thornhill and Møller, 1997; Verdonck, Gaethofs, Carels, and de Zegher, 1999; Bandiera, Guiso, Prat, and Sadun, 2010; Penton-Voak and Chen, 2004; Pound, et al., 2009).

Indeed, Carré and McCormick (2008) and Christiansen and Winkler (1992) find that high fWHR of male predicts more aggressions. Haselhuhn and Wong (2011) find that high fWHR predicts more cheating and deception, Campbell, Dreber, Apicella, Eisenberg, Gray, Little, Garcia, Zamore, and Lum (2010) find that it predicts sensation seeking behavior. Moreover, Apicella (2011), Apicella, Dreber, Campbell, Gray, Hoffman, and Little (2008), and Wong et al. (2011) find that fWHR predicts more competition driven behavior and higher risk taking of the person.

Recent literature has discussed the relationship between testosterone, a steroid hormone, and economic and financial decision-making and economic behavior. In the literature related to financial risk taking, Apicella et al. (2008) find that men with masculine face as a proxy for higher testosterone exposure during puberty are more likely to make risky financial decisions.

Sapienza, Zingales, and Maestripieri (2009) and Stenstrom, Saad, Nepomuceno, and Mendemhall (2011) show that risk aversion is negatively related to prenatal testosterone exposure measured by the ratio of the length of the 2nd (index) finger to the length of the 4th (ring) finger (2D:4D ratio).[4] Coates, Gurnell, and Rustichini (2009) find that lower 2D:4D ratio of male traders have better trading performance.[5]

We start by collecting the facial photographs of 3,298 unique CEOs that had CNBC interviews over 1997~2009, because the CEOs that had interviews by one of the most influential financial television networks may have more photographs available in the internet. Then we narrow down to 1,387 CEOs with the best quality pictures agreed by three researchers. Then we further narrow down to 558 CEOs that are covered in Execucomp. Controlling for selection bias to be interviewed by CNBC, our multiple regression analyses show significantly positive association between fWHR and the risk of the firm measured by daily return volatility of the firm. The finding is robust when we control for CEO's overconfidence based on option holdings (Malmendier and Tate (2005)), vocal masculinity measures - such as voice pitch and formant position of the voice (Mayew, Parsons, Venkatachalam (2013)) -, and CEO's risky hobbies (Cain and McKeown, 2014). Also, to make sure that what we find is not driven by some extreme values of our explanatory variable, we use alternative measures of fWHR, such as the inverse rank of fWHR (highest (lowest) fWHR CEO having the largest (smallest) ordinal number), the dummy variables that are one if the CEO belongs to the highest quintile, tercile, and half of fWHR and find consistent results. One might question whether the result is driven by the cross-sectional variation between the firms that had only one CEO throughout the sample period. Therefore, we narrow down to the firms that had CEO turnovers and find consistent results.

For the testosterone level of the CEOs to influence the risk of the firm, the channel should be either through capital structure decision or capital budgeting decision. Therefore, we first look at the leverage ratio, and find that high testosterone CEOs are associated with higher leverage ratio (financial risk), which is consistent with their risk seeking tendency. For capital budgeting decisions, we look at the acquisitions, because higher testosterone CEOs would be striving to have dominant position (Mazur and Booth, 1998). We find that high testosterone

[4] Higher (lower) prenatal testosterone causes lower (higher) 2D:4D ratio.
[5] Coates, Gurnell and Sarnyai (2010) summarize their findings and provide an excellent survey of the relationship between steroid hormones and financial risk-taking.

CEOs are more acquisitive in terms of the frequency of the deals and the dollar amounts spent on acquisitions. Moreover, we find that investor response to acquisition announcement is significantly more negative when the deal is done by high testosterone CEOs.

To the extent that CEO's testosterone affects risk taking in his corporate decisions, the compensation contract should also be affected by the testosterone of the CEO. We analyze the compensation structure of the CEO and find that high testosterone CEOs' compensation packages are significantly more sensitive to the risk (higher Vega) and more sensitive to performance (delta), using Coles, Daniel, and Naveen's (2006) measures.

We contribute to the literature about the link between CEO's traits and organizational characteristics. Wong, Haselhuhn, and Ormiston (2011) are the first to find positive association between fWHR and firm performance. Mayew, Parsons, and Venkatachalam (2013) find that among male CEOs, the ones with deeper voice are more likely to manage larger sized firms. We look from the angle of company risks and find positive association between testosterone and risk.

Another contribution of our paper is to link between testosterone and acquisitiveness of the CEO. Mergers and acquisitions have been one of the most widely studied areas in business and economics, and the hubris or overconfidence of the CEO has been to blame for value destruction through the acquisition process (Roll, 1986; Malmendier and Tate, 2005; Kim, 2013). We bring another culprit of the value destruction in acquisition, which is testosterone.

The rest of the paper is organized as follows: In section II, we develop hypotheses to test throughout the paper. In section III, we describe how we collect the data and construct the variables. Then we discuss empirical methodology. In section IV, we discuss the empirical results, and we conclude in section V.

II. HYPOTHESES DEVELOPMENT

A series of studies in accounting and finance have attempted to establish the relationship between personal characteristics of senior management and corporate financial reporting practice (Davidson, Dey, and Smith, 2011; Dikolli, Mayew, and Steffen, 2012; Schrand and Zechman, 2012). The recent literature associates CEO personal characteristics with economic decisions

through a CEO's level of testosterone exposure. Wong et al. (2011) use CEO's fWHR to predict a firm-level performance and find that CEOs with higher testosterone levels have a higher ROA, especially for the firms with less cognitively complex firms due to the lower likelihood of delegating authority to lower level managers. Jia, van Lent, and Zeng (2014) come closest to our study in that they find that high testosterone CEOs (measured by fWHR) are more likely to misreport financial statements, to do opportunistic insider trading, and to backdate the option grant. In comparison, we directly link the testosterone of the CEO to the risk of the firm.[6]

Therefore, we formulate our most important hypothesis as follows:

H1: High-testosterone CEOs increase the risk of the firms.

To the extent that a CEO could influence the risk level of the firm, he could do so in the process of either in financing decisions or investment decisions. For financing decisions, we focus on leverage ratio. Higher leverage ratio increases financial risk of the firm (Hamada, 1972) Chava and Purnanandam (2010) find that CEO's incentive is strongly correlated with the capital structure of the firm. Therefore, we hypothesize as follows:

H2: High- testosterone CEOs increase the leverage ratio (financial risk) of the firms.

For investment decisions, we focus on acquisitions. Graham, Harvey, and Puri (2012) find that the decision making authority for acquisitions typically belongs to the CEOs. Moreover, they find that CEO's preference for risk is an important factor in merger decisions. Even though acquisition, especially diversifying mergers lowers the risk of the firm (Amihud and Lev, 1981), excessively frequent mergers or spending too much money on acquisitions may increase the risk of the firm.[7] Therefore, our third hypothesis is as follows:

H3: High-testosterone CEOs are more acquisitive.

If testosterone level of the CEO affects the risk of the firm, it should also affect the incentive contract of the CEO because of the relation between risk and compensation (Holmstrom and Milgrom, 1991; Lambert and Larcker, 1987; Yermack, 1995; Bushman et al., 1996; Aggarwal and Samwick, 1999; Core and Guay, 1999, 2002; Jin, 2002; and Oyer and

[6] In untabulated tests, we do not find significant correlation between testosterone and personal violent incidences, or risky hobbies, or extra-marital affairs.

[7] Cain and McKeown (2014) find that acquisitions driven by the CEOs that have sensation seeking tendency increases the risk of the firm.

Shaefer, 2001). Aggarwal and Samwick (1999) find that pay-performance sensitivity is weaker for high risk companies due to the difficulty of monitoring. Prendergast (2002) argues that because of delegation of responsibility, compensation to a manager is positively correlated with the uncertainty of the firm despite the difficulty of monitoring under uncertainty. Since compensation is an outcome of a contract between the CEO and the board of directors (Shleifer and Vishny, 1997), it would reflect CEO's risk preference, which in turn is affected by his testosterone level. Since high-testosterone CEOs are more risk seeking, they would prefer to have compensation package that are more sensitive to the risk of the firm. Empirically, the sensitivity of compensation to the risk is measured with Vega of the compensation (Core and Guay, 2002; Coles, Daniel, and Naveen, 2006). Thus, our fourth hypothesis is as follows:

H4: High-testosterone CEOs prefer compensation packages with high VEGA.

III. METHODS

Sample

Because we need to obtain the facial photos of the CEOs from Google Image, we start with the CEOs that had interviews on CNBC over the period of 1997~2009. We believe that the images of these CEOs would be easier to find in the web due to the fact that their CNBC interviews and their associated images would be available given that CNBC has been one of the most influential financial television networks (Kim and Meschke, 2012; Engelberg, Sasseville, and Williams,2011). We collect 10,958 CEO interviews from 2,764 unique public firms in the US done by 3,136 unique CEOs[8]. After going through the picture collection and measurement process described in the Appendix A, we narrow down to the 558 unique male CEOs in the Execucomp to combine the best quality face pictures with their compensation data. The Execucomp covers the 1,500 largest public firms in the US, and it provides detailed information about the compensation package, such as option grants and equity ownership of the five highest paid executives including the CEO. We drop financial institutions (SIC code 6XXX), because

[8] For the 6,799 interviews in 1997~2006, we collect the transcripts from Factiva and hand matched their company symbols with CRSP Permno. Since 2007, CNBC stopped providing interview transcripts to Factiva. Thus, we hand collected the remaining interviews (only timestamps, title, and one line summary) from CNBC website over the period of 2007~2009.

they are heavily regulated and have drastically different financial risk characteristics than typical firms in manufacturing industry or service industry.

Dependent Variable

Since our primary research question is whether the variation in testosterone level of the CEOs explains the variation in firm risk, our dependent variable is the total risk of the firm. It is measured as the standard deviation of the daily stock returns over the fiscal year. Due to the skewness of the distribution of the variable, we take natural log of it throughout the paper. As robustness checks, we also use equivalently measured total risk based on six month window that finishes at the end of fiscal year. Additionally, we use total risk based on monthly return over the trailing two fiscal years.

Independent Variable

Testosterone level of the male CEO is proxied by the facial width to height ratio (fWHR) of the CEO. We follow Carré, McCormick, and Mondloch (2009) to measure fWHR, using ImageJ software provided by the National Institute of Health (Rasband, 2012). The measure is defined as the bizygomatic distance divided by the distance between the upper lip and the mid-brow. Weston, Friday, and Lio (2007) find that male and female start to diverge in terms of their fWHR at puberty, which suggests that wider face of male is attributable to higher testosterone level (Verdonck et al.1997).

Control variables

We have controls for CEO characteristics and firm characteristics following Cain and McKeown (2014) where they investigate the impact of CEO's personal risk-taking measured by the pilot license of the CEO upon firm risk. CEO characteristics include CEO age and tenure, and we also use his compensation delta and Vega. We control for CEO age, because testosterone level decreases in age (Harman et al., 2001). For the CEOs that were appointed during our sample period, we can calculate the tenure. For the CEOs that stepped down during the sample period, we look for the tenure information in the Forbes and Google. If missing, we treat the first year of appearing in the Execucomp as the first year of tenure. Firm risk may be affected by the incentive structure of the CEO (Core and Guay 2002). Compensation Delta measures the

dollar amount sensitivity of CEO's total compensation to the change in stock return by one percentage point. Compensation Vega measures the dollar amount sensitivity of CEO's total compensation to the change in the volatility of stock return by one percentage point (0.01). We follow Coles, Daniel, and Naveen (2006) in constructing these two measures.

Size of the firm is proxied by natural log of the book value of assets. We control for financial risk of the firm, which is book value based leverage ratio ((short term interest bearing debt + current portion of long term debt + long term debt)/total assets). R&D margin is defined as R&D expenditure divided by total assets. When R&D is missing, we treat it as zero. Historical growth of the firm size is proxied by sales growth. Profitability is measured by ROA, which is computed as operating income before depreciation and amortization divided by total assets. Growth potential or investment opportunity of the firm is proxied by market to book ratio which is market capitalization of common stocks divided by book value of equity. We also control for log of firm age. In all of the regressions, we take industry (four-digit SIC code) fixed effects and year dummies due to the concern that unobserved heterogeneity attributable to time invariant characteristics of the industry and time specific shocks may drive the results.

Empirical Model

Our empirical model of firm risk is as follows:

$$\text{Risk}_{\text{it}} = \beta_0 + \beta_1 fWHR_{it} + \gamma X_{it} + \xi IMR_{it} + \delta Industry.FE + \psi Year\ FE + \epsilon \ldots (1)$$

fWHR is the facial width to height ratio of the CEO of the firm *i* in fiscal year *t*. X_{it} is a vector of controls, such as CEO characteristics and firm characteristics that are listed in the previous subsection[9]. Because the sample of CEO picture collection started from the CEOs that had CNBC interviews, we control for self-selection bias by including the inverse Mills' ratio (IMR) in all of the regressions (Heckman, 1979), which is obtained from the first stage regression explained below.

Engelberg and Parsons (2010) point out that media coverage is endogenous. Gurun (2009) finds that the slant and coverage of a firm by media are significantly affected by whether the

[9] In untabulated tests, we also investigate whether the relation between fWHR and risk is curve-linear by including a square term of fWHR. However, we do not find strong support.

company has media experts in the board of directors. Thus, we conjecture that the probability of having CNBC interview would be high if the firm has media experts in the board. We use BoardEx data to identify the media experts (the ones who are currently working for media companies or the ones who used to work for media companies during their career history) from the directors. The detail of collecting the data from BoardEx is described in Appendix B and C.

