The Face Value of Innovation: An AI-Based Analysis of CEO Trustworthiness and Corporate Innovation

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This version: August 2025

Abstract

We investigate how trust, specifically perceived CEO trustworthiness, shapes corporate innovation in environments defined by uncertainty and incomplete contracting. Leveraging the well-documented psychological link between facial features and perceived trustworthiness, we use a machine-learning model to generate a unique measure of perceived trustworthiness from CEO faces. We validate this measure by showing that it correlates strongly with higher Glassdoor employee ratings, greater shareholder support in proxy votes, and quicker analyst revisions of earnings forecasts. Our central finding is that firms led by more trustworthy-looking CEOs generate both a larger number and higher-quality patents. This effect is particularly pronounced during industry "trust crises," when peer firms face financial fraud allegations, underscoring the value of CEO trustworthiness during periods of heightened uncertainty. We also show that CEO trustworthiness reduces information asymmetries across stakeholders: it is associated with lower analyst forecast dispersion, a stronger relation between employee options and innovation output, and stronger support for R&D from short-term institutional investors. Taken together, our evidence highlights the role of trust as a form of social capital that facilitates high-risk, high-return innovation.

Keywords: Trust, artificial intelligence, patents, innovation, information asymmetry

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"*Trust is the currency of innovation. It's only with trust that we can progress confidently into the unknown. Whether iterating existing solutions or inventing totally new ways of doing things, we need the trust of employees, stakeholders, and consumers to take the journey with us*."

– Ken Moore, Chief Innovation Officer of Mastercard[1]

1. Introduction

Trustworthiness is an important cornerstone in finance theory and corporate formation (Jensen and Meckling, 1976).[2] As the central figures in a complex stakeholder network, corporate executives are responsible for negotiating and contracting with all parties involved in business operations. Such a task is especially challenging for innovation projects that involve high uncertainty and information asymmetry, and an extended payoff horizon (if they succeed at all) (Aghion and Tirole, 1994a; Aghion and Tirole, 1994b). Given information asymmetries, corporate executives who are not trusted by shareholders may not receive sufficient support for optimal investment in innovation. Furthermore, corporate executives also need to motivate employees to engage in innovation activities that demand extra effort with risky outcomes (Manso, 2011). While companies may adopt incentive packages to encourage innovation efforts, such as job security (Acharya, Baghai, and Subramanian, 2014), the success of these efforts hinges importantly on the trustworthiness of these top executives. Trustworthiness likely determines both shareholder support and employee commitment to technological development.

Prior studies have largely remained silent on the role of executives' trustworthiness in corporate innovation, leaving an important gap in the literature, possibly due to measurement challenges and potential confounding factors. In this paper, we examine whether stakeholders' trust in management matters for corporate innovation. Specifically, we quantify CEOs' perceived trustworthiness using an AI-based machine learning model to analyze their LinkedIn profile face photos, which is motivated by research from biology and cognitive psychology.

Humans are evolutionarily predisposed to form spontaneous impressions about other people based on their faces within milliseconds (Willis and Todorov, 2006; Todorov, Pakrashi, and

[1] Source: *Trust: The Currency of Innovation* at https://hbr.org/sponsored/2022/09/trust-the-currency-of-innovation.
[2] Jensen and Meckling (1976, page 357): *"The publicly held business corporation is an awesome social invention. Millions of individuals voluntarily entrust billions of dollars, francs, pesos, etc., of personal wealth to the care of managers on the basis of a complex set of contracting relationships which delineate the rights of the parties involved."*

Oosterhof, 2009; Todorov, 2017). Among the various traits perceived, trustworthiness stands out as one of the most salient and influential (Sutherland et al. 2013).[3] It captures the observer's perceptions about the observed individual's intention to help or hurt the observer (Oosterhof and Todorov, 2008; Sutherland et al., 2013). The perception of trustworthiness is not only formed quickly but also relatively consistent across individuals and has been shown to predict a range of social and economic outcomes.[4]

As the public face of their firms, CEOs' facial features may influence how stakeholders assess the credibility of management's promises and commitment to risky, innovative projects with long-run payoffs. We hypothesize that more trustworthy-looking CEOs lead firms to generate both a higher quantity and quality of innovation. We propose two plausible mechanisms for this effect. One is an increase in employee effort. Employees who trust the CEO's commitment and vision may be more motivated to increase effort, believing in the promises of compensation and job security (Ruppel and Harrington, 2000; Acharya et al., 2014). A second mechanism is stronger investor support. Investors who lack relevant information may have greater confidence in trustworthy-looking CEOs, thereby helping to overcome information asymmetries inherent in innovation investment (Guiso, Sapienza, and Zingales, 2008).

To measure CEO trustworthiness, we collect CEOs' LinkedIn profile photos of publicly listed firms and quantify their perceived trustworthiness using the AI-based facial analysis procedure developed by Vernon et al. (2014). This automated procedure has been validated by its high correlation with human-rated trustworthiness (Vernon et al., 2014; Peng et al., 2022). For the empirical analysis, we also construct a comprehensive set of CEO and firm characteristics to account for potential confounding factors in the relation between trustworthiness and innovation.

To validate our measure in the CEO context, we examine its correlation with several variables that plausibly reflect the trustworthiness of a firm's management, as perceived by employees and analysts. We find that CEO trustworthiness is positively associated with greater

[3] Sutherland et al. (2013) find that facial impressions can be reduced to three key factors of trustworthiness, youthfulness and attractiveness, and dominance. More importantly, the first trustworthiness factor explains the largest amount of explained variance (37.76% out of total 72.38% explained by the three factors).

[4] For example, people who appear more trustworthy are less likely to receive extreme criminal-sentencing outcomes (Wilson and Rule, 2015), but more likely to receive favorable loan arrangements (Duarte, Siegel, and Young, 2012) and move up in corporate hierarchies (Linke, Saribay, and Kleisner, 2016). Prior empirical evidence has suggested that perceived trustworthiness – based on facial appearance – shapes investor judgments and decision-making (e.g., Hsieh et al., 2020; Peng et al., 2022).

employee satisfaction on Glassdoor.com, as evidenced in higher ratings for the firm overall, senior leadership, and business outlook. This positive association is also evidenced by a firm's ranking on *Fortune* magazine's list of "100 Best Companies to Work For", an alternative proxy for employee satisfaction (Edmans, 2012). Additionally, we find that analysts update their earnings forecasts faster when CEOs are perceived as more trustworthy.

We turn next to shareholders' perspectives, using several tests to validate our measure. First, we find that trustworthy CEOs receive greater support in proxy votes with more "for" votes and fewer "against" votes on their proposed agendas. Second, CEO perceived trustworthiness is positively associated with financing cash flows and debt issuance, indicating more funding from investors that supports innovation. Finally, in a key test of shareholder confidence in the face of short-term failure, we find that trustworthy-looking CEOs are less likely to be terminated after poor performance, a pattern not observed for less trustworthy-looking CEOs.

With our measure validated, we turn to the paper's core empirical tests investigating the role of CEOs' perceived trustworthiness in firms' quantity and quality of patent output. In our panel regression analysis, we find a significant and positive relation between CEO perceived trustworthiness and firm-level patent output measured by the number of newly filed patents and multiple quality measures, including citation count, estimated dollar value, and technological novelty, scope, and originality of those patents. The effects are economically meaningful: a one-standard-deviation increase in CEO perceived trustworthiness is associated with an 11.7% increase in patent filings in the following year, which corresponds to about 2.0 additional patents per year. It is also associated with a 25.9% increase in the number of forward citations received by those patents, which corresponds to about 53.1 additional forward citations.

To provide evidence for a causal interpretation of the positive relation between trustworthiness and innovation, we exploit quasi-exogenous shocks in the form of financial scandals involving peer firms in the same industry. We argue that these events are plausibly unrelated to the focal firm's innovation opportunities and capabilities, yet they heighten the salience of CEO trustworthiness for innovation outcomes. This amplification is specific to trust and unlikely to be explained by other omitted variables.[5] In this setting, treated firms are those in

[5] For an omitted variable to explain our results, it will have to be correlated with peers' financial fraud, the focal firm's perceived CEO trustworthiness, and innovation performance in the same direction.

the same industry as a firm involved in a financial scandal, but without a scandal themselves; control firms are those in industries with no scandals throughout the sample period (i.e., never treated). Using financial scandal data from the Accounting and Auditing Enforcement Releases (AAER) database (Dechow et al., 2011) and a stacked difference-in-differences-in-differences design (Baker, Larcker, and Wang, 2022; Barrios, 2024), we find that, relative to control firms, the association between CEO perceived trustworthiness and corporate innovation is significantly stronger for treated firms following peer firms' financial scandals. In the pre-event period, we do not find different trends between treated and control firms, which is consistent with the groups not having a fundamental pre-existing difference.

To ensure robustness, we conduct a battery of additional tests and find consistent results. Specifically, we use alternative model specifications, such as Poisson and negative binomial regressions. We also consider alternative dependent variables, such as the inverse hyperbolic sine of the number of patents, the number of patents filed over a long horizon, and an indicator variable for patent filing. We also analyze alternative subsamples, such as focusing on firm-years observations with non-zero patents. Further, we control for additional CEO characteristics, such as facial width-to-height ratio (Jia, van Lent, and Zeng, 2014), youthfulness and attractiveness, and dominance (Vernon et al., 2014; Peng et al., 2022), as well as CEO educational discipline and skillsets (Hsu, Li, and Pan, 2025).

We next turn to a series of tests to uncover the specific channels through which CEO trustworthiness enhances innovation. These tests focus on how trust in management teams reduces information asymmetry for employees and shareholders. When stakeholders trust CEOs and their promises more, they are more willing to contribute to innovative activities. First, we show that trustworthy CEOs strengthen the positive relation between employee options and patent output, confirming that trust encourages greater employee effort by strengthening their belief that management will reward their contributions. Moreover, we find that the relation between short-term institutional ownership and R&D investment turns positive with trustworthy CEOs. Lastly, we find a negative relation between perceived CEO trustworthiness and analyst forecast dispersion, suggesting how trust reduces information asymmetry for outsiders. All these results not only highlight how CEO trustworthiness enhances corporate innovation through both internal motivation and external support but also provide further evidence for a causal interpretation of our baseline result.

