



## CEO facial masculinity and bank risk-taking<sup>☆</sup>

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### ABSTRACT

This paper uses Chief Executive Officer (CEO) facial features to examine the association between CEO masculinity and bank risk-taking. Given that high facial width-to-height ratio has been linked to high testosterone levels and masculine behavioral traits such as increased risk tolerance, aggression, and sensation seeking, we postulate a positive relationship between CEO facial masculinity and bank risk-taking. Consistent with this prediction, we document that banks led by CEOs with more masculine facial features are associated with more volatile stock returns and higher levels of idiosyncratic risk.

### 1. Introduction

This paper uses Chief Executive Officer (CEO) facial features to examine the association between CEO masculinity and bank risk-taking. Abundant evidence documented in the biological and psychological literature indicates that facial masculinity as reflected by high facial width-to-height ratio (fWHR) is linked to high testosterone levels among males and masculine behavioral traits such as increased risk tolerance, aggression, and sensation seeking (e.g., Anderl et al., 2016; Apicella et al., 2008; Campbell et al., 2010; Carré & McCormick, 2008; Carré, McCormick, & Mondloch, 2009; Haselhuhn & Wong, 2012; Lefevre, Lewis, Perrett, & Penke, 2013; Ormiston, Wong, & Haselhuhn, 2017). Given the documented linkage between facial masculinity and various attributes that reflect individuals' risk preferences, we hypothesize a positive relationship between CEO facial masculinity and bank risk-taking.

We draw on the upper echelons theory of Hambrick and Mason (1984) and prior empirical studies which indicate that the characteristics, personality, and personal preferences of the top executives may influence firm-level decisions and outcomes (see e.g., Cronqvist, Makhija, & Yonker, 2012; Graham, Harvey, & Puri, 2013; Malmendier,

Tate, & Yan, 2011). Previously, the relation between CEO facial masculinity and corporate outcomes has been examined in Wong, Ormiston, and Haselhuhn (2011), Jia, van Lent, and Zeng (2014), and Kamiya, Kim, and Park (2018).<sup>1</sup> Wong et al. (2011) document that CEO fWHR is positively associated with firm profitability, while Jia et al. (2014) find a positive association between CEO fWHR and the incidence of financial misreporting. Most closely related to our study, Kamiya et al. (2018) investigate the relation between CEO fWHR and firm-level riskiness using data on the S&P 1500 non-financial firms. Their findings indicate that the firms of more masculine CEOs have higher stock return volatility, higher financial leverage, and are more likely to conduct acquisitions.

We complement the work of Kamiya et al. (2018) by examining whether CEO facial masculinity is related to bank risk-taking. Banks are fundamentally different from non-financial firms in terms of their business models, exposure to regulations and supervision, societal importance, and risk-taking incentives. Moreover, the banking industry is often viewed as male-dominated, and in the aftermath of the global financial crisis, financial institutions have been criticized for their masculinity-driven culture and rampant risk-taking (e.g., Maclean,

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<sup>1</sup> In a related study, Lu and Teo (2018) examine whether the fWHR of hedge fund managers is associated with fund performance. Their findings indicate that hedge fund managers with high fWHR take on greater risks, have a greater preference for lottery-like stocks, and are more reluctant to sell loser stocks.

2016). Thus, we consider the banking industry to provide an expedient setting to examine the linkage between CEO facial masculinity and firm-level riskiness.

Our hypothesis builds upon the biological and psychological research on the linkages between facial masculinity, masculine behavioral traits, and testosterone. Biological studies have documented that facial morphology and bone structure are directly related to testosterone exposure in adolescence (see e.g., Lindberg et al., 2005; Nie, 2005; Vanderschueren & Bouillon, 1995; Verdonck, Gaethofs, Carels, & de Zegher, 1999). In general, this literature indicates that facial masculinity within men is largely an outcome of craniofacial bone growth during the pubertal stage which, in turn, is regulated by testosterone administration. Furthermore, studies by Penton-Voak and Chen (2004), Pound, Penton-Voak, and SurrIDGE (2009), and Lefevre et al. (2013) suggest that facial masculinity is positively associated with circulating and reactive levels of testosterone.

The steroid hormone testosterone, on the other hand, has been linked to a wide variety of masculine behavioral traits such as aggression, hostility, sensation seeking, competitiveness, and risk tolerance (see e.g., Apicella et al., 2008; Archer, 2006; Mehta, Jones, & Josephs, 2008; Pound et al., 2009; Roberti, 2004). Collectively, previous studies demonstrate that facial masculinity and masculine behavioral traits are both linked to testosterone levels. Although the neuroendocrinological mechanisms through which testosterone affects human behavior are still not exactly known, prior research leads to the conjecture that differences in facial masculinity across individuals can help to predict differences in behavior.

The general underlying premise in our study is that differences in facial width-to-height ratios across individual bank CEOs reflect differences in masculinity. Given that masculinity and testosterone levels are known to affect the risk preferences and tolerance of individuals, it is of interest to examine whether personal differences in masculinity among CEOs are imprinted on the level of risk-taking of their banks. If facial masculinity predicts individuals' risk preferences and these preferences, in turn, are reflected in corporate outcomes as suggested by the upper echelons theory, we should observe a positive relationship between CEO facial masculinity and bank risk-taking.