Gentzkow and Shapiro (2006, 2010) find that readers of newspapers have significant preference for like-minded news and the media firms try to satisfy their needs by covering the firms the audience want and give the slant to the direction the audience want. Given that CNBC's stated goal is to enable the individual investors to "level the playing field with the institutional investors," CNBC would attempt to cover the firms and CEOs that individual investors are interested in. Also, assuming that individual investors' demand for coverage could be inferred from the coverage of other media, we conjecture that CNBC would be more likely to cover the firms and CEOs that draw much attention from the other media. At the same time, there could be significant information cascade from CNBC to the other media so that the companies CNBC cover could also be covered intensively by the other media companies (Kim and Meschke, 2014). Lastly, media companies can herd in terms of coverage of firms. Thus, our first stage probit regression is as follows[10]:

$$\Phi(\text{CNBC interview}_{it}) = \beta_0 + \beta_1 1\{HaveMediaExp\}_{it} + \beta_2 \ln(1 + \#news\ CEO_{it}) + \beta_3 \ln(1 + \#news\ Firm_{it}) + \gamma X_{it} + \epsilon \quad \text{.....(2)}$$

Where CNBC interview_t is a dummy variable that is one if the CEO of the firm *i* had an interview with CNBC in fiscal year *t*. $\#news\ CEO_{it}$ is the number of news articles about the firm that had CEO's name in the text. $\#news\ Firm_{it}$ is the number of news articles about the firm that did not have CEO's name in the text. X_{it} is a vector of controls such as leverage ratio, log of Tobin's Q, Return on assets, CEO tenure, lagged value of natural log of total risk of the firm over the year. Appendix D describes how we collect and count the news articles about the

[10] One might question whether the investor response to CEO interviews is any different to the fWHR of the CEO due to the potential of increasing risk of the firm, but we do not find any correlation (untabulated). We believe that the testosterone level of the CEO should be already priced in the market, and should not bring any surprise as the CEO comes to the television media.

firms in Execucomp over the sample period and classify the articles into the ones with CEO names (nicknames) and the ones without.

IV. RESULTS

IV.1. Main Results

We first show the summary statistics of the sample of the firm years for the first stage selection regression of having CNBC interviews on Panel A of Table 1. Panel B shows the first stage probit regression. We confirm that the CEOs are more likely to have CNBC interviews (CNBC is more likely to cover a CEO/firm) if (1) the firm has media experts on the board; (2) CEO receives more media coverage; (3) the firm receives more media coverage; (4) the firm is large; (5) the firm has low financial risk; (6) the firm is more profitable; (8) the CEO is more experienced; and (9) the firm's total risk was high in the previous year. Notice that the likelihood of CNBC interview is higher for the firms with higher risk. We obtain inverse Mills' ratio and use it in the subsequent second stage regressions.

[Table 1 & 2 about here]

In Panel A of Table 2, we first show the breakdown of the CEOs in our sample by the industry (1 digit SIC code). Average fWHR of the US CEOs is 2.0207 with a standard deviation of 0.167. We do not find statistically significant variation in fWHR level across the industries. One may argue that the fWHR in agriculture, forestry, and fishing industry is low, but we only have three CEOs in that industry. Besides, our results are robust when we exclude these three CEOs (untabulated). Eighty seven (87) out of the 558 CEOs are from financial services industry, but we remove these CEOs because of the drastically different regulatory environment of banking and insurance industries (notice that financial services firms were excluded in the first stage selection regression in Table 1 as well).

Panel B of Table 2 shows summary statistics of the sample used in the second stage regressions of firm risk upon the testosterone level of the CEO. Specifically, we focus on the regressions where the dependent variable is one year daily return volatility (N=1,976). Notice that the number of observations is only 1,978 even though we have fWHR for 558 CEOs,

because our first stage regression restricts our data to the ones with valid observations in BoardEx database.

Panel C confirms our hypothesis that high testosterone level CEOs drive up the risk level of the company. The coefficient of fWHR is 0.101~0.131 depending on the choice of the risk measurement (6 month~2 years), and the results are significant at 5% level. We concentrate our analysis on the total risk based on one year period, where the average annualized return volatility is 44.17%[=2.783%*$\sqrt{252}$]. Starting from the mean fWHR of 2.020, one standard deviation increase in fWHR (0.166) is associated with 0.101*0.166=0.0168 increase in ln(total risk over one year) or 0.75% point increase in annualized return volatility to 44.92%. The coefficients of the controls generally follow the results in Cain and McKeown (2014), e.g. negative association with firm CEO compensation Vega, size, sales growth, ROA, and firm age; and positive association with compensation delta, leverage, and market to book.

IV.2. Controlling for CEO Overconfidence

Some readers may wonder if the fWHR is highly correlated with CEO overconfidence, because literature finds that male are more likely to be overconfident than female (Barber and Odean, 2001) and overconfident CEOs are more likely to drive the firm more risky (Malmendier and Tate (2005). Thus, we control for CEO overconfidence in our next set of regressions. Overconfidence of the CEO is measured using CEO's option compensation data, as in Malmendier and Tate (2005), Campbell, Gallmeyer, Johnson, Rutherford, and Stanley (2011). "Overconfidence" is a dummy variable that is one if the unexercised option holding of the CEO is on average more than 67% in the money for a second time or more over the sample period[11].

[Table 3 about here]

We show the results in Table 3, and find the correlation between testosterone and risk is robust with similar economic magnitude. Besides, we do *not* find statistically significant correlation between our testosterone measure and overconfidence measure (Pearson correlation=-0.044 with statistical insignificance). Still, we find separate impact of CEO overconfidence upon the level of firm risk. When we compare the result in column 3 of Table 3

[11] Our results are similar when we use 100%, 150%, and 200% threshold level of option exercises (untabulated).

and that in column 3 of Table 2 (return volatility measured over trailing two years), the economic magnitude of the coefficient increases with higher statistical significance as we control for the impact of overconfidence. This assures that the effect of our testosterone upon the firm risk is uniquely different from the effect of CEO overconfidence, which is common in the literature (Jia, van Lent, and Zeng (2014); Johnson et al. (2006)).[12]

IV.3. Controlling for Vocal Masculinity

Some readers may question whether our testosterone measure could be explained away by other masculinity measures such as voice pitch (Puts, Hodges, Cardenas, and Gaulin, 2007; Puts, Apicella, and Cardenas, 2011; Mayew, Parsons, and Venkatachalam, 2013). So, we control for these variables. Vocal masculinity has two dimensions, voice pitch and formant position. Because men's vocal folds and tracts are longer than those of women, men produce voices of lower fundamental frequency (we label it as F0, following the literature, which is commonly perceived as voice pitch) and tighter spacing of formant position. Appendix E describes in detail about how we collect voice pitch and formant position using Praat software and the CNBC interview video files.

[Table 4 about here]

The results in Table 4 clearly shows that the explanatory power of fWHR is not washed away after controlling for CEO voice pitch and formant position, as well as overconfidence. Again, the economic magnitude and statistical significance only increases when we compare the regressions in the third column of Table 4 and the third column of Table 2. Since deeper male voice is associated with more male dominance, one may anticipate negative sign of the coefficient of voice pitch. Also, if we conjecture higher risk level for the firms with more threat potential (lower formant position) of the CEOs, we may expect negative sign of the coefficient of the control variable. Interestingly, the coefficients of voice pitch are positive and significant when the risk is measured over the past 6 months or 2 years. The coefficient of formant position is not statistically significant at all. One might wonder if the fWHR and the vocal masculinity

[12] In an untabulated testing, we fail to find correlation between narcissism and testosterone, using the transcripts of the CNBC interviews and the transcripts of quarterly earnings conference calls. Again, this reaffirms that testosterone is a trait distinct from narcissism.

are highly correlated through testosterone and provide in insignificant coefficients of the latter two. However, Pearson correlation between fWHR and voice pitch is -0.009 (statistically insignificant) and that between fWHR and formant position is only 0.105 (significant at 1%). We believe that the insignificance of the voice related variables may be attributable to the fact that only a subset of the sample with fWHR has valid voice data. What is important is that the effect of fWHR is robust throughout our tests.

IV.4. Controlling for risky personal hobbies of the CEO

Cain and McKeown (2014) find that firm level risk is significantly associated with personal level risk taking behavior, proxied by CEO's private pilot's license. Thus, some readers may argue that the fWHR of the CEO may be merely proxying for the personal risk preference or sensation seeking tendency of the CEO. Some of the CEOs disclose their hobbies in media interviews. Therefore, we extensively search in Google, Forbes, Bloomberg Businessweek, Fortune, and other internet sources for CEO's hobbies with the caveat that there should be selection bias to disclose voluntarily. We collect maximum five different hobbies of the CEO. In the process, we also collect CEO's personal history to check if the testosterone level of the CEO is highly correlated with having other risky personal behavior, such as extra-marital affairs, divorce, drugs, prostitution, physical violence, accounting restatement (GAO database and Factiva search), and class-action lawsuit (Stanford Lawsuit Clearing House database). However, we do not find any significant correlation with these incidences, partly because of the media slant for the firms potentially managed by the PR division of the firms.

Among the 558 CEOs in our sample, we were able to collect the hobby information for 255 CEOs. We standardize the names of the hobbies into 58 hobbies and show the ranking of the 25 most common hobbies of the CEOs in Figure 1. Golf is by far the most common hobby (29% of the CEOs claimed golf is their hobby), followed by skiing (13%), reading (12%), basketball (9%, and tennis (8%). We classify the hobbies of the CEO into risky sports versus not using a criterion set by the life insurance experts based on the list of risky hobbies by referring to six websites, such as "13 Hobbies That Drive Up Term Life Insurance Rates."[13] Among the 58

[13] The list of risky hobbies change as new hobbies are explored and invented by many people. We use the following list of websites to come up with the list of risky hobbies: "13 Hobbies That Drive Up Term Life Insurance Rates" by

hobbies, we label the following nine hobbies as risky hobbies: flying airplanes (pilot: 6 CEOs), scuba diving (4 CEOs), car racing (8 CEOs), martial art (boxing, Tae-Kwan-do, and wrestling: 3 CEOs), hose riding (horse-back riding:7 CEOs), ranching (horse cutting and ranching:2 CEOs), mountain climbing (including rock climbing: 3 CEOs), risky boating (ocean kayaking: 1 CEO), risky biking (motor cycle racing and off-road motor biking: 3 CEOs).

[Figure 1 about here]

In the regressions of Panel A of Table 5, we include the dummy variable that is one if the CEO has risky hobbies as a control variable. We find that CEO's that enjoy risky hobbies significantly increase the firm's total risk (coefficient is 0.088 with a t-stat of 2.08 in the regression of one year risk). Interestingly, our testosterone measure, fWHR, preserves its explanatory power. The coefficient almost doubles from the coefficients in Table 3 to 0.25~0.296 with a t-stat of 2.46~2.64 depending on the methods of risk measures.

In Panel B of Table 5, we replace the "risky hobbies" dummy with the set of nine dummy variables of the categories of specific risky hobbies. For example, "flying airplanes" is takes the value of one if the CEO is reported to have the hobby of civil aviation.

[Table 4 about here]

Consistent with Cain and McKeown (2014), we find that CEOs with a hobby of piloting an airplane significantly increase the firm risk. We also find that CEOs having the hobbies of horse-back riding and risky biking increase the firm risk. Some supposedly risky hobbies such as mountain climbing are associated with lowering the risk of the firm. However, these effects of hobbies do not wash away the impact of testosterone (fWHR). [14]

INSWEB (http://www.insweb.com/life-insurance/13-hobbies-life-insurance.html), "Top 10 Incredibly Dangerous Sports" by LISTVERSE (http://listverse.com/2009/06/18/top-10-incredibly-dangerous-sports/), "The 7 Deadly Hobbies: Pastimes Your Insurer Hates" by (http://www.dailyfinance.com/2011/10/04/the-7-deadly-hobbies-pastimes-your-insurer-hates/), "Hazardous Pastimes & Hobbies" by Life-insurance-help.co.uk (http://www.life-insurance-help.co.uk/life_insurance_hazardous_hobbies.php), "Eight Hobbies Your Life Insurer Won't Approve Of" by Investopedia (http://www.investopedia.com/slide-show/dangerous-hobbies/), and "Top 10 Deadliest Hobbies" by TOPTENZ.NET (http://www.toptenz.net/top-10-deadliest-hobbies.php).

[14] In an untabulated analysis, we fail to find significant correlation between our testosterone measure and other personal specifics, such as experiencing divorce or separation, having love affairs, having sexual harassment related accusations, being reported as having committed physical violence. The psychology literature documents close correlation of these occurrences with higher testosterone which is proxied by wider faces. However, there are

IV.5. Alternative measures of fWHR

One may question whether our result is robust if we switch our continuous measure of testosterone with non-parametric measures. Thus, in Panel A of Table 6, we replace fWHR with the inverse rank of fWHR (1st column: smallest fWHR being rank 1 and largest fWHR being rank 558), the dummy variable that is one if the CEO belongs to the highest quintile (1/5) in terms of fWHR, the dummy variable that is one if the CEO belongs to the highest tercile (1/3) in terms of fWHR, and the dummy variable that is one if the CEO belongs to the highest half in terms of fWHR. The result is robust. In untabulated tests, (1) we replace the set of hobby variables with the risky hobbies dummy and obtain similar results; and (2) we run the same regressions as in Table 4 by excluding highest quartiles of fWHR, and we obtain consistent results.

Some readers may question whether the correlation is robust when we restrict our sample to the firms that had at least one CEO turnovers to check if what we document is not attributable to unobserved heterogeneity among different firms. Panel B in Table 6 confirms the robustness. In this set of regressions, we report only on 1 year risk measure to save space.