Finally, to understand when CEO perceived trustworthiness matters most, we consider two factors that shape a CEO's relationship with stakeholders: appointment type and tenure within the firm. We find that the effect of CEO trustworthiness on innovation is significantly stronger for externally appointed CEOs and for those with shorter firm tenure. These findings are consistent with the idea that facial cues are especially important in new social interactions, where stakeholders have limited prior information about the CEO.

This research makes three main contributions to the literature. First, it extends prior research on the role of social trust in economic growth by offering individual-level evidence. Whereas most studies examine trust at the country or regional level,[6] we provide a more granular individual-specific measure of perceived CEO trustworthiness using AI-facial analysis to examine firm-level innovation outcomes. Our research complements Nguyen (2025), who studies the relation between a personality trait at the CEO-level, shaping tolerance for failure and risk-taking, on firm innovation outcomes. Our study differs in key dimensions including the focus of trust, the underlying mechanism, and the measure. Whereas Nguyen's measure is on CEOs' own trust attitude *toward others*, we study how external stakeholders perceive CEOs: such perception that mitigates information asymmetry helps shape employee and investor willingness to support innovation. Furthermore, our measure is constructed from CEO faces, rather than inferred indirectly from cultural background.[7]

Second, this study contributes to the growing literature on CEOs' roles in corporate innovation. Prior work highlights the importance of observable attributes such as compensation

[6] For related studies, see, e.g., Knack and Keefer (1997), Zak and Knack (2001), Barro and McCleary (2003), Beugelsdijk, de Groot, and van Schaik (2004), Guiso, Sapienza, and Zingales (2006), and Xie et al. (2022).

[7] Prior studies infer corporate trust from textual disclosures and often resort to a corporate culture-based explanation. For example, Larcker and Zakolyukina (2012) and Hope and Wang (2018) analyze the use of trust-related words in corporate earnings conference calls, while Audi, Loughran, and McDonald (2016), Breuer, Knetsch, and Salzmann (2020), and Cho, Krishnan, and Cho (2023) examine such keywords in the Management Discussion and Analysis (MD&A) section of 10-K filings. Evolutionary psychologists suggest that facial impressions are instantaneous and possibly subconscious, having evolved in evolutionary history as a survival trait. Language, on the other hand, may be easier to mimic and therefore more likely to be subject to managerial manipulation. Our measure has also been validated by Vernon et. al (2014), Peng et al. (2022), studies cited in Todorov (2019), and further validated in Section 2.5.

structure and education/professional background,[8] attitudes shaped by early experiences,[9] and overconfidence. Hirshleifer, Low, and Teoh (2009) show that CEO overconfidence promotes innovation by encouraging risk-taking, though at the cost of greater variance in outcomes. In contrast, we focus on perceived trustworthiness, a distinct personal trait that shapes how stakeholders evaluate managerial credibility and commitment to risky long-horizon projects. By emphasizing perceptions of credibility, our study complements research on executive incentives and backgrounds, and expands the set of personal attributes influencing innovative performance.[10]

Finally, this study is also related to the literature on CEO characteristics in corporate governance. Prior studies often rely on indirect observable proxies of executive background, such as political connections (Fan, Wong, and Zhang, 2007), cultural backgrounds (Liu, 2016), and professional training (Heese, Pérez-Cavazos, and Peter, 2023),[11] which may contain multifaceted information about CEOs. The availability of new technologies allows us to directly measure perceived CEO trustworthiness, and our validation tests with Glassdoor employee surveys, shareholder votes, and CEO turnover suggest real effects of this specific trait. Our mechanism tests increase confidence in our inference that there are real effects from employee and shareholder trust in CEOs. Our study underscores the importance of trustworthiness in corporate governance by showing how it reduces information asymmetries and fosters greater employee and investor support to foster innovation in companies.

[8] Balkin, Markman, and Gomez-Mejia (2000) use *Forbes* and proxy statements to measure CEOs' short-term salary and long-term equity-based compensation. Barker and Mueller (2002) extract CEO characteristics, such as tenure, age, stock holdings, education, and experience, from *Business Week Corporate Elite* special issues. Mao and Zhang (2018), following Coles, Daniel, and Naveen (2006), compute managerial incentives (delta and vega) using CEO compensation data.

[9] Yi, Chu, and Png (2022) show that people experienced early-life hardship are subsequently more likely to become entrepreneurs. In addition, Bernile, Bhagwat, and Rau (2017) show that CEOs with early-life exposure to disasters tend to adopt more aggressive strategies in corporate expansion.

[10] Jia, van Lent, and Zeng (2014) measure CEOs' facial width-to-height ratio (*FWHR*), a proxy for testosterone-related risk-taking, and find that it is associated with higher stock return volatility, greater financial leverage, and a higher likelihood of financial misstatements. See Todorov (2019) for concerns about the *FWHR* measure. Blankespoor, Hendricks, and Miller (2017) use human-rated CEO perceptions (the average of perceived competence, trustworthiness, and attractiveness) and find a positive association with IPO pricing. Focusing on CFO trustworthiness, Hsieh et al. (2020) find that more trustworthy-looking CFOs are associated with lower audit fees.

[11] Fan, Wong, and Zhang (2007) find that Chinese IPOs with politically connected CEOs underperform those without such CEOs in stock returns and profitability. Liu (2016) measures firms' corruption culture using executives' and directors' country of ancestry and finds that such culture leads to more earnings management, accounting fraud, option backdating, and opportunistic insider trading. Heese, Pérez-Cavazos, and Peter (2023) find that when CEOs and CFOs with Dutch professional accounting degrees took mandatory one-time integrity oaths in 2016, their firms improved their financial reporting quality.

The remainder of the paper is organized as follows. Section 2 discusses our data, sample formation, and validation tests for our trustworthiness measures. Section 3 presents our main empirical results, robustness checks, and identification tests. Section 4 reports mechanism tests, and Section 5 presents heterogeneous effects. Section 6 concludes.

2. Data and Sample

2.1 CEO's Perceived Trustworthiness

To measure a CEO's perceived trustworthiness, we first manually collect CEO LinkedIn profiles using the full list of CEO names from the ExecuComp database. Our research assistants manually search for their LinkedIn profile photos. We use LinkedIn profile photos because they are publicly available, professional in appearance, uniform in settings across individuals,[12] and very likely approved by the CEOs to project a specific image to the external world.[13] To ensure matching accuracy, we require that the individual's LinkedIn name, firm, and job title all align with the corresponding information in ExecuComp.[14] In total, we identified 3,017 LinkedIn profiles, with 1,911 having profile photos.[15] Figure 1 plots the sample coverage over time. On average, 39.5% of CEOs in the ExecuComp database are registered on LinkedIn, and 52.1% of these have profile photos.[16]

[12] Contextual factors may influence the interpretation of a face (e.g., a face in a business suit against an office backdrop may be seen as more competent and trustworthy than the same face in casual attire at a beach). So, a uniform setting helps remove context-related factors. For related discussions, see, e.g., Oosterhof and Todorov (2008).

[13] LinkedIn advises users to upload a current photo that accurately reflects their appearance. They have offered guidelines for profile pictures, such as using a high-resolution image, selecting an expression that conveys professionalism, and opting for soft, natural lighting. For related discussion, see https://business.linkedin.com/talent-solutions/blog/2014/12/5-tips-for-picking-the-right-linkedin-profile-picture.

[14] Specifically, we apply the following criteria: (i) the first and last name of the individual on LinkedIn needs to match the CEO name in ExecuComp, (ii) the working experience of the individual on LinkedIn needs to match the CEO's working experience in ExecuComp, and (iii) the job title of the individual on LinkedIn needs to include at least one of the following terms: "CEO", "Chief Executive Officer", "Board", "Chief Manager", "Chairman", "President", "Principal", "Director", or "Chairperson".

[15] Two possibilities for the missing profile photos are: (i) the CEO has not uploaded a profile photo, and (ii) the CEO's privacy settings restrict public access to their profile photos (e.g., only visible to 1st-degree or 2nd-degree connections).

[16] The ratio of CEOs registered on LinkedIn has been increasing before 2010 and becomes relatively stable at 50% after 2010. The ratio of CEOs who have registered on LinkedIn have publicly visible profile photos has been gradually increasing over time, from 40% in the 1990s to 50% in the 2000s, and then to 60% in the 2010s and 2020s.

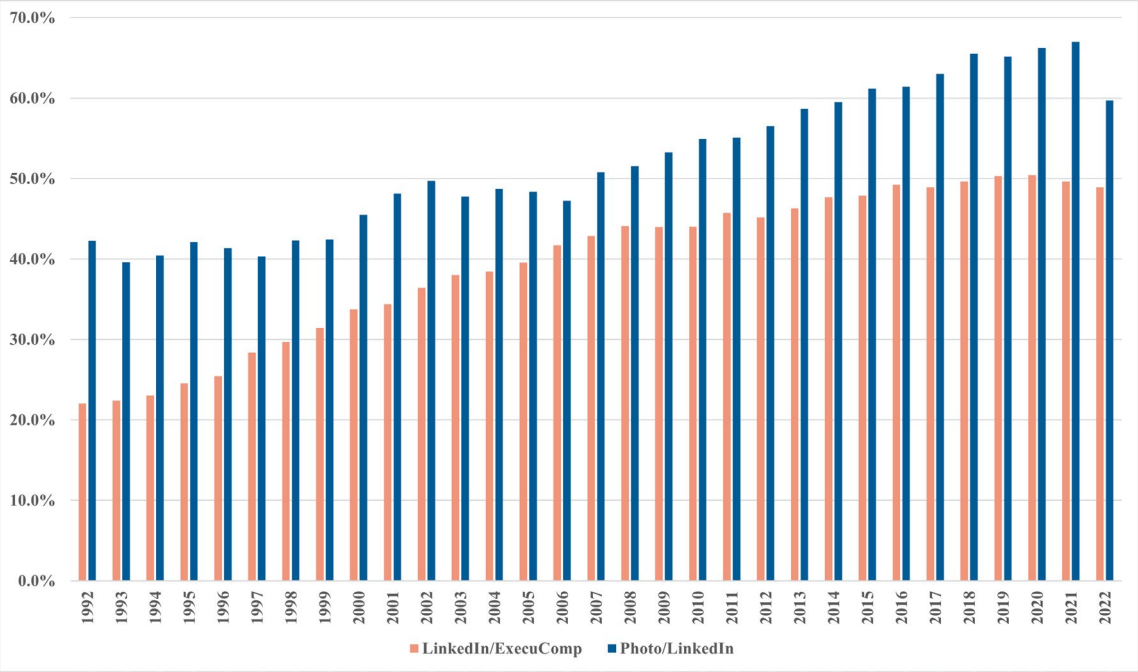


Figure 1. Sample Coverage
This figure plots the sample coverage ratio over time. The pink bars plot the fraction of CEOs who have registered on LinkedIn relative to CEOs in the ExecuComp dataset. The blue bars plot the fraction of LinkedIn CEOs with profile photos. The sample period is from 1992 to 2022.