By examining this hypothesis, we contribute to the scarce literature on how individual differences in masculinity among top executives may potentially influence corporate behaviour. Consistent with our research hypothesis, we document a positive association between CEO facial masculinity and bank risk-taking. Thus, our results suggest that individual differences in masculinity not only influence personal financial risk-taking behavior but may also have important implications for firm-level risk-taking. In general, these findings can be considered to add further knowledge to our understanding of how personal differences among executives may be reflected in corporate decisions and outcomes.

## 2. Data and variables

### 2.1. Data

In our empirical analysis, we used data on publicly traded U.S. banks included in the S&P 500, S&P MidCap 400, and S&P SmallCap 600 indices over the period 2006–2014. We first collected the names, ages, and genders of the CEOs of firms with primary Standard Industrial Classification (SIC) codes between 6000 and 6300 from ExecuComp.<sup>2</sup> After excluding female CEOs, we manually collected facial pictures of

<sup>2</sup> SIC codes are a system used by U.S. government agencies and departments for classifying industries by a four-digit code. Firms with SIC codes between 6000 and 6300 are depository institutions, non-depository credit institutions, and security and commodity brokers, dealers, exchanges, and services. Following the prior banking literature, we define these financial institutions as banks.

the CEOs using Google Image Search.<sup>3</sup> We collected at least two pictures of each CEO and chose the picture that is of best quality for measuring fWHR.<sup>4</sup> In addition to CEO pictures and demographics, we collected financial data for the banks from Bankscope and stock price data from Thomson Reuters Datastream. The final sample used in our analysis consisted of 134 individual CEOs, 104 banks, and 618 firm-year observations.

### 2.2. CEO facial masculinity

Following Wong et al. (2011), Jia et al. (2014), and Kamiya et al. (2018), we used CEO facial width-to-height ratio as our main proxy for CEO masculinity. The fWHR is calculated as bizygomatic width (i.e., the distance between the cheekbones) divided by upper-face height (i.e., the distance between the upper lip and the midpoint of the inner ends of eyebrows). We utilize Face++ facial recognition software to extract facial dimensions from CEO pictures.

In addition to fWHR, we used expected testosterone levels of bank CEOs as an alternative proxy for CEO masculinity. Studies by Hodges-Simeon, Sobraske, Samore, Gurven, and Gaulin (2016), Welker, Bird, and Arnocky (2016), and Hodges-Simeon et al. (2018) suggest that age moderates the relationship between individual's testosterone level and fWHR. On the other hand, clinical studies have documented that testosterone levels of men decrease with age (see e.g., Feldman et al., 2002; Harman, Metter, Tobin, Pearson, & Blackman, 2001). Because aging potentially decreases testosterone levels and because testosterone mediates the relationship between fWHR and masculine behavioral traits such as risk-taking, we constructed an alternative proxy for CEO masculinity based on CEO facial width-to-height ratio and age. For this purpose, we utilized the clinical data on baseline and reactive testosterone levels provided in Lefevre et al. (2013). Specifically, using clinical data on baseline and reactive testosterone levels of males, we estimated the following seemingly unrelated regression (SUR) system:

$$\sqrt{\text{Testosterone}_i} = \alpha + \beta_1 \text{fWHR}_i + \beta_2 \log(\text{Age}_i) + \varepsilon_i, \quad (1)$$

where *Testosterone* is either the baseline or the reactive level of testosterone in individual *i*'s blood, *fWHR* is the facial width-to-height ratio, and *Age* denotes the individual's age in years. After estimating the coefficients  $\alpha$ ,  $\beta_1$ , and  $\beta_2$  in Eq. (1), we utilized these coefficient estimates together with the facial width-to-height ratios and ages of the bank CEOs to predict their expected testosterone levels.<sup>5</sup>

### 2.3. Bank risk-taking

We used three alternative measures of bank risk-taking: (i) stock return volatility, (ii) idiosyncratic risk, and (iii) Z-score. Stock return volatility and idiosyncratic risk are market-based measures of risk, while Z-score is an accounting-based risk measure estimated from balance sheet variables.

Stock return volatility was measured as the annualized standard deviation of daily stock returns over a calendar year. Stock return volatility captures the overall riskiness of a bank and it can be considered

<sup>3</sup> The facial width-to-height ratio is a valid measure of masculinity only for men. Biological studies indicate that facial masculinity within men is largely an outcome of craniofacial bone growth during the pubertal stage which, in turn, is regulated by testosterone administration. Due to the confounding effects of other hormonal factors, testosterone is less directly related to facial morphology of women (e.g., Lefevre et al., 2013). Consequently, the common practice in the fWHR literature is to exclude women from the sample.

<sup>4</sup> We defined the quality based on the neutrality of head pose in terms of pitch, roll, and yaw angles. We utilize Face++ facial recognition software to obtain pitch, roll, and yaw angles for each picture.

<sup>5</sup> Specifically, we calculated the expected testosterone levels of bank CEOs based on the facial width-to-height ratios and ages of the CEOs as follows:  $\sqrt{\text{Testosterone}_i} = 14.53 + 2.64 \times \text{fWHR}_i - 3.21 \times \log(\text{Age}_i)$ .

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