[Table 6 about here]

IV.6. Leverage and Testosterone

If the testosterone level increases the risk level of the firm, one of the possible channels could be the CEO's decision on financial leverage. Thus, in this subsection we investigate whether CEOs with high testosterone level increase the leverage ratio of the firm. The empirical model is as follows:

$$\text{Leverage}_{it+1} = \beta_0 + \beta_1 fWHR_{it} + \gamma X_{it} + \xi IMR_{it} + \delta Industry\ FE + \psi Year\ FE + \epsilon \ldots (3)$$

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several problems to empirically test it. For a wrongdoing to be observable, it has to be detected as well as committed. Since our CEOs are high profile persons of big corporations with a lot of economic resources. To the extent that these people are high ability persons, they may be able to conceal significant part of their own wrongdoings under the radar. Also, even if there were some wrongdoings, the PR division would try their best not to publicize. Therefore, the data we obtain through class action lawsuits database and news article search through Factiva has substantial limitations.

Where $\text{Leverage}_{\text{it+1}}$ is market value based leverage ratio that is computed as total debt/(total debt + market value of equity). We compute market value of equity as the number of common shares outstanding times the stock price as of the fiscal year end. X is a vector of control variables, which consists of the following variables: (1) dummy variable of risky hobbies that is one if the CEO has risky hobbies; (2) voice pitch of the CEO; (3) formant position of the CEO's voice; (4) overconfidence dummy; (5) CEO age; (6) log of CEO tenure; (7) compensation delta; (8) compensation VEGA; (9) sales growth; (10) ROA; (11) market to book ratio; (12) firm size (log of assets); and (13) collateral, proxied by the gross property, plant, and equipment divided by total assets.

Consistent with our hypothesis, we find that CEOs with higher testosterone level significantly increase the leverage ratio of the firm. One standard deviation increase in fWHR translates into an increase of leverage ratio by 2.82% point from the sample average of 19.95% with a t-statistic of 2.99. The result is robust when we replace the fWHR with non-parametric measures of testosterone level. In Panel B, we do a robustness check by replacing the dependent variable with book value of leverage ratio. The result is robust.

[Table 7 about here]

IV.7. Acquisitiveness and Testosterone

Since testosterone is associated with male dominance, one of the ways to achieve such dominance in the profession of the CEO is to take over another firm. In addition, acquisition is an important capital budgeting decision that could affect the risk of the firm. Thus, in this subsection, we test whether high testosterone CEOs are more acquisitive. Using SDC Platinum data, we obtain the information about completed acquisitions in which more than 50% target shares were acquired and in which the deal value was at least five million dollars. As in Güner, Malmendier and Tate (2008), leveraged buyouts, recapitalizations, self-tenders, subsidiary acquisitions, spin-offs, exchange offers, repurchases, minority stake purchases, privatizations, and remaining interest acquisitions are excluded. We set up the empirical model as follows:

$$1\{\text{acquired}\}_{\text{it}} = \beta_0 + \beta_1 fWHR_{it} + \gamma X_{it} + \xi IMR_{it} + \delta F\text{irm } FE + \psi Year\ FE + \epsilon \ldots (4)$$

Where $1\{\text{acquired}\}_{it}$ is a dummy variable that is one if the company acquired a target company in fiscal year t. Following Cain and McKeown (2014) the control variables (X_{it}) are 1{Risky Hobbies}, voice pitch and formant position of the CEO, overconfidence, age, tenure, compensation delta and VEGA of the CEO, leverage ratio, dividend yield, ROA, firm size, cash flow (=(net income + depreciation)/lagged property, plant, and equipment), Tobin's Q ((book value of assets + market value of equity - book value of equity)/book value of assets), and investment (=capital expenditure/ lagged property, plant, and equipment). The result is shown in Panel A of Table 7. The coefficient of fWHR is 2.605 with a t-statistic of 2.84, supporting that high-testosterone CEOs are more acquisitive. The result is robust when we use alternative measures of testosterone.

In Panel B, we replace the dependent variable with (1) the aggregate dollar amount of deal values (columns 1 and 2) and (2) the average dollar amount per deal (columns 3 and 4). The result is consistent, and it shows that CEOs with higher testosterone level are more likely to have bigger sized deals on average and spend more money in total. Starting from the mean of aggregate deal value of $196 million, one standard deviation increase in fWHR is associated with an increase in the aggregate deal value by $1,847 million. The economic magnitude of the impact of testosterone is very large. We do not find significant impact of testosterone on the frequency of the acquisition. Instead, we find its impact on the average deal size. Therefore, high-testosterone CEOs seem to do large sized acquisitions to establish dominant positions than frequent acquisitions. It may be that Roll's hubris hypothesis (1980) is mainly attributable to the CEOs with higher testosterone level given that male are more likely to be overconfident (Barber and Odean, 2002).

[Table 8 about here]

Given that we find high testosterone CEOs spend more dollars per deal, it is conceivable that high-testosterone CEOs destroy shareholder value by spending too much on acquisition. As a consequence, once an acquisition is announced, the stock market response would be more negative for the deals done by high-testosterone CEOs. Thus, we do regression analyses of cumulative abnormal returns around the time of acquisition announcements. We follow Cain and McKeown (2014) in terms of the specification of control variables that are lagged by one

year. The result in Table 9 confirms our hypothesis. We find significant negative coefficient on the measure of testosterone. When testosterone level is higher by one standard deviation, the announcement return is 0.88% lower (=0.053*0.1669; t-statistic=2.09 in column 2).

[Table 9 about here]

IV.8. Testosterone and CEO compensation structure

Thus far, we find that high-testosterone CEOs increase the risk of the firm. Given that compensation contract is a mechanism to align the interest of the CEO with that of the shareholders, the choice of compensation package by the CEO may be significantly affected by the testosterone level of the CEO. Specifically, since high testosterone CEOs are less afraid to take the risk, he may choose the compensation that increases more when the risk of the firm increases. Consequently, high testosterone CEOs may prefer high VEGA compensation package, in which VEGA measures the dollar amount change in CEO option holdings when the volatility of the stock changes by one percentage point (Coles, Daniel, and Naveen, 2006). Also, since high testosterone would spur the CEO to make decisions to be dominant in terms of performance, he would prefer high Delta compensation package. Delta measures the dollar amount change in compensation when the stock return increases by one percentage point (Coles, Daniel, and Naveen, 2006). At the same time, the board of directors may want to exploit the CEO's traits, such as high-testosterone. Our argument is equivalent to the theoretical prediction about the relation between overconfidence and CEO incentives in Gervais, Heaton, and Odean (2010). There, the authors predict that companies would provide convex compensation to overconfident CEOs. In empirical model, we largely follow Low (2009) where the author finds exogenous increase in takeover protection results in lower Vega of CEO compensation.

$$\ln(1 + \text{VEGA})_t = \beta_0 + \beta_1 fWHR_{it} + \gamma X_{it} + \xi IMR_{it} + \delta \text{Firm } FE + \psi Year\ FE + \epsilon \ldots.(5),$$

$$\ln(1 + \text{DELTA})_t = \beta_0 + \beta_1 fWHR_{it} + \gamma X_{it} + \xi IMR_{it} + \delta \text{Firm } FE + \psi Year\ FE + \epsilon \ldots.(6),$$

where X_{it} is a vector of the following control variables: overconfidence, tenure, chairman CEO duality dummy, dummy variable for high ownership of the CEO, CEO age, total return volatility over one year, ROA, leverage ratio, firm size, and market to book ratio.

[Table 10 about here]

The results show that high-testosterone CEOs have high-VEGA compensation and high-Delta compensation. One standard deviation increase in fWHR is associated with an increase in Vega by $391,674 from the sample mean of $241,097 (t-stat of 3.97) and an increase in Delta by $6.4 million from the sample mean of $2.6 million (t-stat of 4.12). The results are similar when we replace fWHR with other alternative measures such as the inverse of rank and the dummy variables of highest fWHR quantile.

V. CONCLUSION

Recent global financial crisis gave a serious lesson about the downside risk of high-testosterone corporate culture (Adams and Ragunathan, 2012; Kristof, 2009; and Sherman, 2012). Until now, it has been impossible to measure the testosterone levels of a large sample of CEOs. Borrowing from the literature of neuroendocrinology, we proxy for the testosterone of the CEOs by measuring the facial width-to-height ratio of male CEOs (Wong, Ormiston, Haselhuhn, 2011; Carré and McCormick, 2008). The findings in our paper suggest that CEOs of high testosterone level indeed increase the risk level of the firm. The empirical channels we find are through leverage increase and acquisitions. Naturally, the high-testosterone CEOs prefer volatility inducing compensation package. Our paper contributes to the literature in a handful of aspects. First, it fills the gap in the literature by finding the direct evidence that high testosterone of the CEO increases firm risk. The result is important because it is the first finding that the hormone level of the leader has an impact on the organization's risk level and decision making, while the literature has been finding evidence on personal financial decisions. Second, we contribute to the literature about capital structure by providing the first evidence that it is significantly affected by testosterone of the CEO. Third, we contribute to the literature about M&A and CEO characteristics in the sense that testosterone level affects the acquisitiveness of the CEO.

Our finding that testosterone level is not significantly correlated with overconfidence identifier is commonly reported by contemporaneous researchers (Jia, van Lent, and Zeng, 2014). Also, it is noteworthy that our testosterone measure is not a substitute of personal risk-taking proxied by CEO's exotic hobbies (Cain and McKeown, 2014). Lastly, one of the practical

implications of our paper is that frontal face photos of male candidates could be informative about their testosterone level and risk appetite in organizational decision making. Hence, collecting face photos could be helpful for the underwriters in insurance industry (at least for director and executive insurance).

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Appendix A. Procedure of selecting best quality CEO pictures

We start with the 3,298 unique CEOs that had CNBC interviews at least one time over the sample period. For each of the CEOs, we collect the facial pictures of the person using his name string and company name (either from CNBC transcript or from Compustat) using Google Image. We are able to obtain facial pictures for 3,136 unique CEOs. We follow Carré, McCormick, and Mondloch (2009) to measure the facial width to height ratio. First, each photo was converted to 8-bit, gray scale image with a standard height of 400 pixels. When a picture is big and contains more than the face and upper chest of the CEO, we cut the picture to focus on the facial part and convert it similarly. Then with the converted picture files two research assistants independently measure the bizygomatic distance and upper facial height (fWHR). Even though we try to obtain CEO pictures of directly facing the front, we are not able to obtain the highest quality photographs for all of the CEOs. For example, some pictures are too small and have low resolution. Also, since human face is a 3-dimensional object while fWHR is measured through a 2-dimensional photo, the measure could be affected by the head posture of the CEO and the angle of the camera. Some pictures are taken from sideways (about 30~45 degrees) or angled from downside or upside, which makes it difficult to measure his bizygomatic distance. Also, in some pictures, even though the camera angle was perfectly from the front, the CEO rotated his face clockwise or counterclockwise. But in this case, we treat it as high quality picture, because we can reverse the rotation and measure correctly. Therefore, each research assistant gives ratings of the photographs from zero to three in terms of suitability for measuring fWHR.

0: Worst posture in which only one ear is visible, because (1) the person is facing sideways; or (2) the photographer took the picture from below or from above so that the measurement of facial height could be problematic.

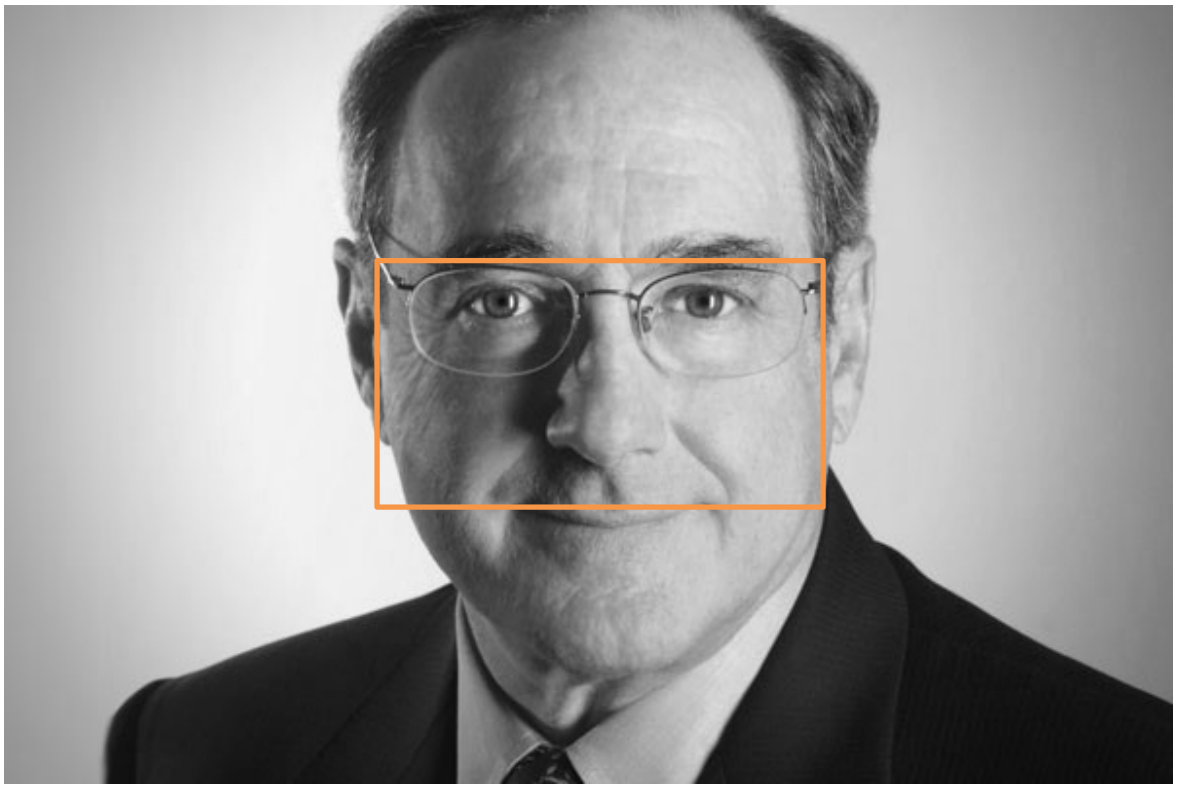
1: One ear is perfectly visible but only half of the other ear is visible, because the person is facing slightly sideways. The photographer took the picture from below or from above so that the measurement of facial height could be problematic.