Next, we compute the trustworthiness score for each photo following prior studies (Vernon et al., 2014; Peng et al., 2022). Specifically, we use the iBUG facial landmark detection tool to identify 68 key fiducial points on each CEO photo (Sagonas et al., 2016). An example of an annotated profile photo is shown in Online Appendix Figure OA1. We then compute 65 facial attributes using the coordinates of key fiducial points. The perceived trustworthiness is calculated as a combination of these facial attributes using the weights in Vernon et al. (2014).[17] Figure 2 visualizes this process, with additional technical details provided in Online Appendix 1. To provide an intuitive understanding of the measure, we illustrate in Figure 3 the average faces of different levels of perceived trustworthiness using our collected CEO photos.

[17] A complete list of 65 facial attributes is provided in Online Appendix Table OA1.

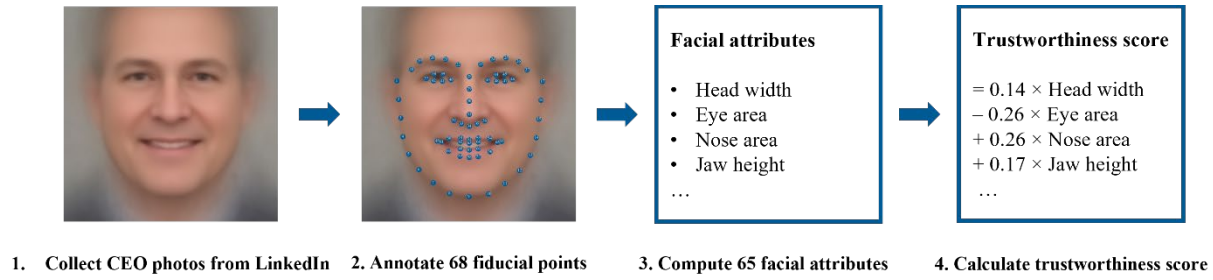


Figure 2. The Procedure of Measuring CEO Perceived Trustworthiness
In this figure, we illustrate the procedure for measuring CEO trustworthiness. In step 1, we collect CEO photos from LinkedIn. In step 2, we extract the face from each photo and delineate its 68 fiducial points using the iBUG tool. In step 3, we compute the 65 facial attributes based on the annotated points. In step 4, we compute the trustworthiness score for each CEO by linearly combining the facial attributes using the weights in Vernon et al. (2014).

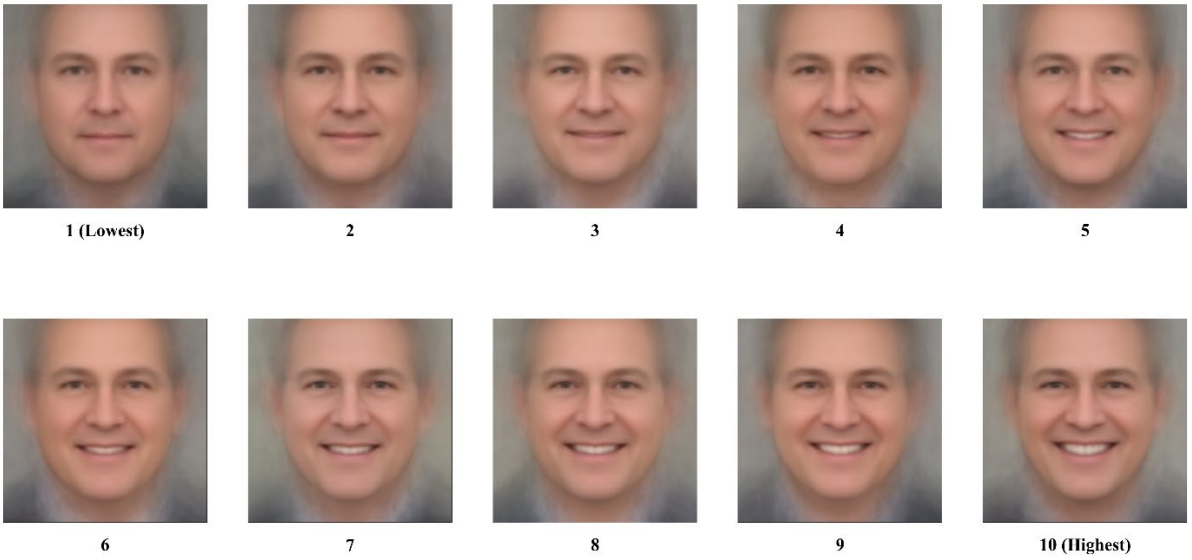


Figure 3. The Average Face by CEO Perceived Trustworthiness
In this figure, we illustrate the average face for each decile of CEO trustworthiness (1 = lowest and 10 = highest). The average face is generated using the Delaunay triangulation warping method.

This automated procedure has been validated using human-rated scores of trustworthiness in prior psychology and economics studies (Vernon et al., 2014; Peng et al., 2022),[18] and the

[18] For example, Vernon et al. (2014) compare the automated and human rated trustworthiness scores for synthesized face-like images and find their correlation is 0.93. Using MTurk human raters, Peng et al. (2022) find that, in the setting of stock analysts, the correlation between automated and human rated trustworthiness scores is 0.92.

algorithm's outputs have been shown to be robust to observable characteristics such as age.[19] The underlying rationale of this approach draws on evolutionary psychology: Over millions of years, humans have developed an instinctive ability to assess the trustworthiness of others within a split second — a trait crucial for selecting reliable friend or foe as collaborators and social partners. This instinct is largely driven by facial features and their configurations, which convey social cues that the human brain is attuned to interpret (Todorov, 2017).

To validate the representativeness of LinkedIn profile photos, we compare the perceived trustworthiness scores from a random sample of 100 official CEO photos obtained from firms' proxy statements. [20] We find that these scores are highly correlated with those derived from their LinkedIn profile photos (ρ = 78.5%), indicating that LinkedIn photos provide a reliable measure of perceived trustworthiness.

2.2 Corporate Innovation Performance

To measure corporate innovation performance, we use the patent data from two sources: the Kogan et al. (2017) patent database and PatentsView.org. The former provides firm-level innovation metrics such as the number of patents and citations, as well as the real and nominal dollar value of each patent. To construct additional measures for innovation quality, we link patent citation data from PatentsView.org to public firms using the link provided by Kogan et al. (2017), and compute each patent's novelty, scope, and originality following prior studies on innovation (Dong, Hirshleifer, and Teoh, 2021; Tian, Yan, and Zuo, 2025). Appendix 1 provides a list of detailed definitions of all innovation variables used in this study.

2.3 Sample Construction and Summary Statistics

To construct the sample for our empirical analyses, we begin with the 1,911 hand-collected CEO photos from LinkedIn. We match them to the ExecuComp database, which yields 16,768 firm-year observations. We then apply the following sample screens.

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[19] Sutherland et al. (2013) use principal factor analysis and find that, unlike other facial impressions (such as dominance and attractiveness), trustworthiness has low and unsubstantial loading over age (ρ = 0.04, as shown in their Table 1, page 111). This could be due to the judgment of trustworthiness relying more on the structural configuration of the face (such as bone structure and long-term muscle, Todorov, 2017). In our sample, the correlation between CEO trustworthiness and age is also very low (ρ = 0.00, as shown in Table 3 Panel B).

[20] We do not use proxy statements as the main source of CEO photos for several reasons: (i) many proxy statements do not include CEO photos, (ii) photos in proxy statements are often low-resolution, in non-jpeg format, or presented in greyscale, and (iii) these photos frequently contain embedded captions or feature multiple individuals.

First, we require data to construct control variables. We obtain firm fundamental data from Compustat, CRSP, and Thomson Reuters Institutional Holdings (13F) databases. This step excludes 3,968 observations due to missing firm-level data. Next, we collect CEO characteristics from ExecuComp, CRSP, and the CEO incentive database, excluding an additional 619 observations due to missing data. We also require non-missing corporate innovation variables for year t+1, which excludes 1,534 observations. Finally, in our regression analyses, we include firm fixed effects to account for time-invariant, firm-specific confounders. This specification identifies 93 singleton observations, which are also excluded from our regression analyses.

Our final dataset comprises a firm-year panel of 10,554 firm-year observations for 1,163 firms from 1992 to 2022 that includes CEO perceived trustworthiness, innovation outcomes, and the full set of control variables. Table 1 outlines the full sample selection process. As shown in Online Appendix Table OA2, firms included in our LinkedIn-photo sample exhibit similar fundamentals and CEO characteristics to those in the broader Compustat universe, confirming the representativeness of our sample. The fact that our sample is reasonably similar to the Compustat universe also suggests that our results are more generalizable to all publicly listed firms.

Table 2 summarizes the distribution of our sample. The number of observations per year increases from 30 in 1992 to 510 in 2015, followed by a stable trend of around 500 in recent years. The three most represented industries are Business Services (two-digit SIC 73, 12.4%), Chemical and Allied Products (two-digit SIC 28, 8.2%), and Electronic and Other Electric Equipment (two-digit SIC 36, 7.4%). These three industries cover a substantial share of innovative firms (including Microsoft, Google/Alphabet, General Electric, Johnson & Johnson, etc.) and are also among the most represented industries in the broader Compustat universe.[21]

Table 3 Panel A presents descriptive statistics of key variables. On average, CEO perceived trustworthiness has a mean of 0.078 and a standard deviation of 0.476. An average firm has book value of $2.12 billion, files 17 patents per year, and receives 205 forward citations. Crucially, Pearson correlations shown in Table 3 Panel B suggest that (i) CEO perceived trustworthiness, *CEO TRUST*, is positively correlated with the number of patents and forward citations in the following year, and (ii) *CEO TRUST* has low correlations (with none exceeding 10%) with firm

[21] In the broader Compustat universe, Business Services (two-digit SIC 73), Chemical and Allied Products (two-digit SIC 28), and Electronic and Other Electric Equipment (two-digit SIC 36) represent 9.65%, 9.35%, and 5.97% of all observations, respectively.

fundamentals and CEO characteristics. These patterns provide preliminary evidence that CEO perceived trustworthiness could be a distinct, unexplored factor contributing to corporate innovation.

2.4 Research Design

To examine the relation between CEO perceived trustworthiness and various outcome variables, we estimate the following ordinary least squares regression model using our constructed sample:

$$Outcome_{i,t\ or\ t+1} = \beta \cdot CEO\ TRUST_{i,t} + Controls_{i,t} + \sum FEs + \varepsilon_{i,t}\ , \quad (1)$$

where *Outcome* denotes one of several outcome variables of firm *i* in year *t* or *t*+1. The key explanatory variable, *CEO TRUST*, is the facial trustworthiness score of the CEO hired by firm *i* in year *t*. *Controls* denotes a vector that includes an extensive list of firm fundamentals and CEO characteristics.[22] Detailed definitions of these control variables are listed in Appendix 1. In addition, *FEs* includes firm fixed effects to account for time-invariant, firm-specific innovation styles and year fixed effects to account for time-varying, market-wide trends. The statistical inferences are based on standard errors clustered by firm to accommodate estimation errors related to firms.

2.5 Validation of Perceived Trustworthiness Measure

In this section, we validate our CEO perceived trustworthiness measures using various data related to the trust of key stakeholders, including employees, shareholders, and financial analysts.

[22] The firm-level control variables include: *SIZE*, measured as the natural logarithm of book assets; *RD*, measured as R&D expenses scaled by book assets; *FIRM AGE*, measured as the natural logarithm of one plus the number of years that a firm is listed on Compustat; *ROA*, measured as the operating income before depreciation divided by the book assets; *PPE*, measured as the net PP&E scaled by book assets; *LEVERAGE*, measured as book debt scaled by book assets; *CAPEX*, measured as capital expenditures scaled by book assets; *TOBIN Q*, measured as the natural logarithm of the ratio of the sum of the market equity and book debt to the sum of the book equity and book debt; *KZ INDEX*, measured as a composite index of financial constraints following Lamont, Polk, and Saaá-Requejo (2001); *HHI* and *HHI SQUARED*, measured as the squared Herfindahl index and its square, based on revenue concentration within the firm's four-digit SIC industry; *INSTITUTION*, measured as the fraction of shares held by institutional investors; *ILLIQUIDITY*, measured as stock illiquidity measure following Amihud (2002). The CEO-level controls include: *FEMALE*, measured as an indicator variable equal to one if a CEO is female and zero otherwise; *AGE*, measured as the CEO's age; *TENURE*, measured as the CEO's tenure in years; *EDU*, measured as the CEO's education level; *SALARY*, measured as the CEO's annual salary; *BONUS*, measured as the CEO's annual bonus; *EQUITY HOLDINGS*, measured as the CEO's total equity holdings; *NEW OPTION PPS*, measured as the price volatility of the CEO's newly granted options; *NEW STOCK PPS*, measured as the price volatility of the CEO's newly granted stocks; *DELTA*, measured as the sensitivity of the CEO's total wealth to stock price; *VEGA*, measured as the sensitivity of the CEO's total wealth to stock volatility.

2.5.1 CEO Perceived Trustworthiness and Employees' Trust

CEO perceived trustworthiness may motivate greater effort from employees when they are more confident that management will reward their efforts and that their team effort will succeed. To test this, we analyze Glassdoor employee reviews from Revelio Labs and estimate Equation (1) using employee satisfaction ratings on Glassdoor as the dependent variable. Specifically, we consider overall ratings for the firm as well as ratings for the senior leadership and business outlook.[23] We find consistent evidence that CEO perceived trustworthiness is positively and significantly associated with employee satisfaction on Glassdoor. As shown in columns (1) to (3) of Table 4, a one-standard-deviation increase in *CEO TRUST* is associated with a 6.3% (= 0.476 × 0.133 × 100%) increase in employees' overall rating of their firm, a 6.0% (= 0.476 × 0.126 × 100%) increase in their rating of senior leadership, and a 5.3% (= 0.476 × 0.111 × 100%) increase in their rating of the firm's business outlook.[24]

To further validate our measure, we examine firms' ranking in *Fortune* magazine's "100 Best Companies to Work For" list, a widely recognized indicator of employee satisfaction (Edmans, 2012). As shown in column (4) of Table 4, a one-standard-deviation increase in *CEO TRUST* corresponds to a 40 (= 0.476 × 0.084 × 1,000) position improvement for firms on the list.[25] This result reinforces our interpretation that CEOs who appear more trustworthy foster more positive workplace environments, which, in turn, supports higher levels of employee engagement. All these results collectively support that employees' trust increases with CEOs' perceived trustworthiness

2.5.2 CEO Perceived Trustworthiness and Shareholders' Trust

Trustworthy CEOs are expected to enhance shareholder confidence in the firm's R&D and innovation investments, making it more likely that they will back such initiatives. To test this, we replace the dependent variable in Equation (1) with various empirical proxies for shareholders' trust. We first examine shareholder voting outcomes using data from ISS ESG Voting Analytics.

[23] The employee satisfaction is computed as the average of all employee ratings for a firm in a year. To construct a robust measure of employee satisfaction, we require each firm to have at least 10 reviews in a year.
[24] CEO perceived trustworthiness is also positively and significantly associated with employee ratings in other aspects, such as career opportunities, compensation and benefits, and work-life balance (untabulated).
[25] We gratefully thank Long Yi for sharing the "100 Best Companies to Work For" data. In an untabulate analysis, we find that *CEO TRUST* is positively correlated with a firm's inclusion in the list (ρ=0.04). We do not focus on this outcome as more than 95% of firms are never included, leaving little variation after including firm fixed effects.

Consistent with our expectations, we find that trustworthy CEOs receive greater support for their proposed agendas. As shown in columns (1) and (2) of Table 5, a one-standard-deviation increase in *CEO TRUST* is associated with a 0.8% (= 0.476 × 0.016 × 100%) increase in the percentage of "for" votes and a corresponding 0.8% (= 0.476 × 0.017 × 100%) decrease in the percentage of "against" votes.[26]

We also find that firms led by trustworthy CEOs secure more financing for innovation. As reported in columns (3) and (4) of Table 5, a one-standard-deviation increase in *CEO TRUST* is associated with a 7.1% (= 0.476 × 0.015 × 100%) increase in financing cash flows and an 8.1% (= 0.476 × 0.017 × 100%) increase in debt issuance, suggesting that capital providers are more willing to fund innovation led trustworthy leaders.[27]

Shareholder confidence in the CEO is especially valuable during periods of short-term failures, which are common in innovation. To examine this, we create an indicator variable for poor performance, *LOW ROA*, which equals one if a firm's ROA falls into the bottom quintile relative to contemporaneous two-digit SIC peers and zero otherwise. We also classify a CEO as low trustworthy-looking if their trustworthiness score falls into the bottom quintile relative to contemporaneous two-digit SIC peers. We find that in the subsample of firms with low trustworthy-looking CEOs, poor performance increases the likelihood of CEO termination in the following year by 2.5%. In contrast, among the firms led by trustworthy-looking CEOs, poor performance does not significantly increase the risk of termination. The difference in coefficients on *LOW ROA* between the two subsamples is statistically significant ($p < 0.05$). These results are presented in columns (5) and (6) of Table 5. All results presented in this table support a positive relation between our CEO perceived trustworthiness and shareholders' trust.

2.5.3 CEO Perceived Trustworthiness and Financial Analysts' Trust

Then, we examine how CEOs are perceived as trustworthy in the view of financial analysts, who play a vital role in interpreting and communicating the firm's potential to the market. We

[26] CEO perceived trustworthiness is not significantly associated with the percentage of "abstain" votes (untabulated).
[27] The cash flow of financing activities is calculated as debt issuance (Δat – Δceq – Δtxdb) plus sales of stocks (sstk – prstkc) minus the issuance of dividends (dvc + dvp), scaled by the average of current and lagged total equity. The debt issuance is calculated as the change in assets minus the change in book equity [Δtotal assets (at) – Δbook equity (ceq) – Δ deferred taxes (txdb)], scaled by the average of current and lagged total equity.

expect that when analysts trust the CEO, they can more effectively deliver their insights to the market, reinforcing trust among employees and shareholders.

To capture analysts' trust, we construct a variable *FORECAST SPEED*, which represents analyst forecast speed and is calculated as the inverse of the median number of days for analysts to revise their earnings forecasts after a firm's corporate earnings conference calls. Faster forecast revisions reflect analysts' stronger confidence in the information provided to them during earnings conference calls. Analyst forecasts are retrieved from the I/B/E/S database, and corporate earnings calls are collected from the Thomson ONE StreetEvents database. We find that CEO perceived trustworthiness is associated with faster forecast revision. Economically, a one-standard-deviation increase in *CEO TRUST* is associated with a 2.8% (= 0.476 × 0.059 × 100%) faster post-call earnings revision. These estimation results are tabulated in Table 6.