2: Both ears are clearly visible to their roots in the face and the person is looking straight to the front, but the head is slightly rotated either clockwise or counterclockwise.

3: Perfect posture in which both ears are clearly visible to their roots in the head and the person is looking straight to the front.

In addition, one of the coauthors independently gave ratings of the pictures. Then, we narrow down to the pictures in which all three raters gave the rating of at least 2. By these, we narrowed down to 1,387 CEO pictures. Cronbach's alpha for the two RA's measures was 0.85. Notice almost 2/3 of the initially collected pictures was dropped at this stage even though all of these were deemed as best candidate pictures for the respective CEOs in our sample. Furthermore, we narrow down to the CEOs in the Execucomp, which finally gives us 558 unique CEOs.

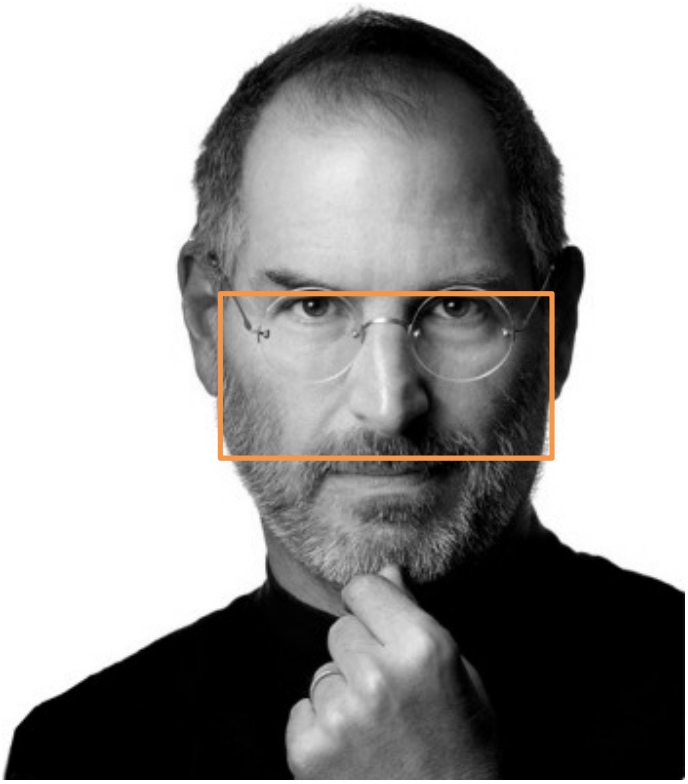
Appendix Figure 1. Measuring fWHR using CEO pictures



[Photograph of Robert I. Toll, CEO of Toll Brothers (TOL), source: Google Image Search]

We follow Carré and McCormick (2008) and Mayew, Parsons, and Venkatachalam (2013) in measuring the facial width-to-height ratio. Specifically, it is the distance between the left and the right zygion (bizygomatic width) divided by the distance between upper lip and the midpoint of the inner ends of the eyebrows (upper facial height). Some researchers, such as Jia, van Lent, and Zeng (2014) and Lefevre, Lewis, Perrett, and Penke (2013) measure the upper facial height in a slightly different manner in that they measure the distance between the upper lip and the heights point of the eyelids. We believe that our measurement process is better following the theory, because it is about the growth of sexually dimorphic growth of the *bones (not the skin)* triggered by different testosterone levels.

Some readers may question that sometimes the pictures are squeezed horizontally or vertically, which may bring about unwanted noises. We have two answers: (1) such manipulation biases against finding the results; (2) it is very difficult to believe that the modifiers of risky firms are intentionally flattening the face; (3) Google image search throws us many different pictures of the same CEO, which enables us to sort out some potentially manipulated pictures.



[Photograph of Steve Jobs, CEO of Apple Inc (AAPL), source: Google Image Search]

For some CEO pictures, the difference in measurement algorithm does not make any difference, because the highest point of the eyelids and the midpoint of the two inner points of the eyebrows are at the same height.

Appendix B. Link between BoardEx and Compustat databases and identifying executives

The problem with BoardEx data is that less than 7,185 firm names out of 601,442 organization names are matched with the Compustat database on a one-to-one basis through the CIK number. One slightly different name spelling of the same company would fail to have a matching CIK. Since BoardEx is only partially merged with Compustat, I run exhaustive fuzzy text/string matches to find firm identification numbers from all the databases to which the school subscribes. I run multiple rounds of string matching using the following databases in a recursive manner in the sense that whatever is left over from the current matching round with a certain database is used again in the next matching round with the next database. These databases include Compustat North America, Compustat Global, CRSP, Dealscan, Bank Regulatory Database by Chicago FED (find Bank Holding Company Names), Jay Ritter's IPO Adviser ranking table, SDC Platinum (M&A/IPO adviser names). I use the compged function of SAS, which is the most sophisticated linguistic string match technique. I obtain identification numbers for 40,434 organization names in BoardEx from any of the databases listed above, and I am then able to identify whether the company is a commercial bank or investment bank. For these 40,434 matched names, I hand-check whether the two company names (one from BoardEx and the other from one of the listed databases) really are the same business identity using BusinessWeek and Hoovers databases and then checking their websites. In checking whether the companies really are a bank holding company, I use the FDIC Bankfind database on their website. After this procedure, 39,370 of the BoardEx company names are matched with the ID numbers of one of the databases above[15]. Focusing on the GVKEYs, 27,035 unique GVKEYs are matched to 33,030 firm names in BoardEx, which is 4.6 times the number of initial matches through CIK.

[15] This number means that 6.55% different organization names in BoardEx are linked to standard databases. The reason for such a small matching result is that most of the organizations are non-profit organizations such as universities, clubs, government organizations, international organizations, etc.

Appendix C. The procedure of identifying directors with media expertise

We first identify all the firms that belong to printed, audio, or visual media. From the list of organizations in BoardEx, we first extract the firms with GVKEY match, because we can track the SIC code. For this group, we identify the firm as a potential media company if the SIC code belongs to the following set: {SIC code = X | 2700 <= X <=2709, 2710 <= X <=2719, 2720 <= X <=2729, 2730 <= X <=2739, 2740 <= X <=2749, 4800 <= X <=4800, 4830 <= X <=4839, 4840 <= X <=4841, 4880 <= X <=4889, 4890 <= X <=4890, 4891 <= X <=4891, 4892 <= X <=4892, 4899 <= X <=4899, 7383 <= X <=7383, 7800<= X <=7829, 8740 <= X <=8748} We obtain 672 potential media firms.

For organizations that do not have a GVKEY match, we identify them as potential media companies if the name string has any of the following key words:

TRIBUNE COMPANY, JOURNAL REGISTER COMPANY, KNIGHT RIDDER, THE MCCLATCHY COMPANY, MEDIANEWS GROUP, THE SEATTLE TIMES COMPANY, GANNETT COMPANY, LEE ENTERPRISE, HEARST COMMUNICATIONS, THE NEW YORK TIMES COMPANY, E W SCRIPTS, THE WASHINGTON POST, NEWS CORPORATION, WASHINGTON POST, WALL STREET JOURNAL, WALL STREET JOURNAL INC, JOURNAL,
MEDIA, NEWS, TIMES, TELEVISION, RADIO, REUTERS, PUBLISHING, TRIBUNE, TIME WARNER.

We find 5,369 potential media firms. For the two groups of firm names, we search Google and company history on the internet to find out whether they are or were media companies at one point in their history. Through this process we identify 3,651 unique company IDs of the BoardEx that are in the media industry. Then we identify all the directors that had work experience in the media companies throughout their career history up to 2009. For each company, we aggregate the number of directors with career experience in the media.

Appendix D. Collecting and classifying news articles with CEO names and the ones without

For the firms in the Execucomp database, we searched in the Factiva for any news articles that have the company names in the first paragraph or the title. We followed the official company names in Execucomp after removing the suffixes, such as "/DE" and "- CA." We restricted the sources of the news in Factiva to the "Top Sources: Dow Jones Newswires, Major News and Business Publications, Reuters Newswires, and the Wall Street Journal." For the 3,262 unique firms in our sample, we downloaded 1,768,269 articles. Because our focus was on the media exposure of the CEO, not the firm itself, we classified the news articles into the ones with CEO title or names and the ones without. For this procedure, we identified the news articles that have the "CEO" title in the article and exactly the same name strings as shown in the Execucomp database (EXEC_FULLNAME) in any part of the text. One empirical issue about going beyond searching for CEO title is that regional or divisional CEOs or the CEO of another company (competitors or customers or CEO of equity research firms) could be cited for the company of our attention. Another empirical issue is that sometimes the journalists mention CEOs names in nicknames, which may be different from the first or middle names in the Execucomp and that the CEOs sometimes use their middle names more often than their first names. Therefore, in our second round of name search in the articles, if we found the last name of the CEO in the article, we checked if any of the official first name, middle name, or their possible nickname is found in the word before the last name. We referred to Baby Name Wizard[16] and Baby Names Pedia[17] to come up with an exhaustive list of nicknames for any given first names and middle names. As a result, we found CEO names in 149,647 of the news articles about the firms.

Because the distribution of news coverage for the CEOs in a fiscal year was highly skewed (mean=4.79, median=0, standard deviation=24.64, 25th percentile=0, 75th percentile=2, skewness=25.49), we added one and took the natural log of the count of news articles with CEO names.

Appendix Table 1. Breakdown of the news articles by the fiscal year

Fiscal year	N	#news with CEO names					#news without CEO names				
		Total	Average	25th pctl	Median	75th pctl	Total	Average	25th pctl	Median	75th pctl
1992	1392	1,859	1.34	0	0	0	31,404	22.59	0	0	14
1993	1564	2,231	1.43	0	0	0	36,668	23.46	0	1	16
1994	1636	1,884	1.15	0	0	0	34,903	21.35	0	0	19
1995	1725	1,329	0.77	0	0	0	32,277	18.72	0	0	16
1996	1855	1,674	0.90	0	0	0	35,212	19.00	0	0	17
1997	1911	2,351	1.23	0	0	0	50,810	26.67	0	1	38
1998	1922	4,744	2.47	0	0	0	117,245	61.00	1	10	70
1999	1854	5,449	2.94	0	0	0	123,590	66.73	2	21	66
2000	1756	6,715	3.82	0	0	1	96,271	54.95	3	18	50
2001	1754	9,251	5.27	0	0	1	95,243	54.39	3	13	39
2002	1706	13,040	7.64	0	0	2	122,753	71.95	4	14	52
2003	1729	11,516	6.66	0	0	2	116,168	67.19	5	12	50

[16] http://www.babynamewizard.com/baby-name)
[17] http://www.babynamespedia.com/

2004	1714	15,090	8.80	0	1	2	124,760	73.00	6	13	54
2005	1660	14,196	8.55	0	0	2	120,850	73.02	6	14	54
2006	1742	17,504	10.05	0	0	3	128,329	73.84	6	16	57
2007	1698	17,812	10.49	0	1	4	135,996	80.19	7	18	67
2008	1850	12,101	6.54	0	0	2	113,559	61.45	4	10	44
2009	1794	10,901	6.08	0	0	2	102,584	57.31	4	11	41

We also control for the visibility of the firms with the count of news articles without CEO names. Due to the skewness from the distribution of the count of news articles (mean=51.88, median=9, standard deviation=181.53, 25th percentile=0, 75th percentile=43, skewness=14.39), so we transformed the variable by adding one and taking natural log.

Appendix E. Measuring the Vocal Masculinity of the CEO

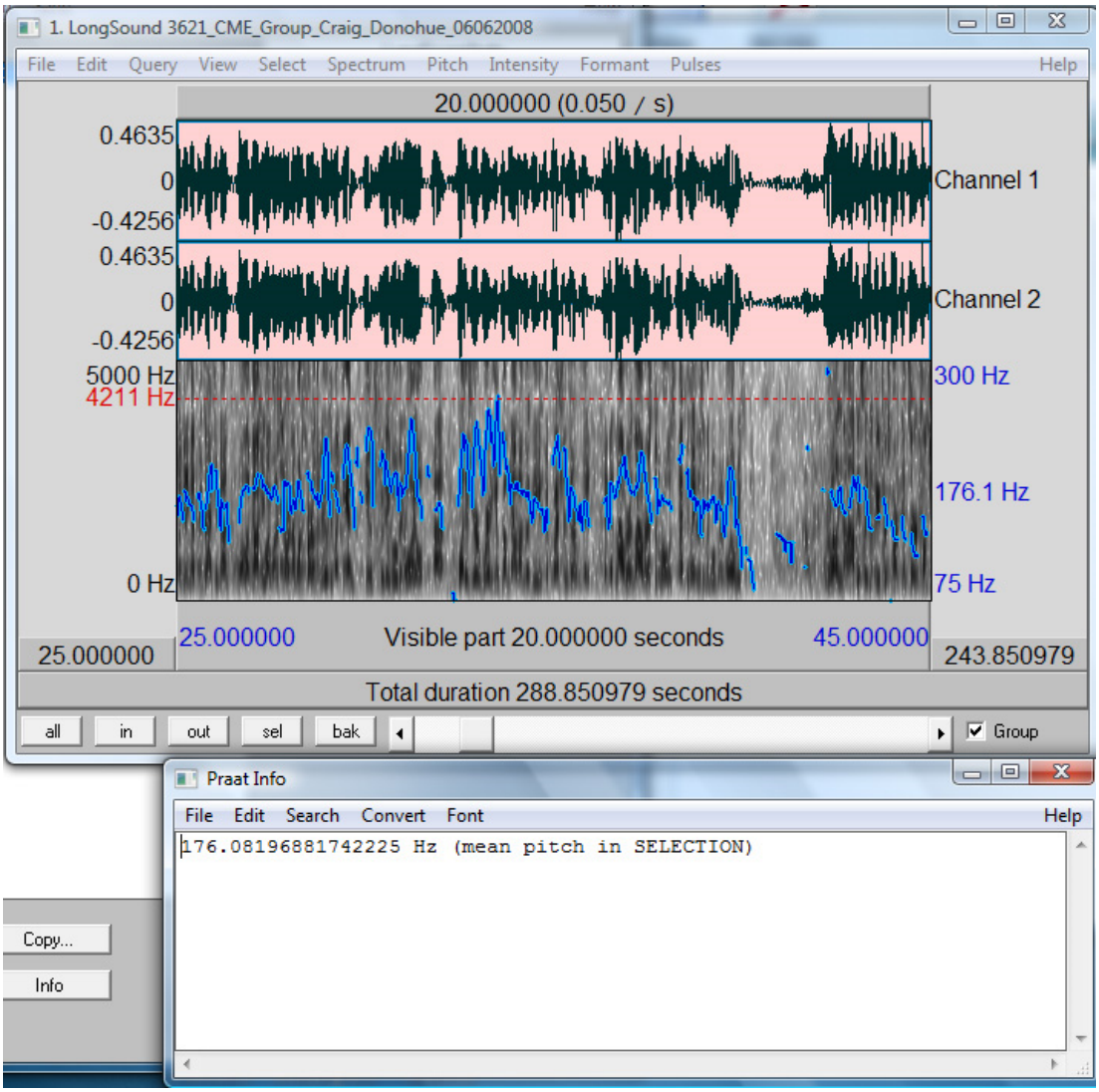
Voice pitch: F0, Fundamental Frequency. Mayew, Parsons, and Venkatachalam (2013) find that CEOs with lower voice pitch (F0) manage larger firms and receive more compensation, indicating their male dominance at work in corporate setting. Following their method, we use Praat software to measure the voice pitch of the CEO. We search for the CEO interview video clips from Youtube.com and Google.com for the CEOs in our sample. Since the minimum length of the voice recording of the CEO has to be 20 seconds, we make sure that the video clip is longer than 20 seconds and the length of speech by the CEO is more than 20 seconds. We download the sound files into MP3 format using the free online service from YouTube mp3 (http://www.youtube-mp3.org/). Following Mayew, Parsons, Venkatachalam (2013), we run Praat acoustic software version 5.3.41 to measure the fundamental frequency (F0) over the first 20 seconds of CEO's speech in each of the downloaded sound file. Our procedure includes setting the pitch floor as 75 Hz and the ceiling as 300 Hz in recognition that these are the well accepted boundaries to analyze speech of adult males (Puts, Hodges, Cardenas, and Gaulin, 2007). Through this, we are able to collect the voice pitch for 336 CEOs in our sample. Average fundamental frequency is 122.31 Hz with a standard deviation of 22.86 Hz.

Formant position (P_f) is another sexually dimorphic acoustic feature. Puts, Hodges, Cardenas and Gaulin (2007) argue that through evolutionary process lower male voice – characterized by lower fundamental frequency (voice pitch) and lower formant position – came to be perceived as a sign of physical dominance among men. Puts, Apicella, and Cardenas (2011) find that formant position is an indicator of men's threat potential. We follow Puts, Apicella, and Cardenas (2011) in measuring formant position as the average standardized formant ($Std.F_i$) value for the first four formants using Praat software via GSU Praat quantify formants add-on tools.

$$P_f = \frac{\sum_{i=1}^{4} Std.F_i}{4}, where\ Std.F_i = \frac{F_{ij} - AvgF_i}{StdevF_i} \quad \text{.....(A.1.),}$$

Where *j* is a subscript of the CEO and *i* is the subscript for the *i*th formant. We set the maximum thresholds of F_1 as 1000, F_2 as 2850, F_3 as 3750, and F_4 as 4500 Hz, respectively. Before standardizing, mean F_1 =187.66±23.66, mean F_2 =862.49±108.99, mean F_3 =1986.87±125.80, and mean F_4 =3304.11 ±123.88. Through this procedure, we find the average and standard deviation of formant position are 0 and 0.557, respectively. Because these two variables are controls and we need to secure enough number of observations, whenever the value is missing, we attribute the average values to the variables in the following regressions. However, the result does not change when we work with the observations with non-missing voice pitch values.

Appendix Figure 2. Screen Capture of Analyzing voice files using Praat Software



Appendix F. Variable Definition

Variable	definition
Firm Characteristics	
#articles about CEO_t	The number of news articles about the company in fiscal year t that has any versions of CEO name.
#articles about $Firm_t$	The number of news articles about the company in fiscal year t that does not have any versions of CEO name. Appendix D describes our procedure of collecting and counting news articles and our algorithm of text searching for CEO names.
1{CEO was interviewed}$_t$	1 if CEO was interviewed by CNBC in fiscal year t
1{Have Media Experts on Board}$_t$	1 if the firm has one or more directors that have work experience in media companies. For definition of media companies, please refer to Appendix C.
1yr daily return volatility	Standard deviation of daily return over the fiscal year.
2 years monthly return volatility	Standard deviation of monthly return over the second half of fiscal year.
6 mo daily return volatility	Standard deviation of daily return over the second half of fiscal year.
Cash Flow	the net income plus depreciation divided by lagged property, plant, and equipment
Collateral	Net PP&E divided by total assets
Dividend Yield	Dividend divided by share price as of fiscal year end (DVPSP_F / PRCC_F) following Cain and McKeown (2014).
Firm Age	Fiscal year minus the minimum of two: the first year that the company appeared in Compustat or the first year the company appeared in CRSP.
Investment	the capital expenditure divided by lagged property, plant, and equipment
Leverage	Book value of leverage ratio is defined as (DLC+DLTT)/AT
M/B	Market value of equity divided by book value of equity
R&D	Research and development expenditure divided by total assets.
ROA	Operating income before depreciation and amortization divided by assets
Sales Growth	REVT(t)-REVT(t-1) in Computat
Tobin's Q	Book value of assets plus market value of equity minus book value of equity divided by book value of assets.
total assets ($Million)	Compustat data item AT

CEO Characteristics

1{Widest Half}	A dummy variable that is one if the fWHR of the CEO belongs to the largest 1/2 of the sample
1{Widest Quartile}	A dummy variable that is one if the fWHR of the CEO belongs to the largest 1/4 of the sample
1{Widest Quintile}	A dummy variable that is one if the fWHR of the CEO belongs to the largest 1/5 of the sample
1{Widest Tercile}	A dummy variable that is one if the fWHR of the CEO belongs to the largest 1/3 of the sample
1{Chairman=CEO}	A dummy variable that is one if the CEO is the chairman of the board, which is obtained from Risk Metrics database.
1{Ownership>5%}	A dummy variable that is one if the stock ownership of the CEO is greater than 5%.
1{Risky Hobbies}	A dummy variable that is one if the CEO is found to have any of the following hobbies: flying airplanes, scuba diving, car racing, martial art, horse-back riding, ranching, mountain climbing, risky boating, and risky biking.
Car Racing	A dummy variable that is one if the CEO's hobby is car racing
CEO age	Age of the CEO
Delta	Dollar change in CEO's wealth for a 1% change in stock price, following Coles, Daniel, and Naveen (2006).
Flying Airplanes	A dummy variable that is one if the CEO's hobby is aviation with his pilot license
fWHR	Facial width-to-height ratio. Appendix A describes the detailed procedure of obtaining the facial pictures of the CEOs and measuring fWHR.
Horse Riding	A dummy variable that is one if the CEO's hobby is horseback riding
Inverse Rank of WHR	Inverse of the ranking of the fWHR. Smallest fWHR being rank 1 and largest fWHR being largest rank number.
Martial Art	A dummy variable that is one if the CEO's hobby is martial art such as wrestling and Taekwondo.
Mountain Climbing	A dummy variable that is one if the CEO's hobby is mountain climbing or rock climbing (excluding hiking).
overconfidence	A dummy variable that is one if the unexercised option holding of the CEO is on average more than 67% in the money for a second time or more over the sample period. We follow Campbell, Gallmeyer, Johnson, Rutherford, and Stanley (2011).
Pf	Formant position of the voice of the CEO. Appendix E describes the procedure of measuring.

Ranching	A dummy variable that is one if the CEO's hobby is cutting horses and ranching.
Risky Biking	A dummy variable that is one if the CEO's hobby is off-road motorcycling and motorcycle racing.
Risky Boating	A dummy variable that is one if the CEO's hobby is power boating, and ocean kayaking.
Scuba Diving	A dummy variable that is one if the CEO's hobby is scuba diving.
Tenure	Tenure is the number of years the CEO has been in the position. For the CEOs that were captured in turnover classification process, we hand collected the year of appointment. For the CEOs that did not have turnover, we attribute the first year of the CEO in Execucomp as the year of appointment.
Vega	Dollar change in CEO's wealth for a 0.01 change in standard deviation of returns, following Coles, Daniel, and Naveen (2006).
Voice Pitch	Fundamental frequency of the voice of the CEO. Appendix E describes the procedure of measuring.

M&A Related Variables

1{Cash Deal}	A dummy variable that is one if the merger is 100% financed with cash
1{diversifying merger}	A dummy variable that is one if the two digits SIC codes of the target and the acquirer are different.
1{private target}	A dummy variable that is one if the target firm is a private company
CAR[-1,1]	Cumulative abnormal return over the event window of [-1, 1] trading days using market model based on CRSP VWRETD.
ln(deal value/assets)	Natural log of deal value (SDC Platinum) divided by total assets (Compustat, AT).

All the continuous variables are winsorized at 1% and 99% level.

Table 1. CNBC interview selection probit model

Panel A. Summary statistics for the observations in the first stage selection model

Variable	N	Mean	Std.	10pct	median	90pct
$1\{\text{CEO was interviewed}\}_t$	14680	0.131	0.337	0.000	0.000	1.000
$1\{\text{Have Media Experts on Board}\}_t$	14680	0.012	0.109	0.000	0.000	0.000
#articles about CEO_t	14680	6.562	31.358	0.000	0.000	15.000
#articles about $Firm_t$	14680	69.609	199.902	0.000	15.000	150.000
total $assets_t$ ($Million)	14680	6921.474	25701.660	245.179	1552.744	15163.650
$Leverage_t$	14680	0.232	0.170	0.000	0.227	0.447
Tobin's Q_t	14680	2.020	1.351	1.042	1.581	3.450
ROA_t	14680	0.140	0.097	0.052	0.138	0.246
$Tenure_t$	14680	7.377	7.281	1.000	5.000	23.000
1yr daily return $volatility_{t-1}$	14680	0.027	0.013	0.013	0.023	0.045

Panel B. 1st stage selection of sample: likelihood of being the CEO to be interviews by CNBC throughout the sample period –Probit model.

Dependent variable is one if the CEO had an interview with CNBC in year *t* and zero otherwise. Z-statistics reported in every second line are based on heteroskedasticity robust standard errors. *, **, and *** represent statistical significance at 10%, 5%, and 1% level, respectively. For variable definition, please refer to Appendix F.

Dependent variable:$1\{\text{CEO was interviewed}\}_t$		
$1\{\text{Have Media Experts on Board}\}_t$	0.249	**
	(2.08)	
$\ln(1+\#\text{articles about CEO})_t$	0.261	***
	(19.91)	
$\ln(1+\#\text{articles about Firm})_t$	0.019	**
	(2.11)	
size:$\ln(\text{total assets})_t$	0.289	***
	(23.49)	
$Leverage_t$	-0.45	***
	(-4.59)	
$\ln(\text{Tobin's Q})_t$	0.344	***
	(9.87)	
ROA_t	-0.079	
	(-0.42)	
$Tenure_t$	0.006	***
	(2.94)	
$\text{Ln(1yr daily return volatility)}_{t-1}$	0.571	***
	(15.80)	
constant	-1.767	***
	(-14.28)	
N	14680	
Pseudo R2	0.214	

Table 2. CEO's facial width to height ratio and firm level risk

Panel A. Breakdown of observations by the industry (1 digit SIC code)

1st digit SIC code	Description	N	Mean	Std.	Median
0	Agriculture, forestry, and fishing*	3	1.872	0.071	1.869
1	Mining & Construction	33	2.020	0.164	2.007
2	Beverages, Apparel, Lumber, and Manufacturing	77	2.005	0.156	2.010
3	Plastic, Steel, Computer, Electronic Manufacturing	142	2.034	0.165	2.028
4	Transportation, Communications	53	2.043	0.174	2.037
5	Wholesale, Retail Stores	61	2.047	0.146	2.048
6	Financial Services**	87	2.021	0.161	2.015
7	Hotels, Services, Amusement Parks	89	2.020	0.198	1.963
8	Medical Services, Consulting	11	2.053	0.150	2.051
9	Public Administration	2	2.053	0.078	2.053
Total		558	2.027	0.167	2.014

* Our results in the paper are robust when we exclude these CEOs in the agriculture, forestry, and fishing industry.
** CEOs of financial services industry are taken out of the analysis due to the drastically different regulatory environment and capital structure.