Overall, our validation tests show that CEO perceived trustworthiness is positively associated with the trust of key stakeholders of employees, shareholders, and financial analysts. They collectively support the validity of our CEO perceived trustworthiness measure.

3. Main Empirical Findings

3.1 CEO Perceived Trustworthiness and Innovation Performance

We now examine how firms' innovation output is related to perceived CEO trustworthiness. Using several measures for innovation output of firm i in year t+1 as the dependent variable, we estimate Equation (1). We focus on the number of patents and their forward citations in our baseline regression, and will discuss all other measures later in this section. In particular, we use *Ln(PATENTS)* as the natural logarithm of one plus the number of patents a firm filed in year t+1, and *Ln(FORWARD CITATIONS)* as the natural logarithm of one plus the number of forward citations received by a firm's patents in year t+1. While we use this log-linear measure as our main output variable in OLS regressions, we also consider the inverse hyperbolic sine of the number of patents in OLS regressions as well as the raw number of patents in Poisson and negative binomial regressions in robustness checks.

Table 7 presents our main results. Columns (1) to (3) of Panel A show the results from estimating Equation (1) under various model specifications. Column (1) includes only the key

explanatory variable, *CEO TRUST*. Column (2) adds firm-level control variables to account for firm fundamentals. Column (3) further incorporates CEO-level control variables to address heterogeneity in CEO characteristics.

In all specifications, the estimated coefficients of our main interest, *CEO TRUST*, are positive and highly statistically significant, regardless of the inclusion of control variables.[28] The estimated coefficients are also economically meaningful. In the fully controlled specification (as shown in column (3)), a one-standard-deviation increase in *CEO TRUST* is associated with an 11.7% (= 0.476 × 0.246 × 100%) increase in the number of patents filed in the subsequent year, which corresponds to about 2.0 (= 11.7% × 17.003) more patents per year. This economic magnitude is also comparable to other significant determinants of corporate innovation documented in prior studies, such as CEO overconfidence (Hirshleifer, Low, and Teoh, 2012).[29]

Columns (4) to (6) of Panel A repeat the analysis by replacing the dependent variable with *Ln(FORWARD CITATIONS)*, which is the natural logarithm of one plus the number of forward citations received by the patents filed by firm *i*'s in year *t*+1. The estimated coefficients of *CEO TRUST* remain positive and highly significant. In the full specification shown in column (6), a one-standard-deviation increase in *CEO TRUST* is associated with a 25.9% (= 0.476 × 0.545 × 100%) increase in the number of forward citations received by the patents filed in the subsequent year, which corresponds to about 53.1 (= 25.9% × 204.684) more forward citations per year. We label the two results in columns (3) and (6) as our baseline regression.

Furthermore, we examine the relation between CEO perceived trustworthiness and several other widely used measures of innovation quality. They include: the number of forward citations per patent, economic value, novelty, scope, and originality per patent (Kogan et al., 2017; Dong, Hirshleifer, and Teoh, 2021). We use them as dependent variables for Equation (1) and present the estimation results in Table 7 Panel B. The estimated coefficients of *CEO TRUST* are all positive and statistically significant. For each patent, a one-standard-deviation increase in *CEO TRUST* corresponds to an 11.8% (= 0.476 × 0.248 × 100%) increase in forward citations, a 37.0% (= 0.476 × 0.777 × 100%) increase in real patent value, and a 38.3% (= 0.476 × 0.805 × 100%) increase in

[28] For the control variables, we find that the coefficients of *SIZE*, *RD*, *PPE*, *TOBIN Q*, *NEW OPTION PPS*, and *NEW STOCK PPS* are positive and significant.

[29] Specifically, in Hirshleifer, Low, and Teoh (2012), an indicator of confident CEO (measured using their granted options) is associated with 9.3% to 11.1% more patents, as shown in their Table V columns (1) to (3) on page 1474.

nominal patent value. Additionally, it is associated with a 3.6% (= 0.476 × 0.076 × 100%), 1.0% (= 0.476 × 0.020 × 100%), and 1.6% (= 0.476 × 0.034 × 100%) increase in patent novelty, scope, and originality, respectively. These findings not only validate our baseline results but also indicate that CEO perceived trustworthiness is positively related to patent output in different dimensions.

3.2 Identification for Causality

To examine whether the documented positive relation between CEO perceived trustworthiness and innovation output is causal, we exploit the quasi-exogenous shock of peers' financial scandals. The intuition is that a peer firm's financial scandal is directly related to the importance of the focal firm's CEO's perceived trustworthiness (relevance criteria) but is less likely to directly influence the focal firm's corporate innovation (exclusion restriction).

We identify corporate financial scandals using the Accounting and Auditing Enforcement Releases (AAER) database.[30] We exploit the staggered timing of different scandals to create cohorts of treated and control firms, examining each scandal across a seven-year window from years -3 to +3, including the event year 0 (defined by the announcement year). A firm is identified as a treated firm if it operates in the same industry (three-digit SIC) as another firm involved in a financial scandal (but it does not have a scandal itself). A firm is identified as a control firm if it operates in an industry (three-digit SIC) with no financial scandal throughout the sample (i.e., never-treated). We then "stack" all cohorts, which gives us a balanced window for each cohort firm, and estimate a difference-in-differences-in-differences design (Baker, Larcker, and Wang, 2022; Barrios, 2024) as follows:

$$\begin{aligned} Ln(PATENTS)_{c,i,t+1} or\ Ln(FORWARD\ CITATIONS)_{c,i,t+1} = {} & \beta_1 \cdot CEO\ TRUST_{c,i,t} \times TREAT_{c,i} \times \\ & POST_{c,t} + \beta_2 \cdot CEO\ TRUST_{c,i,t} \times POST_{c,t} + \beta_3 \cdot CEO\ TRUST_{c,i,t} \times \\ & TREAT_{c,i} + \beta_4 \cdot TREAT_{c,i} \times POST_{c,t} + \beta_5 \cdot CEO\ TRUST_{c,i,t} + \\ & \sum Cohort\ FE \times Controls_{c,i,t} + \sum Cohort\ FE \times FEs + \varepsilon_{c,i,t}\ , \end{aligned} \quad (2)$$

in which *c* indexes cohort (event), *i* indexes firm, and *t* indexes year. *Ln(PATENTS)* and *Ln(FORWARD CITATIONS)* of firm *i* in year *t*+1 can appear in multiple cohort *c*. *POST* is an indicator for fraudulent event years and onward of a cohort, and *TREAT* is an indicator variable

[30] The SEC AAERs are listed at https://www.sec.gov/enforcement-litigation/accounting-auditing-enforcement-releases and summarized by at https://sites.google.com/usc.edu/aaerdataset/home (Dechow et al., 2011).

for treated firms in a cohort. The focus in Equation (2) is the coefficient on the triple-interaction term, *CEO TRUST* × *TREAT* × *POST*, which tests whether CEO perceived trustworthiness becomes more important after peers' financial fraud. A positive coefficient estimate will support a causal effect of CEO perceived trustworthiness on corporate innovation because peer financial fraud is an exogenous event and should only influence focal firm innovation through enhancing the effect of trust. To ensure identification, our estimation is cohort-specific, which includes in Equation (2) the cohort fixed effects (*Cohort FE*) interacted with all control variables, firm fixed effects, and year fixed effects. Essentially, the coefficient of interest, β_1, reflects the average treatment effects across all cohorts. Note that the standalone terms of *TREAT* and *POST* are subsumed by cohort-specific firm fixed effects and cohort-specific year fixed effects, respectively.

Table 8 column (1) shows the estimation results. The estimated coefficient for *CEO TRUST* is positive and significant, confirming our baseline results. More importantly, the estimated coefficient for the triple interaction term, *CEO TRUST* × *TREAT* × *POST*, is also significantly positive, supporting a causal effect of trust. This increase is also economically meaningful: For treated firms, a one-standard-deviation increase in *CEO TRUST* translates to about a 10.0% (= 0.476 × 0.211 × 100%) increase in patent output following a peer financial scandal, which is approximately 1.3 (= 0.211 ÷ 0.160) times the overall trust effect. It is worth noting that, in this test, *CEO TRUST* × *POST* is positively significant, indicating that perceived trustworthiness becomes more important in general after financial scandals. In contrast, *CEO TRUST* × *TREAT* is not significant, suggesting that the importance of perceived trustworthiness does not differ significantly between treated and control firms.

We also conduct a dynamic test to validate the parallel-trend assumption. In Table 8 column (2), we replace *POST* with a series of indicator variables for each year relative to the scandal (i.e., *PRE_3*, *PRE_2*, *POST_0*, *POST_1*, *POST_2*, *POST_3*). The year before the event (i.e., *PRE_1*) is used as the baseline, so its interactions (i.e., *CEO TRUST* × *TREAT* × *PRE_1*, *CEO TRUST* × *PRE_1*, and *TREAT* × *PRE_1*) are omitted because of multicollinearity. The results present no significant differences in the years prior to the scandal, indicating the absence of differential pre-trends between treated and control firms. For an easier and more straightforward visual interpretation, we plot the results of dynamic tests in Figure 4(a). This helps rule out the unobservable heterogeneity between treated and control firms that should have led to different

triple coefficients before the event. In contrast, the positive relation between CEO perceived trustworthiness and innovation becomes significantly larger for treated firms in the years following a peer scandal. This pattern supports the parallel-trend assumption and strengthens the causal interpretation of our findings. If the positive relation between CEO perceived trustworthiness and innovation output were driven by an unobservable factor, then such a factor should also correlate with both peer scandals and patent output. Identifying a potential factor that satisfies all these criteria would be difficult. Thus, the only reasonable interpretation of the identification results is that CEO perceived trustworthiness promotes innovation.