Panel B. Summary statistics of the selected firm years

Variable	N	Mean	Std.	10pct	median	90pct
1yr daily return volatility	1976	0.028	0.014	0.014	0.024	0.047
fWHR	1976	2.020	0.166	1.803	2.006	2.231
CEO age	1976	54.090	6.515	46.000	54.000	62.000
Tenure	1976	7.492	6.698	1.000	5.000	17.000
Delta	1976	2601.183	23702.030	71.521	433.625	2341.629
Vega	1976	241.097	381.310	10.408	115.825	595.850
Assets($Million)	1976	14785.400	50750.830	449.663	3243.309	31062.000
Leverage	1976	0.227	0.169	0.001	0.222	0.441
R&D	1976	0.066	0.187	0.000	0.003	0.174
Sales Growth	1976	0.130	0.274	-0.105	0.086	0.392
ROA	1976	0.147	0.091	0.063	0.143	0.253
M/B	1976	3.535	3.490	1.177	2.637	6.641
Firm Age	1976	29.817	17.622	9.000	26.000	55.000

Panel C. 2nd stage regression of total risk on fWHR controlling for selection bias

Dependent variable is the natural log of total risk of stock return based on the estimation windows and frequency specified. All regressions include industry (4 digit SIC code) fixed effects and year fixed effects. T-statistics are based on heteroskedasticity robust standard errors. *, **, and *** represent statistical significance at 10%, 5%, and 1% level, respectively. For variable definition, please refer to Appendix F.

Estimation window	6mo		1 year		2 years	
Frequency of return	daily		daily		monthly	
fWHR	0.118	**	0.101	**	0.131	**
	(2.08)		(1.97)		(2.34)	
CEO age	-0.001		0		-0.002	
	(-0.56)		(-0.28)		(-1.21)	
ln(Tenure)	0.037	***	0.03	***	0.027	**
	(2.85)		(2.64)		(2.04)	
Delta	-0.019	**	-0.016	*	0.003	
	(-1.98)		(-1.96)		(0.30)	
Vega	-0.019	**	-0.018	***	-0.011	
	(-2.58)		(-2.72)		(-1.48)	
Size:ln(Assets)	-0.092	***	-0.108	***	-0.137	***
	(-7.96)		(-10.53)		(-11.84)	
Leverage	0.286	***	0.252	***	0.354	***
	(4.66)		(4.55)		(5.29)	
R&D	0.022		0.032		0.149	**
	(0.47)		(0.73)		(2.32)	
Sales Growth	0.087	***	0.058	***	0.022	
	(3.54)		(2.59)		(0.78)	
ROA	-0.815	***	-0.87	***	-0.971	***
	(-7.97)		(-8.68)		(-8.34)	
M/B	0.001		0.002		0.002	
	(0.39)		(1.06)		(0.76)	
ln(Firm Age)	-0.003	***	-0.003	***	-0.004	***
	(-3.28)		(-4.12)		(-4.58)	
IMR	0.264	***	0.335	***	0.41	***
	(6.28)		(8.58)		(9.00)	
constant	-3.225	***	-3.042	***	-1.509	***
	(-22.48)		(-24.10)		(-10.81)	
N	1978		1976		1971	
Adj.R2	0.736		0.765		0.739	

Table 3. Controlling for CEO overconfidence

Dependent variable is the total risk of stock return based on the estimation windows and frequency specified. All regressions include industry (4 digit SIC code) fixed effects and year fixed effects. T-statistics are based on heteroskedasticity robust standard errors. *, **, and *** represent statistical significance at 10%, 5%, and 1% level, respectively. For variable definition, please refer to Appendix F.

Estimation window	6mo		1 year		2 years	
Frequency of return	daily		daily		monthly	
fWHR	0.113	*	0.095	*	0.14	**
	(1.94)		(1.82)		(2.44)	
overconfidence	0.057	***	0.05	***	0.065	***
	(2.90)		(2.89)		(3.42)	
CEO age	0		0		-0.002	
	(0.05)		(0.18)		(-1.06)	
ln(Tenure)	0.031	**	0.027	**	0.026	*
	(2.27)		(2.18)		(1.91)	
Delta	-0.017		-0.014		0.001	
	(-1.48)		(-1.46)		(0.06)	
Vega	-0.022	**	-0.022	***	-0.013	
	(-2.51)		(-2.67)		(-1.39)	
Size:ln(Assets)	-0.092	***	-0.108	***	-0.135	***
	(-7.40)		(-9.82)		(-11.22)	
Leverage	0.279	***	0.237	***	0.337	***
	(4.16)		(3.99)		(4.84)	
R&D	0.012		0.023		0.135	**
	(0.25)		(0.51)		(2.08)	
Sales Growth	0.08	***	0.05	**	0.016	
	(3.25)		(2.20)		(0.55)	
ROA	-0.825	***	-0.886	***	-1.032	***
	(-7.76)		(-8.53)		(-8.95)	
M/B	0		0.002		0.003	
	(0.06)		(0.78)		(1.02)	
ln(Firm Age)	-0.003	***	-0.003	***	-0.004	***
	(-2.97)		(-3.66)		(-4.36)	
IMR	0.248	***	0.321	***	0.39	***
	(5.75)		(8.01)		(8.23)	
constant	-3.283	***	-3.074	***	-1.547	***
	(-22.25)		(-23.80)		(-10.78)	
N	1906		1904		1899	
Adj.R2	0.74		0.767		0.741	

Table 4. Controlling for Voice Pitch and Overconfidence

Dependent variable is the total risk of stock return based on the estimation windows and frequency specified. All regressions include industry fixed effects (4 digit SIC code) and year fixed effects. T-statistics are based on heteroskedasticity robust standard errors. *, **, and *** represent statistical significance at 10%, 5%, and 1% level, respectively. For variable definition, please refer to Appendix F.

Estimation window	6mo	1 year	2 years
Frequency of return	daily	daily	monthly
fWHR	0.111 *	0.092 *	0.136 **
	(1.88)	(1.75)	(2.36)
Voice Pitch	0.001 **	0.001	0.001 **
	(2.13)	(1.43)	(2.45)
Pf	0.006	0.009	0.011
	(0.22)	(0.43)	(0.45)
overconfidence	0.056 ***	0.05 ***	0.064 ***
	(2.87)	(2.86)	(3.36)
CEO age	0	0	-0.001
	(0.13)	(0.22)	(-0.98)
ln(Tenure)	0.028 **	0.025 **	0.023 *
	(2.05)	(2.04)	(1.66)
Delta	-0.015	-0.014	0.002
	(-1.34)	(-1.37)	(0.24)
Vega	-0.023 ***	-0.022 ***	-0.013
	(-2.59)	(-2.72)	(-1.48)
Size:ln(Assets)	-0.093 ***	-0.108 ***	-0.136 ***
	(-7.51)	(-9.85)	(-11.32)
Leverage	0.283 ***	0.238 ***	0.341 ***
	(4.25)	(4.01)	(4.88)
R&D	0.018	0.028	0.142 **
	(0.37)	(0.61)	(2.20)
Sales Growth	0.079 ***	0.05 **	0.015
	(3.20)	(2.17)	(0.52)
ROA	-0.809 ***	-0.875 ***	-1.013 ***
	(-7.63)	(-8.40)	(-8.82)
M/B	0	0.002	0.002
	(-0.06)	(0.70)	(0.89)
ln(Firm Age)	-0.003 ***	-0.003 ***	-0.004 ***
	(-3.05)	(-3.72)	(-4.49)
IMR	0.253 ***	0.323 ***	0.395 ***
	(5.86)	(7.99)	(8.25)
constant	-3.396 ***	-3.137 ***	-1.675 ***
	(-21.02)	(-22.23)	(-10.50)
N	1906	1904	1899
Adj.R2	0.741	0.767	0.742

Table 5. Controlling for CEO's risky hobbies

Dependent variable is the total risk of stock return based on the estimation windows and frequency specified. All regressions include industry (4 digit SIC code) fixed effects and year fixed effects. T-statistics are based on heteroskedasticity robust standard errors. *, **, and *** represent statistical significance at 10%, 5%, and 1% level, respectively. For variable definition, please refer to Appendix F.

Panel A. Using Risky Hobbies dummy variable

Estimation window	6mo	1 year	2 years
Frequency of return	daily	daily	monthly
fWHR	0.297 **	0.251 **	0.274 ***
	(2.50)	(2.49)	(2.68)
1{Risky Hobbies}	0.062	0.07 *	0.042
	(1.26)	(1.70)	(0.84)
Voice Pitch	0.002 *	0.001	0.002 *
	(1.78)	(1.60)	(1.87)
Pf	0.043	0.059 *	0.059
	(1.11)	(1.91)	(1.59)
overconfidence	0.058	0.068 **	0.092 ***
	(1.65)	(2.37)	(3.06)
CEO age	0.001	0	0.001
	(0.40)	(0.14)	(0.28)
ln(Tenure)	0.018	0.017	0.005
	(0.77)	(0.88)	(0.27)
Delta	0.005	0.002	0.014
	(0.22)	(0.14)	(0.90)
Vega	-0.017	-0.012	0.01
	(-1.25)	(-1.00)	(0.77)
Size:ln(Assets)	-0.131 ***	-0.13 ***	-0.178 ***
	(-6.51)	(-7.77)	(-9.55)
Leverage	0.334 ***	0.322 ***	0.511 ***
	(2.61)	(3.07)	(4.85)
R&D	0.008	0.051	0.205 **
	(0.10)	(0.74)	(2.04)
Sales Growth	0.113 **	0.079 **	0.034
	(2.55)	(2.16)	(0.91)
ROA	-1.407 ***	-1.376 ***	-1.529 ***
	(-7.01)	(-7.52)	(-7.75)
M/B	-0.001	0.002	0.005
	(-0.13)	(0.57)	(1.27)
ln(Firm Age)	-0.002	-0.003 *	-0.002
	(-1.46)	(-1.86)	(-1.19)
IMR	0.336 ***	0.368 ***	0.504 ***
	(4.88)	(6.23)	(7.44)
constant	-3.758 ***	-3.517 ***	-2.006 ***
	(-12.46)	(-14.52)	(-6.58)
N	837	837	831
Adj.R2	0.786	0.82	0.82

Panel B. Controlling for CEO's different kinds of risky hobbies

Estimation window	6mo		1 year		2 years	
Frequency of return	daily		daily		monthly	
fWHR	0.3	**	0.261	**	0.253	**
	(2.44)		(2.49)		(2.42)	
Flying Airplanes	0.249	**	0.266	**	0.266	**
	(2.18)		(2.38)		(2.07)	
Scuba Diving	0.092		0.128		0.077	
	(0.61)		(1.12)		(0.71)	
Car Racing	-0.009		0.011		-0.033	
	(-0.09)		(0.15)		(-0.34)	
Martial Art	0.005		0.043		0.039	
	(0.05)		(0.58)		(0.52)	
Horse Riding	0.463	**	0.457	***	0.722	***
	(2.36)		(3.06)		(7.55)	
Ranching	-0.046		-0.098		-0.279	
	(-0.29)		(-0.64)		(-1.27)	
Mountain Climbing	-0.52	*	-0.494	**	-0.37	
	(-1.78)		(-2.15)		(-1.40)	
Risky Boating	0.073		0.045		-0.191	
	(0.33)		(0.26)		(-1.34)	
Risky Biking	0.27		0.017		0.237	
	(1.59)		(0.11)		(1.20)	
Voice Pitch	0		0		0	
	(0.02)		(-0.28)		(0.36)	
Pf	0.067		0.088	**	0.072	*
	(1.49)		(2.49)		(1.77)	
overconfidence	0.075	**	0.081	***	0.101	***
	(2.01)		(2.68)		(3.29)	
CEO age	0.001		0		0	
	(0.24)		(-0.10)		(-0.04)	
ln(Tenure)	0.023		0.022		0.005	
	(1.00)		(1.12)		(0.28)	
Delta	-0.004		-0.006		0.006	
	(-0.20)		(-0.33)		(0.41)	
Vega	-0.017		-0.014		0.006	
	(-1.28)		(-1.21)		(0.47)	
Size:ln(Assets)	-0.129	***	-0.125	***	-0.17	***
	(-6.08)		(-7.04)		(-8.55)	
Leverage	0.313	**	0.296	***	0.455	***
	(2.34)		(2.72)		(4.31)	
R&D	0.02		0.043		0.229	**
	(0.22)		(0.53)		(2.01)	
Sales Growth	0.104	**	0.071	**	0.026	
	(2.40)		(1.97)		(0.70)	
ROA	-1.307	***	-1.272	***	-1.381	***
	(-6.31)		(-6.78)		(-6.82)	
M/B	-0.002		0		0.003	

	(-0.52)		(-0.01)		(0.79)	
ln(Firm Age)	-0.002		-0.003	*	-0.002	
	(-1.19)		(-1.72)		(-1.08)	
IMR	0.307	***	0.338	***	0.467	***
	(4.53)		(5.83)		(7.26)	
constant	-3.508	***	-3.286	***	-1.773	***
	(-10.54)		(-12.21)		(-5.22)	
N	837		837		831	
Adj.R2	0.789		0.824		0.826	

Table 6. Robustness check

Dependent variable is the total risk of stock return based on the estimation windows and frequency specified. All regressions include industry (4 digit SIC code) fixed effects and year fixed effects. T-statistics are based on heteroskedasticity robust standard errors. *, **, and *** represent statistical significance at 10%, 5%, and 1% level, respectively. For variable definition, please refer to Appendix F.

Panel A. Using alternative measures of facial width-to-height ratio

Dependent variable:	1 year daily return volatility							
Inverse Rank of WHR	0	***						
	(2.62)							
1{Widest Quintile}			0.103	**				
			(2.43)					
1{Widest Tercile}					0.094	**		
					(2.47)			
1{Widest Half}							0.057	**
							(2.01)	
Flying Airplanes	0.264	**	0.246	**	0.258	**	0.27	**
	(2.39)		(2.19)		(2.32)		(2.36)	
Scuba Diving	0.125		0.131		0.138		0.11	
	(1.09)		(1.12)		(1.15)		(0.94)	
Car Racing	0.02		-0.028		0.026		0.007	
	(0.25)		(-0.37)		(0.33)		(0.08)	
Martial Art	0.048		0.045		0.043		0.066	
	(0.64)		(0.61)		(0.57)		(0.90)	
Horse Riding	0.452	***	0.434	***	0.468	***	0.452	***
	(3.01)		(2.86)		(3.06)		(2.96)	
Ranching	-0.097		-0.151		-0.13		-0.113	
	(-0.64)		(-0.96)		(-0.84)		(-0.75)	
Mountain Climbing	-0.487	**	-0.406	*	-0.417	*	-0.459	**
	(-2.13)		(-1.77)		(-1.82)		(-2.00)	
Risky Boating	0.039		0.032		-0.06		0.049	
	(0.22)		(0.18)		(-0.33)		(0.28)	
Risky Biking	0.016		0.017		-0.008		0.013	
	(0.10)		(0.12)		(-0.05)		(0.09)	
Voice Pitch	0		0		0		0	
	(-0.24)		(-0.15)		(-0.03)		(-0.17)	
Pf	0.087	**	0.089	**	0.089	**	0.083	**
	(2.44)		(2.48)		(2.48)		(2.31)	
overconfidence	0.081	***	0.072	**	0.085	***	0.074	**
	(2.69)		(2.53)		(2.80)		(2.49)	
CEO age	0		0		-0.001		0	
	(-0.21)		(-0.10)		(-0.25)		(-0.00)	

ln(Tenure)	0.021		0.022		0.021		0.019	
	(1.11)		(1.15)		(1.09)		(0.98)	
Delta	-0.006		-0.003		-0.004		-0.005	
	(-0.34)		(-0.19)		(-0.22)		(-0.28)	
Vega	-0.013		-0.014		-0.012		-0.011	
	(-1.09)		(-1.13)		(-0.94)		(-0.85)	
Size:ln(Assets)	-0.126	***	-0.116	***	-0.123	***	-0.129	***
	(-7.09)		(-6.22)		(-6.90)		(-7.27)	
Leverage	0.29	***	0.297	***	0.312	***	0.295	***
	(2.66)		(2.74)		(2.91)		(2.70)	
R&D	0.046		0.031		0.017		0.051	
	(0.57)		(0.39)		(0.21)		(0.65)	
Sales Growth	0.071	*	0.068	*	0.067	*	0.071	*
	(1.95)		(1.83)		(1.82)		(1.95)	
ROA	-1.266	***	-1.207	***	-1.221	***	-1.225	***
	(-6.73)		(-6.65)		(-6.57)		(-6.52)	
M/B	0		0		-0.001		0	
	(-0.03)		(-0.08)		(-0.20)		(-0.14)	
ln(Firm Age)	-0.003	*	-0.003	**	-0.004	**	-0.002	
	(-1.73)		(-1.99)		(-2.12)		(-1.44)	
IMR	0.343	***	0.323	***	0.338	***	0.351	***
	(5.84)		(5.55)		(5.74)		(5.88)	
constant	-2.824	***	-2.863	***	-2.838	***	-2.819	***
	(-14.06)		(-14.25)		(-14.09)		(-14.10)	
N	837		837		837		837	
Adj.R2	0.824		0.823		0.823		0.822	

Panel B. Subsample of the firms that had CEO turnovers at some point over the sample period

Dependent Variable:	1 year daily return volatility							
fWHR	0.12	**	0.096	*	0.283	***	0.266	**
	(2.10)		(1.67)		(2.84)		(2.45)	
overconfidence			0.039	*	0.08	**	0.105	***
			(1.95)		(2.53)		(3.12)	
Voice Pitch					0		0	
					(0.01)		(-0.02)	
Pf					0.08	**	0.065	
					(2.06)		(1.59)	
1{Risky Hobbies}					0.097	*		
					(1.87)			
Flying Airplanes							0.245	**
							(2.07)	
Scuba Diving							0.022	
							(0.18)	
Car Racing							0.095	
							(1.02)	
Martial Art							-0.046	
							(-0.30)	
Horse Riding							0.464	***
							(2.82)	
Ranching							-0.136	
							(-0.84)	
Risky Boating							-0.021	
							(-0.11)	
CEO age	0.002		0.002		0.004		0.004	
	(1.46)		(1.24)		(1.47)		(1.24)	
ln(Tenure)	0.015		0.014		-0.001		-0.01	
	(1.12)		(0.96)		(-0.05)		(-0.42)	
Delta	-0.006		-0.006		0.005		0.002	
	(-0.63)		(-0.53)		(0.34)		(0.11)	
Vega	-0.02	**	-0.019	**	-0.013		-0.017	
	(-2.41)		(-1.98)		(-1.02)		(-1.33)	
Size:ln(Assets)	-0.117	***	-0.126	***	-0.142	***	-0.135	***
	(-9.97)		(-9.96)		(-7.32)		(-6.87)	
Leverage	0.271	***	0.299	***	0.267	**	0.21	
	(4.08)		(4.07)		(2.02)		(1.54)	
R&D	0.023		0.004		0.102		0.127	
	(0.18)		(0.03)		(0.51)		(0.66)	
Sales Growth	0.052	*	0.043		0.105	**	0.095	**

	(1.85)		(1.51)		(2.16)		(1.97)	
ROA	-0.773	***	-0.788	***	-1.355	***	-1.247	***
	(-6.84)		(-6.69)		(-6.11)		(-5.68)	
M/B	0		-0.001		0.003		0.002	
	(-0.08)		(-0.29)		(0.86)		(0.66)	
ln(Firm Age)	-0.003	***	-0.002	***	-0.004	*	-0.004	*
	(-3.53)		(-2.60)		(-1.79)		(-1.80)	
IMR	0.309	***	0.318	***	0.294	***	0.26	***
	(7.26)		(7.34)		(4.69)		(3.97)	
constant	-3.169	***	-3.092	***	-3.487	***	-3.441	***
	(-23.06)		(-22.31)		(-11.47)		(-9.45)	
N	1473		1428		626		626	
Adj.R2	0.77		0.772		0.822		0.825	

Table 7. Do high testosterone CEOs increase leverage ratio?

Panel A. Market value based leverage ratio and testosterone

Dependent variable is market value based leverage ratio (book value of debt/ (book value of debt + market capitalization)), where market capitalization is computed as the number of common shares outstanding times the price as of the end of fiscal year. We control for industry (4 digit SIC code) and year fixed effects. T-statistics are based on heteroskedasticity robust standard errors. *, **, and *** represent statistical significance at 10%, 5%, and 1% level, respectively. For variable definition, please refer to Appendix F.

Dependent Variable: MV Leverage$_{t+1}$										
fWHR	0.17	***								
	(2.99)									
Inverse Rank of WHR			0.0002	***						
			(3.59)							
1{Widest Quintile}					0.066	***				
					(2.84)					
1{Widest Tercile}							0.052	***		
							(3.03)			
1{Widest Half}									0.081	***
									(4.58)	
1{Risky Hobbies}	0.017		0.019		0.01		0.016		0.031	
	(0.60)		(0.70)		(0.38)		(0.58)		(1.14)	
Voice Pitch	0		0		0		0		0	
	(0.54)		(0.67)		(0.17)		(0.37)		(1.00)	
Pf	0.048	***	0.047	***	0.05	***	0.053	***	0.043	***
	(2.77)		(2.75)		(2.82)		(2.90)		(2.60)	
overconfidence	0.006		0.008		0.003		0.009		0.01	
	(0.37)		(0.55)		(0.21)		(0.61)		(0.65)	
CEO age	-0.002		-0.002	*	-0.002		-0.002	*	-0.002	*
	(-1.61)		(-1.85)		(-1.51)		(-1.73)		(-1.68)	
ln(Tenure)	0.033	***	0.033	***	0.033	***	0.034	***	0.03	**
	(2.89)		(2.86)		(2.96)		(2.96)		(2.56)	
Delta	-0.025	***	-0.025	***	-0.024	**	-0.024	**	-0.024	**
	(-2.60)		(-2.61)		(-2.51)		(-2.56)		(-2.54)	
Vega	0.002		0.002		0.003		0.004		0.004	
	(0.32)		(0.37)		(0.52)		(0.68)		(0.70)	
Sales Growth	-0.001		-0.001		-0.001		-0.001		-0.001	
	(-0.03)		(-0.06)		(-0.04)		(-0.04)		(-0.05)	
ROA	-0.618	***	-0.631	***	-0.573	***	-0.579	***	-0.642	***
	(-5.82)		(-5.96)		(-5.57)		(-5.56)		(-6.07)	
M/B	0		0		0		0		0.001	
	(0.22)		(0.24)		(0.06)		(-0.04)		(0.28)	
Size:ln(Assets)	0.041	***	0.04	***	0.044	***	0.039	***	0.038	***

	(4.76)		(4.68)		(5.06)		(4.66)		(4.53)	
Collateral	0		-0.013		0.01		0.012		-0.049	
	(-0.00)		(-0.12)		(0.08)		(0.10)		(-0.45)	
IMR	-0.109	***	-0.103	***	-0.116	***	-0.107	***	-0.094	***
	(-3.24)		(-3.09)		(-3.54)		(-3.18)		(-2.82)	
constant	-0.162		0.145		0.143		0.167	*	0.146	
	(-1.15)		(1.49)		(1.52)		(1.75)		(1.50)	
N	760		760		760		760		760	
Adj.R2	0.679		0.682		0.678		0.677		0.688	

Panel B. Book value based leverage ratio and testosterone

Dependent variable is book value based leverage ratio (book value of debt/total assets = (DLC+DLTT)/AT). We control for industry (4 digit SIC code) and year fixed effects. T-statistics are based on heteroskedasticity robust standard errors. *, **, and *** represent statistical significance at 10%, 5%, and 1% level, respectively. For variable definition, please refer to Appendix F.

Dependent Variable: BV Leverage$_{t+1}$					
fWHR	0.129 **				
	(2.49)				
Inverse Rank of WHR		0.0002 ***			
		(3.03)			
1{Widest Quintile}			0.07 ***		
			(3.65)		
1{Widest Tercile}				0.036 **	
				(2.31)	
1{Widest Half}					0.06 ***
					(3.53)
1{Risky Hobbies}	0.086 ***	0.088 ***	0.078 ***	0.085 ***	0.096 ***
	(3.50)	(3.61)	(3.30)	(3.47)	(3.90)
Voice Pitch	-0.001 ***	-0.001 ***	-0.002 ***	-0.001 ***	-0.001 ***
	(-3.60)	(-3.52)	(-3.91)	(-3.69)	(-3.38)
Pf	0.083 ***	0.082 ***	0.084 ***	0.087 ***	0.08 ***
	(4.41)	(4.42)	(4.30)	(4.36)	(4.29)
overconfidence	-0.004	-0.001	-0.003	-0.002	-0.001
	(-0.24)	(-0.06)	(-0.17)	(-0.15)	(-0.06)
CEO age	0	0	0	0	0
	(0.16)	(-0.07)	(0.15)	(0.13)	(0.06)
ln(Tenure)	0.018	0.017	0.018 *	0.018 *	0.016
	(1.63)	(1.60)	(1.70)	(1.69)	(1.38)
Delta	-0.031 ***	-0.031 ***	-0.029 ***	-0.03 ***	-0.03 ***
	(-4.54)	(-4.59)	(-4.39)	(-4.46)	(-4.47)
Vega	-0.001	0	0	0.001	0.001
	(-0.16)	(-0.11)	(-0.11)	(0.25)	(0.30)
Sales Growth	0.039 *	0.039 *	0.039 *	0.038 *	0.04 *
	(1.74)	(1.73)	(1.71)	(1.69)	(1.74)
ROA	-0.1	-0.113	-0.073	-0.066	-0.111
	(-1.10)	(-1.25)	(-0.77)	(-0.70)	(-1.22)
M/B	0	0	0	0	0
	(0.16)	(0.19)	(0.12)	(0.01)	(0.19)
Size:ln(Assets)	0.043 ***	0.042 ***	0.046 ***	0.042 ***	0.042 ***
	(6.12)	(6.00)	(6.39)	(5.99)	(5.78)
Collateral	0.179 ***	0.169 ***	0.188 ***	0.187 ***	0.145 **
	(2.79)	(2.66)	(2.84)	(2.79)	(2.28)
IMR	-0.152 ***	-0.147 ***	-0.158 ***	-0.15 ***	-0.141 ***
	(-5.87)	(-5.65)	(-6.36)	(-5.81)	(-5.32)
constant	-0.016	0.218 **	0.221 **	0.232 ***	0.219 **
	(-0.12)	(2.43)	(2.49)	(2.62)	(2.45)
N	827	827	827	827	827
Adj.R2	0.643	0.646	0.646	0.64	0.648

Table 8. Are high testosterone CEOs more acquisitive?

Panel A. Linear probability model of acquisition

Dependent variable is a dummy variable that is one if the firm announces a successful merger bid in fiscal year *t+1* and zero otherwise. We control for firm and year fixed effects. T-statistics are based on heteroskedasticity robust standard errors. *, **, and *** represent statistical significance at 10%, 5%, and 1% level, respectively. For variable definition, please refer to Appendix F.