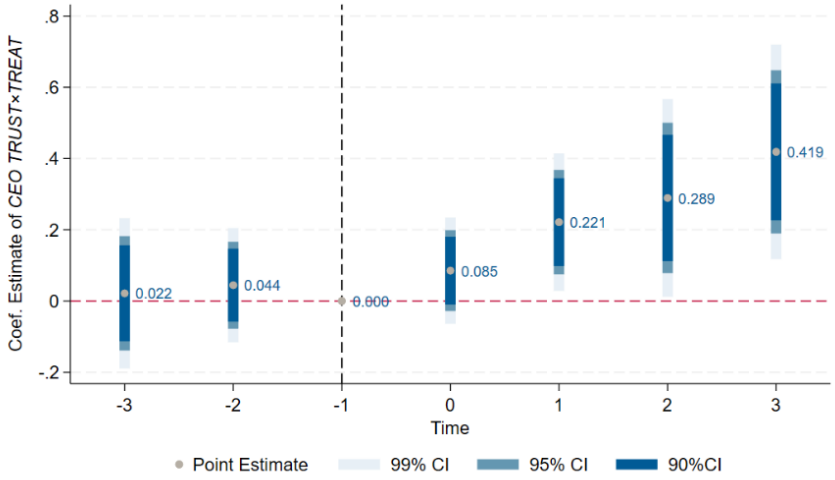


Figure 4(a). Number of Patents

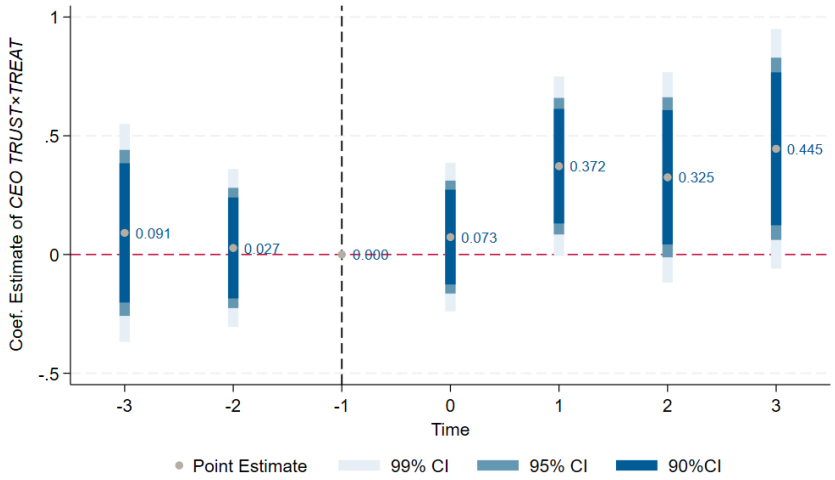


Figure 4(b). Number of Forward Citations

Figure 4. The Quasi-exogenous Shock of Corporate Financial Scandals
In this figure, we illustrate the regression results of Equation (2), showing the effects of the quasi-exogenous shock of corporate financial scandals on corporate innovation. In Figure 4(a), the dependent variable *Ln(PATENTS)* is the

natural logarithm of one plus the number of a firm's filed patents in year t+1; in Figure 4(b), the dependent variable is *Ln(FORWARD CITATIONS)* is the natural logarithm of one plus the number of forward citations received by a firm's patents filed in year t+1. The grey dots denote the coefficient estimates of the key independent variable, *CEO TRUST×TREAT×EVENT YEARS*, and the dark, medium, and light blue bars represent confidence intervals at 90%, 95%, and 99% levels, respectively. *EVENT YEARS* includes indicators of *PRE_3* (t=-3), *PRE_2* (t=-2), *POST_0* (t=0), *POST_1* (t=1), *POST_2* (t=2), and *POST_3* (t=3). For each event of corporate financial scandal, we create a cohort of treated and control firms around the event window of 7 years (i.e., -3 to 3, including the event year t=0). A firm is identified as a treated firm (i.e., *TREAT* = 1) if it is in the same industry (three-digit SIC) as the firm involved in the financial scandal but does not have a scandal itself. A firm is identified as a control firm (i.e., *TREAT* = 0) if it is in an industry (three-digit SIC) with no financial scandal throughout the sample (i.e., never-treated). The treated firms are expected to have a comparable trust effect to the control firms before scandals but to experience an exogenous increase in the importance of trust afterward, leading to a more pronounced effect of *CEO TRUST* on corporate innovation. Corporate financial scandals are identified using the AAER dataset. All regressions include cohort-specific control variables, cohort-specific year fixed effects, and cohort-specific firm fixed effects. The standard errors are estimated by clustering at the cohort-firm level. The year before event (i.e., t=-1) is used as the baseline and is omitted because of multicollinearity. All variable definitions are provided in Appendix 1. The sample period is from 1992 to 2022.

Further, we replace the dependent variable with the number of forward citations, *Ln(FORWARD CITATIONS)*, and repeat the empirical analysis. As shown in Table 8 column (3), the estimated coefficients of *CEO TRUST* and the triple interaction term, *CEO TRUST* × *TREAT* × *POST*, continue to be positive and statistically significant. In terms of economic magnitudes, for treated firms, a one-standard-deviation increase in *CEO TRUST* translates to about a 11.9% (= 0.476 × 0.249 × 100%) increase in forward citations received following a peer financial scandal, which is approximately 0.7 (= 0.249 ÷ 0.358) times the overall trust effect. Table 8 column (4) shows the estimation results for the dynamic test, validating the parallel-trend assumption. The estimated results are visualized in Figure 4(b). Overall, the causal effect of CEO perceived trustworthiness extends to innovation quality as measured by forward citations.

3.3 Robustness Checks

To ensure the robustness of our findings, we conducted a battery of tests to validate the relation between CEO perceived trustworthiness and corporate innovation performance. We tabulate these results in Table 9.

3.3.1 Alternative Measures of Corporate Innovation

First, we examine whether our results hold when using alternative measures of corporate innovation output as the dependent variable of Equation (1). We check robustness using the inverse hyperbolic sine of the number of patents (Card and DellaVigna, 2020). As shown in column (1) of Table 9 Panel A, the coefficient on *CEO TRUST* remains positive and statistically significant. A

one-standard-deviation increase in *CEO TRUST* is associated with 13.6% (= 0.476 × 0.285 × 100%), which is 1.2 (= 0.285 ÷ 0.246) times the baseline effect.

Considering that innovation activities are typically long-term and involve multi-stage efforts, we next examine the long-term impact of CEO perceived trustworthiness using the average number of patents over a three-year window (i.e., *t*+1 to *t*+3). As shown in column (2) of Table 9 Panel A, the estimated coefficient for *CEO TRUST* remains highly significant and economically comparable to the baseline (0.248 versus 0.246 as in the baseline).

To examine the extensive margin (i.e., whether a firm engages in patenting activities), we create an indicator variable, *PATENT INDICATOR*, equal to one if a firm has at least one patent in a year, and zero otherwise. We estimate a linear probability model (LPM) as suggested by Alcácer and Gittelman (2006) and report the results in column (3) of Table 9 Panel A. The estimated coefficient for *CEO TRUST* is 0.050, suggesting that a one-standard-deviation increase in *CEO TRUST* raises the probability of engaging in patenting activities by about 2.4% (= 0.476 × 0.050 × 100%).

The positive relation between *CEO TRUST* and *Ln(FORWARD CITATIONS)* is also highly robust. As shown in columns (4) to columns (6) of Table 9 Panel A, the estimated coefficients on *CEO TRUST* remain all positive and statistically significant when using alternative measures of forward citations. Specifically, when using the inverse hyperbolic sine of the number of forward citations, a one-standard-deviation increase in *CEO TRUST* is associated with a 28.8% (= 0.476 × 0.606 × 100%) increase in forward citations, which is 1.1 (= 0.606 ÷ 0.545) times the baseline effect. It is also associated with a 23.8% (= 0.476 × 0.501) increase in the average number of patents over a three-year window (i.e., *t*+1 to *t*+3). Using an indicator variable, *FORWARD CITATION INDICATOR*, equal to one if a firm has at least one forward citation in a year, and zero otherwise, the estimated coefficient for *CEO TRUST* is 0.084, suggesting that a one-standard-deviation increase in *CEO TRUST* raises the probability of receiving forward citations by about 4.0% (= 0.476 × 0.084 × 100%).

3.3.2 Alternative Regression Specifications

To alleviate the concerns about the potential bias introduced by the log one-plus transformation, we follow Cohn, Liu, and Wardlaw (2022) and estimate Poisson and negative

binomial models using the raw number of patents as the dependent variable. As shown in columns (1) and (2) of Table 9 Panel B, the estimated coefficients are both positive and statistically significant. Their implied effects of a one-standard-deviation increase in *CEO TRUST* range from a 29.1% to 34.1% (= $e^{0.476\times0.538} - 1$ and $e^{0.476\times0.616} - 1$) increase in patent output, representing approximately 2.5 to 2.9 (= 0.291 ÷ 0.117 and 0.341 ÷ 0.117) times the baseline effect.

We also use the raw number of forward citations as the dependent variable. As shown in columns (3) and (4), the estimated coefficients remain positively significant. A one-standard-deviation increase in *CEO TRUST* is associated with a 46.0% to 50.3% (= $e^{0.476\times0.967} - 1$ and $e^{0.476\times1.057} - 1$) increase in forward citations, which approximates to 1.8 to 1.9 (= 0.460 ÷ 0.259 and 0.503 ÷ 0.259) times the baseline effect.[31]

3.3.3 Subsample Analyses

Next, we analyze the intensive margin of innovation (i.e., the extent to which a firm has patenting activities, conditional on having patenting activities) by re-estimating Equation (1) using the subsample of firm-years observations with non-zero patents (i.e., *PATENTS* > 0) and non-zero forward citations (i.e., *FORWARD CITATIONS* > 0). As shown in columns (1) and (4) of Table 9 Panel C, the estimated coefficient on *CEO TRUST* is both positive and statistically significant. In terms of economic magnitude, within the subsample of non-zero patents firms, a one-standard-deviation increase in *CEO TRUST* increases the number of patents by 22.7% (= 0.476 × 0.476 × 100%), which approximates 1.9 (= 0.227 ÷ 0.117) times the baseline effect. Within the subsample of non-zero forward citations firms, a one-standard-deviation increase in *CEO TRUST* increases the number of forward citations by 46.1% (= 0.476 × 0.968 × 100%), which approximates 1.8 (= 0.461 ÷ 0.259) times the baseline effect.

To test for the temporal consistency of our results, we also categorize firms into cohorts of non-recent (i.e., before 2010) and recent (i.e., after 2010) subsamples. As shown in columns (2)

[31] We do not use these nonlinear models in our main specification for two reasons. First, the identifying assumptions required in nonlinear models are very restrictive in practice (Wooldridge, 2002). For example, Poisson regression assumes that the mean and variance of the dependent variable are equal; however, in our sample, the variance of *PATENTS* is 4583.3 (= 67.7^2), which is 269.6 (= 4583.3 ÷ 17.0) times the mean; the variance of *FORWARD CITATIONS* is 2,453,922.3 (= 1566.5^2), which is 11,987.9 (= 2,453,922.3 ÷ 204.7) times the mean. They both indicate substantial overdispersion. Second, the Stata command "ppmlhdfe" automatically drops firms with constant zero patent or forward citation during estimation, resulting in a much smaller sample and lower statistical power; moreover, the observed ex post zero patent or forward citation does not necessarily indicate a lack of ex ante intention to innovate.

and (3) of Table 9 Panel C, when using *Ln(PATENTS)* as the dependent variable, the estimated coefficients across the two cohorts are highly similar (i.e., 0.253 versus 0.252 for the non-recent and recent cohorts, respectively), and the difference in coefficients on *CEO TRUST* between the two subsamples is statistically insignificant ($p > 0.1$). When using *Ln(FORWARD CITATIONS)* as the dependent variable, the estimated coefficient of *CEO TRUST* for the non-recent cohort is larger than the recent cohort (i.e., 0.775 versus 0.369 for the non-recent and recent cohorts, respectively), yet the difference in coefficients between the two subsamples is not statistically significant ($p > 0.1$). These results are reported in columns (5) and (6) of Table 9 Panel C.

3.3.4 Controlling for Additional CEO Characteristics

We further test the robustness of our findings by controlling for additional CEO characteristics. Specifically, we consider CEO facial width-to-height ratio (*FWHR*; Jia, van Lent, and Zeng, 2014), youthfulness and attractiveness, and dominance (*YOAT* and *DOM*; Vernon et al., 2014; Peng et al., 2022), as well as CEO education discipline and skillsets (*STEM*, *SCIENCE SKILLS*, and *TECH SKILLS*; Hsu, Li, and Pan, 2025). We do not include these variables in the baseline specification for two main reasons. First, the CEO discipline and skillsets data are extracted from the BoardEx database, which is only available for the subsample after 2000. Second, after accounting for the existing control variables and fixed effects, these additional CEO characteristics are statistically insignificant and do not improve model explanatory power.[32] After including these variables, the coefficients on *CEO TRUST* remain highly significant for both patents and forward citations, reinforcing the robustness and validity of our main conclusion: CEO perceived trustworthiness has a positive impact on corporate innovation performance. The estimation results are tabulated in Table 9 Panel D. Our results suggest that the effect of CEO perceived trustworthiness is distinct from other known characteristics we can think of.

[32] While Pearson correlations in Table 3 Panel B confirm that these CEO skills are positively correlated with corporate innovation performance, adding them as controls only improves adjusted R^2 by 0.2% (i.e., from 86.4% to 86.6% as shown in columns (1) and (3) in Table 9).

4. Mechanism Tests

4.1 Employee Motivation

To examine potential mechanisms, we first test whether CEO perceived trustworthiness enhances corporate innovation by increasing the effectiveness of employee stock options. We hypothesize that trustworthy CEOs motivate rank-and-file employees to have a brighter prospect of their granted stock options, thereby extracting greater employee effort for innovation. To estimate the number of stock options granted to rank-and-file employees (*EMPLOYEE STOCK OPTIONS*), we follow the approaches of Call, Kedia, and Rajgopal (2016) and Holderness, Huffman, and Lewis-Western (2019).[33] We add this constructed variable and its interaction with *CEO TRUST* in Equation (1).

As shown in Table 10 Panel A, the coefficient on *EMPLOYEE STOCK OPTIONS* is positive and significant, consistent with its beneficial role in fostering innovation. More crucially, the interaction term of *CEO TRUST* × *EMPLOYEE STOCK OPTIONS* is positive and highly significant, suggesting that trustworthy CEOs can better motivate employees by reinforcing their belief in the value of granted stock options. Economically, holding the level of employee stock options constant, a one-standard-deviation increase in *CEO TRUST* is associated with a 95.2% (= $0.476 \times 0.010 \div 0.005 \times 100\%$) increase in the positive effect of employee stock options on patents. It is associated with a 115.0% (= $0.476 \times 0.029 \div 0.012 \times 100\%$) increase in the positive effect on forward citations.

4.2 Institutional Investors' Support

We next examine whether CEO perceived trustworthiness strengthens the positive effect of institutional investor support on corporate innovation. Institutional investors can provide valuable

[33] Specifically, the number of employee stock options (ESOs) granted to rank-and-file employees is estimated as the total ESOs a firm granted in a year minus the number of ESOs granted to its executives and non-executive managers. To estimate the number of total ESOs granted by a firm, we use two variables in ExecuComp: the number of ESOs granted to an executive (*NUMSECUR*) and the percentage of ESOs granted to an executive (*PCTTOTOPT*). As the number of total ESOs granted by a firm can be estimated from the compensation of each of the top five executives reported in ExecuComp, we use the average value of those estimates. To ensure data reliability, we drop estimates that are not within 1% of each other and use the average value from all remaining executives as the measure of total options granted by the firm. Following Hochberg and Lindsey (2010), we assume that the number of ESOs granted to non-executive managers is equal to one-tenth of the total ESOs awarded to the second through fifth highest-paid executives. As ExecuComp stopped reporting the percentage of ESOs granted to an executive (*PCTTOTOPT*) since 2006, we use the number of options granted by a firm (*OPTGR*) from Compustat as the number of total ESOs granted by a firm thereafter.

resources and exert monitoring that encourages long-term innovation investments (Aghion, Van Reenen, and Zingales, 2013). However, their willingness to support such risky projects often depends on their confidence in the CEO's competence and integrity. Accordingly, we expect trustworthy CEOs to enhance innovation through strengthening the positive relation between institutional investors and innovation-related expenditures.

To test this mechanism, we interact *CEO TRUST* with decile-ranked institutional ownership and examine the effect on subsequent R&D expenditures. As shown in column (1) of Table 10 Panel B, the estimated coefficient on the interaction term is positively significant, confirming that institutional ownership is more effective in promoting innovation when the CEO is perceived as trustworthy. Further, we decompose institutional ownership into dedicated, quasi-indexer, and transient institutional ownership following Bushee (1998) and interact each with *CEO TRUST*.[34] The results, reported in column (2) of Table 11 Panel B, reveal two key insights. First, both the standalone term of *INSTITUTION (DEDICATED)* and its interaction with *CEO TRUST* are positively significant, indicating that trustworthy CEOs further enhance the already supportive role of dedicated institutional investors in fostering innovation. Second, while the standalone term of *INSTITUTION (TRANSIENT)* is insignificant, its interaction with *CEO TRUST* is positive and significant, which suggests that trustworthy CEOs can convert some transient institutional investors, who typically do not favor long-term risky projects, into more supportive shareholders.

4.3 Information Asymmetries of Financial Analysts

Finally, we examine how CEO perceived trustworthiness mitigates the information asymmetries for stock investors through the reactions from financial analysts, who play a vital role in interpreting and communicating the firm's potential to the market. We expect that trustworthy CEOs provide more precise and transparent information to stock investors and financial analysts and make the latter more likely to form a consensus on firms' prospects. To empirically test this proposition, we construct *FORECAST DISPERSION*, which represents analyst forecast dispersion and is calculated as the standard deviation of the latest earnings forecasts issued by all analysts covering a firm. Lower forecast dispersion indicates greater consistency and agreement among analysts, which is more likely to occur when the messages from CEOs are correct and clear. As

[34] We use decile-ranked institutional ownership to mitigate the influence of extreme values on the estimation results. Untabulated analyses show that both the economic magnitudes and statistical significance are comparable when using the raw values.

shown in Table 10 Panel C, CEO perceived trustworthiness is associated with lower forecast dispersion. Economically, a one-standard-deviation increase in *CEO TRUST* is associated with a 1.3% (= 0.476 × 0.028 × 100%) decrease in forecast dispersion. This result, together with the finding in Section 4.2, confirms that trustworthy-looking CEOs indeed deliver the right information to the market, which mitigates information asymmetries for outside investors and thus wins their support in innovation investment.

Taken together, our empirical evidence suggests that CEO perceived trustworthiness promotes corporate innovation through two main mechanisms: enhancing the motivational effect of employee compensation within the firm and reducing information asymmetries to gain support from investors outside the firm. These mechanism tests also reinforce our main conclusion that trustworthy CEOs help foster corporate innovation.

5. Heterogeneous Effects of Trust

To determine when CEO perceived trustworthiness has a greater impact, we examine two characteristics that shape the CEOs' relation with existing stakeholders: the type of CEO appointment (i.e., internal versus external) and CEO tenure (i.e., the number of years a CEO has worked for a firm).