Dependent Variable:	1{Acquired a company}$_{t+1}$							
fWHR	2.11	**						
	(2.29)							
Inverse Rank of WHR			0.003	***				
			(2.77)					
1{Widest Quintile}					0.682	*		
					(1.75)			
1{Widest Quartile}							0.894	***
							(3.10)	
1{Risky Hobbies}	0.019		0.027		0.038		-0.258	
	(0.06)		(0.09)		(0.12)		(-0.83)	
Voice Pitch	-0.012	*	-0.011	*	-0.01		-0.007	
	(-1.87)		(-1.91)		(-1.22)		(-1.01)	
Pf	-0.2	**	-0.168	**	-0.243		0.146	
	(-2.42)		(-2.25)		(-1.52)		(1.07)	
overconfidence	0.181	**	0.176	**	0.232	***	0.182	***
	(2.59)		(2.57)		(3.16)		(2.75)	
CEO age	-0.005		-0.011		0.002		-0.024	*
	(-0.70)		(-1.32)		(0.16)		(-1.88)	
ln(Tenure)	0.038		0.045		-0.009		0.064	
	(0.56)		(0.66)		(-0.12)		(0.88)	
Delta	0.048		0.048		0.053		0.059	
	(1.32)		(1.35)		(1.37)		(1.63)	
Vega	0		0		0.003		-0.002	
	(-0.01)		(-0.01)		(0.07)		(-0.04)	
Leverage	0.549	**	0.557	**	0.545	**	0.57	**
	(2.30)		(2.34)		(2.27)		(2.41)	
Dividend Yield	0.779		0.759		0.783		0.788	
	(0.69)		(0.69)		(0.68)		(0.70)	
ROA	-0.121		-0.135		-0.164		-0.205	
	(-0.28)		(-0.31)		(-0.37)		(-0.47)	
Size:ln(Assets)	0.07		0.068		0.056		0.06	
	(0.83)		(0.81)		(0.68)		(0.72)	
Cash Flow	-0.019		-0.019		-0.018		-0.019	

	(-0.94)		(-0.95)		(-0.87)		(-0.93)	
Q	0.013		0.013		0.007		0.01	
	(0.52)		(0.52)		(0.30)		(0.40)	
CapEx	0.138	*	0.138	*	0.138	*	0.132	*
	(1.93)		(1.93)		(1.90)		(1.83)	
IMR	-0.054		-0.048		-0.044		-0.061	
	(-0.32)		(-0.28)		(-0.25)		(-0.36)	
constant	-3.111	*	0.546		0.473		0.979	
	(-1.70)		(0.74)		(0.44)		(1.36)	
N	830		830		830		830	
Adj.R2	0.279		0.281		0.278		0.282	

Panel B. Robustness check using deal values as dependent variables

Dependent variable is the natural log of one plus the aggregate amount spent on all the acquisition deals in fiscal year *t* [columns 1 and 2] or the natural log of one plus the average acquisition deal value in fiscal year *t*[columns 3 and 4]. We control for firm and year fixed effects. T-statistics are based on heteroskedasticity robust standard errors. *, **, and *** represent statistical significance at 10%, 5%, and 1% level, respectively. For variable definition, please refer to Appendix F.

Dependent Variable:	Ln(1+Agg.Deal Value)$_t$		Ln(1+Avg.Deal Value)$_t$	
fWHR	13.398 ***		13.102 ***	
	(3.29)		(3.45)	
Inverse Rank of WHR		0.018 ***		0.017 ***
		(3.38)		(3.41)
1{Risky Hobbies}	-2.111	-2.056	-1.855	-1.8
	(-1.26)	(-1.23)	(-1.16)	(-1.12)
Voice Pitch	-0.04	-0.039	-0.032	-0.032
	(-1.02)	(-1.03)	(-0.87)	(-0.88)
Pf	-0.658	-0.454	-0.54	-0.342
	(-1.34)	(-1.02)	(-1.19)	(-0.82)
overconfidence	0.602	0.586	0.647 *	0.634 *
	(1.59)	(1.57)	(1.84)	(1.83)
CEO age	-0.058	-0.09 *	-0.063	-0.094 *
	(-1.35)	(-1.75)	(-1.53)	(-1.86)
ln(Tenure)	0.367	0.393	0.373	0.396
	(1.09)	(1.15)	(1.17)	(1.23)
Delta	0.261	0.265	0.235	0.239
	(1.47)	(1.51)	(1.38)	(1.43)
Vega	-0.11	-0.109	-0.113	-0.111
	(-0.56)	(-0.56)	(-0.63)	(-0.63)
Leverage	2.407 **	2.452 **	2.309 **	2.352 **
	(2.25)	(2.29)	(2.35)	(2.39)
Dividend Yield	3.226	3.134	4.061	3.979
	(0.53)	(0.52)	(0.68)	(0.67)
ROA	-1.002	-1.097	-1.474	-1.569
	(-0.41)	(-0.45)	(-0.64)	(-0.69)
Size:ln(Assets)	0.649	0.64	0.562	0.553
	(1.45)	(1.44)	(1.32)	(1.30)
Cash Flow	-0.133	-0.134	-0.126	-0.126
	(-1.27)	(-1.28)	(-1.23)	(-1.23)
Q	0.12	0.118	0.106	0.105
	(0.90)	(0.89)	(0.88)	(0.87)
CapEx	1.084 ***	1.081 ***	1.048 ***	1.045 ***
	(2.70)	(2.69)	(2.75)	(2.74)

IMR	-0.53		-0.503		-0.511		-0.488
	(-0.52)		(-0.50)		(-0.54)		(-0.52)
constant	-23.526	***	-0.051		-23.251	***	-0.24
	(-2.82)		(-0.01)		(-2.99)		(-0.06)
N	830		830		830		830
Adj.R2	0.049		0.05		0.049		0.05

Table 9. CAR regressions of acquisition announcement. Is investor response more negative when an acquisition is driven by testosterone?

Dependent variable is CAR[-1,1] of acquisition announcements (cumulative abnormal return over the [-1, 1] trading day window relative to the announcement). Market model based on CRSP value weighted index return is used to obtain the CAR. All the explanatory variables and controls are lagged by one year. We control for firm and year fixed effects. T-statistics are based on the standard errors clustered at the firm level. *, **, and *** represent statistical significance at 10%, 5%, and 1% level, respectively. For variable definition, please refer to Appendix F.

Dependent Variable:	CAR[-1,1]					
	Coeff.	t-stat		Coeff.	t-stat	
fWHR	-0.04	(-2.43)	**	-0.053	(-2.09)	**
1{Risky Hobbies}				-0.014	(-0.86)	
Voice Pitch				0	(-0.82)	
Pf				-0.003	(-0.26)	
overconfidence				0	(-0.05)	
CEO age	-0.001	(-1.18)		-0.001	(-0.94)	
ln(Tenure)	0	(-0.02)		0.003	(0.50)	
Delta	0	(-0.02)		0.002	(0.33)	
Vega	0.001	(0.47)		0.003	(0.65)	
ln(Firm Age)	0.006	(1.21)		0.018	(1.96)	*
Cash Flow	0.063	(0.23)		0.426	(1.58)	
Investment	0.229	(0.19)		-0.469	(-0.36)	
Size:ln(Assets)	0.002	(0.34)		0.002	(0.32)	
ROA	0.063	(1.32)		0.017	(0.25)	
Leverage	0.028	(0.97)		0.052	(1.01)	
Dividend Yield	-0.321	(-1.28)		-1.081	(-2.23)	**
1{Cash Deal}	0.003	(0.69)		0.007	(1.29)	
ln(deal value/assets)	-0.03	(-1.42)		-0.05	(-2.45)	**
1{private target}	0.011	(2.03)	**	0.011	(1.77)	*
1{diversifying merger}	-0.002	(-0.45)		0.003	(0.48)	
IMR	0.015	(0.76)		0.004	(0.18)	
constant	0.033	(0.41)		0.086	(0.98)	
N	947			533		
Adj.R2	0.036			0.125		

Table 10. Do high testosterone CEOs have compensation structure that is loaded more towards equity compensation?

We run the following regression models.

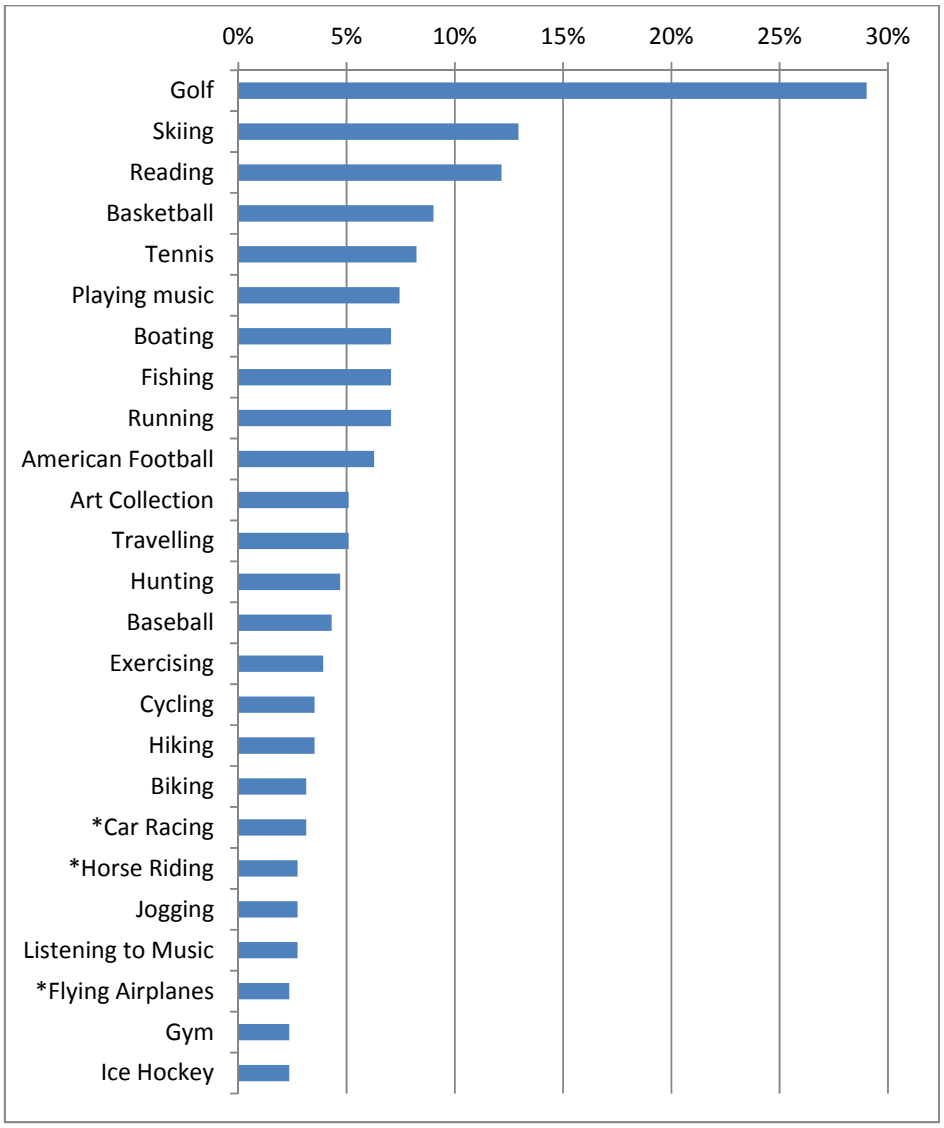
Ln(1+VEGA)=b*fWHR +Controls +Firm & Year FE

Ln(1+DELTA)=b*fWHR +Conrols +Firm & Year FE

VEGA and DELTA of CEO compensation are obtained following Coles, Daniel, and Naveen (2006). T-statistics are based on heteroskedasticity robust standard errors. *, **, and *** represent statistical significance at 10%, 5%, and 1% level, respectively. For variable definition, please refer to Appendix F.

Dependent Variable:	$\ln(1+VEGA)_t$				$\ln(1+DELTA)_t$			
fWHR	1.154	***	6.247	***	1.345	***	7.463	***
	(2.84)		(3.97)		(3.15)		(4.12)	
1{Risky Hobbies}			0.215				-0.957	*
			(0.16)				(-1.89)	
Voice Pitch			-0.011				0.003	
			(-0.97)				(0.39)	
Pf			0.405	*			0.592	
			(1.67)				(1.41)	
Overconfidence	-0.013		-0.281	**	0.343	***	0.082	
	(-0.15)		(-2.17)		(5.29)		(0.75)	
Ln(Tenure)	0.364	***	0.337	***	0.448	***	0.614	***
	(5.07)		(2.70)		(8.95)		(6.99)	
1{Chairman=CEO}	0.094		0.347	***	-0.027		-0.07	
	(1.42)		(2.68)		(-0.46)		(-0.76)	
1{Ownership>5%}	-0.058		-0.349		1.156	***	0.654	**
	(-0.32)		(-1.27)		(5.32)		(2.20)	
Age	-0.033	**	-0.053	***	0.021	***	-0.039	**
	(-2.40)		(-2.98)		(3.18)		(-2.21)	
1yr daily ret. volatility	-0.344	***	-0.454	***	-0.439	***	-0.407	***
	(-3.03)		(-2.60)		(-5.02)		(-2.91)	
ROA	0.303		1.125		1.318	***	1.645	***
	(0.85)		(1.39)		(4.46)		(3.12)	
Leverage	-0.704	***	-1.164	***	-0.91	***	-1.493	***
	(-2.78)		(-2.82)		(-4.06)		(-3.69)	
Size:ln(Assets)	0.463	***	0.532	***	0.391	***	0.361	***
	(5.36)		(4.75)		(5.79)		(3.90)	
M/B	0.012		0.016		0.059	***	0.061	***
	(1.45)		(1.38)		(5.54)		(4.10)	
IMR	-0.622	**	-0.588		0.326	**	0.503	**
	(-2.57)		(-1.47)		(2.19)		(2.04)	
constant	-2.411	**	-10.995	***	-4.19	***	-13.209	***
	(-2.11)		(-3.21)		(-4.00)		(-3.53)	
N	1955		861		1955		861	
Adj.R2	0.769		0.763		0.821		0.802	

Figure 1. Top 25 popular hobbies among the CEOs in our sample.



Horizontal axis shows the percentage of the CEOs whose hobbies were identified through our hand collection. Out of 558 CEOs in our sample, the information about 255 CEOs was found, and we collected up to five different hobbies of the CEO. Horizontal axis shows the percentage of the 255 CEOs. Asterisk (*) indicates risky sports in our analysis. The categories are the ones commonly listed as sports of high fatality rate. The figure excludes 149 cases of "other" category, which includes photography, farming, and performing magic. "Running" means mainly short distance track running, which is distinguished from jogging.