5.1 CEO Type

We first examine CEO type by classifying CEOs as either internally promoted or externally appointed. We expect the effect of CEO perceived trustworthiness to be more pronounced for externally appointed CEOs. This is because, unlike internally promoted CEOs, who have established records within the firm and long-term relationship with its stakeholders, externally appointed CEOs lack pre-existing credibility and are less known by stakeholders. As a result, employees, board members, and investors rely more on observable cues, such as perceived trustworthiness, to assess the intention of the CEO.

To test this, we partition the sample into two subsamples based on CEO type and re-estimate Equation (1) separately for each subsample. Using data from ExecuComp, a CEO is classified as external if the CEO is appointed from outside the firm, and internal otherwise. Columns (1) and (2) of Table 11 Panel A show the regression results for these two subsamples. Consistent with our

expectations, the estimated coefficient for *CEO TRUST* is significantly associated with future patents only in the external CEO subsample. In the externally appointed subsample, a one-standard-deviation increase in *CEO TRUST* is associated with an 18.2% (= 0.476 × 0.383 × 100%) increase in the following year's number of patents, which is 2.6 (= 0.383 ÷ 0.145) times that for the internal CEO subsample. It is also associated with a 34.7% (= 0.476 × 0.728 × 100%) increase in the following year's number of forward citations, which is 1.3 (= 0.347 ÷ 0.259) times that for the internal CEO subsample. The differences in coefficients on *CEO TRUST* between the two subsamples are both statistically significant. Similar results are found in columns (3) and (4) for forward citations.

5.2 CEO Tenure

Next, we investigate the role of CEO tenure. As discussed earlier, novelty from a new face invites attention, but this novelty effect wears off eventually as familiarity builds. Accordingly, we hypothesize that the impact of CEO perceived trustworthiness is more pronounced for CEOs with low within-firm tenure.

To test this, we also partition the sample into two subsamples based on CEO tenure and re-estimate Equation (1) for the subsamples. A CEO is defined to have a high (low) tenure if the number of years a CEO has worked for a firm is above (below) the sample median. Columns (1) and (2) of Table 11 Panel B show the regression results for these two subsamples using patents as the dependent variable. Consistent with our expectations, the estimated coefficient for *CEO TRUST* is only significant in the low CEO tenure subsample. In the low-tenure subsample, a one-standard-deviation increase in *CEO TRUST* is associated with a 12.4% (= 0.476 × 0.260 × 100%) increase in the following year's number of patents. In contrast, the estimated coefficient for *CEO TRUST* in the high-tenure subsample is not statistically significant. The difference in coefficients on *CEO TRUST* between the two subsamples is statistically significant. Columns (3) and (4) of Table 11 Panel B show the regression results using forward citations as the dependent variable.

In summary, these findings suggest that CEO perceived trustworthiness is particularly important in new social interactions: When stakeholders have limited prior exposure to the CEO, they rely more heavily on the CEO's appearance to form judgments.

6. Conclusion

As science and technology continue to advance, future innovation will increasingly rely on large-scale teams with effective communication and coordination. Human decision-making, which often analytical, is also influenced by subjective judgments, including spontaneous impressions of trustworthiness based on facial traits. Such judgements and decisions on trust are not necessarily irrational because they arise in evolutionary history as an adaptive trait. This study applies a validated method (Vernon et al. 2014) to quantify CEO perceived trustworthiness using AI- facial analysis and examines its association with firm innovation, arguably one of the most critical performance indicators of modern business.

Our empirical evidence demonstrates that U.S. publicly listed firms led by more trustworthy CEOs produce a higher quantity and quality of patents. This relation is robust across an extensive range of additional checks. Our identification test using financial fraud among peers as an external shock provides a basis for inferring a causal interpretation. We further identify and validate the underlying mechanisms by showing that a trustworthy-looking CEO tends to garner greater support from employees, stock investors, and stock analysts. The effect of such trustworthiness is especially pronounced when CEOs are relatively new to stakeholders, suggesting that initial judgements of trustworthiness are more meaningful in new professional relationships. Collectively, our empirical analyses highlight that a CEO's perceived trustworthiness is a fundamental factor that facilitates the collaboration necessary for technological innovation.

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Appendix 1. Variable Definition

Variable	Definition
PATENTS	The number of patents filed by a firm. Data Source: PatentsView.org.
FORWARD CITATIONS	The number of forward citations received by the patents filed by a firm. Data Source: PatentsView.org.
CITATIONS PER PATENT	The average number of forward citations received by each of a firm's filed patents. Data Source: Kogan et al. (2017) patent database.
$VALUER	The average real dollar value of a firm's filed patents. Data Source: Kogan et al. (2017) patent database.
$VALUEN	The average nominal dollar value of a firm's filed patents. Data Source: Kogan et al. (2017) patent database.
NOVELTY	The average patent novelty of a firm's filed patents. The novelty of each patent is computed as the class- and year-adjusted citations received over time (Dong, Hirshleifer, and Teoh, 2021). Data Source: PatentsView.org.
SCOPE	The average patent scope of a firm's filed patents. The scope of each patent is computed as 1 minus the Herfindahl index across technological classes of future citations of the patent (Dong, Hirshleifer, and Teoh, 2021). Data Source: PatentsView.org.
ORIGINALITY	The average patent originality of a firm's filed patents. The originality of each patent is computed as 1 minus the Herfindahl concentration index for the fraction of citations made by the patent to patents in other technological classes (Dong, Hirshleifer, and Teoh, 2021). Data Source: PatentsView.org.
CEO TRUST	The trustworthiness score of the CEO, calculated using the facial attributes of the CEO's LinkedIn profile photo (Peng et al., 2022). Data Source: LinkedIn.
SIZE	The natural logarithm of book value of total assets. Data Source: Compustat.
RD	The research and development (R&D) expenditure divided by the book value of total assets. Data Source: Compustat.
FIRM AGE	The firm age, calculated as the natural logarithm of one plus the number of years that a firm is listed on Compustat. Data Source: Compustat.
ROA	The operating income before depreciation divided by the book value of total assets. Data Source: Compustat.
PPE	The net property, plant, and equipment (PP&E) divided by the book value of total assets. Data Source: Compustat.
LEVERAGE	The book value of debt divided by the book value of total assets. Data Source: Compustat.
CAPEX	The capital expenditure divided by the book value of total assets. Data Source: Compustat.
TOBIN Q	A firm's Tobin's Q, measured as the natural logarithm of the ratio of the sum of the market value of equity and the book value of debt to the sum of the book value of equity and book value of debt. Data Source: Compustat.
KZ INDEX	The KZ Index defined in Lamont, Polk, and Saaá-Requejo (2001), calculated as (-1.002 × cash flow / Net PP&E + 0.283 × Tobin's Q + 3.139 × Leverage - 39.36 × Dividends / Net PP&E - 1.315 × cash holding / Net PP&E). Net PP&E is lagged. The value is divided by 1,000. Data Source: Compustat.
HHI	The Herfindahl index of revenue of the four-digit SIC industry to which a firm belongs. Data Source: Compustat.
HHI SQUARED	The squared Herfindahl index of revenue of the four-digit SIC industry to which a firm belongs. Data Source: Compustat.

INSTITUTION	The ownership of institutional investors, calculated as the ratio of their held shares to total shares outstanding. Data Source: Thomson Reuters Institutional Holdings (13F).
ILLIQUIDITY	The average value of the illiquidity measure of Amihud (2002). The illiquidity measure is calculated as the absolute value of daily return divided by the dollar value of trading volume, and it is measured at the daily level. Data Source: CRSP.
FEMALE	An indicator variable equal to one if the CEO is a female, and zero otherwise. Data source: ExecuComp.
AGE	The CEO's age. Data source: ExecuComp.
TENURE	The CEO's tenure in years computed based on the date the individual became chief executive officer. Data source: ExecuComp.
EDU	The CEO's education, which is a discrete variable equal to 1 if the CEO has a bachelor's degree, 2 if the CEO has a master's degree, and 3 if the CEO has a doctor's degree. This variable is coded as 0 if the education experience on the LinkedIn profile is below a bachelor's degree, non-degree, or missing. Data source: LinkedIn.
SALARY	The CEO's annual salary in millions of dollars. Data source: ExecuComp
BONUS	The CEO's annual bonus in millions of dollars for observations before December 15, 2005. After this date, following Hayes, Lemmon, and Qiu (2012), it is the sum of the annual bonus and nonequity incentives in millions of dollars. Data source: ExecuComp.
EQUITY HOLDINGS	The CEO's equity holdings, calculated as the sum of in-the-money unexercised options (opt_unex_exer_est_val + opt_unex_unexer_est_val) and shares owned (shrown_excl_opts × prcc_f) in millions of dollars. Data source: ExecuComp, CRSP.
NEW OPTION PPS	The sensitivity of the value of newly issued options held by the CEO to a 1% change in stock price. The measure is based on Core and Guay (1999) and is in millions of dollars. Data source: ExecuComp, CRSP.
NEW STOCK PPS	The sensitivity of the value of newly issued stocks held by the CEO to a 1% change in stock price. The measure is based on Core and Guay (1999) and in millions of dollars. Data source: ExecuComp, CRSP.
DELTA	The sensitivity of CEO total wealth to price, which is the dollar change in CEO wealth to a 1% change in stock price. Data source: Coles, Daniel, and Naveen (2006).
VEGA	The sensitivity of CEO total wealth to volatility, which is the dollar change in CEO wealth to a 1% change in a standard deviation of the firm's returns. Data source: Coles, Daniel, and Naveen (2006).
STEM	An indicator variable equal to 1 if a CEO has earned a degree in STEM (science, technology, engineering, and mathematics), and 0 otherwise. Data source: Hsu, Li, and Pan (2024).
SCIENCE SKILLS	An indicator variable equal to 1 if a CEO has experience in scientific research or research and development, and zero otherwise. A CEO has such experience if her prior job roles or job descriptions contain any of the following keywords: researcher, scientist, scientific, research & development, R&D, clinical research, research fellow, or research investigator. Data source: Hsu, Li, and Pan (2024).
TECH SKILLS	An indicator variable equal to 1 if a CEO has experience in technology, and zero otherwise. A CEO has such experience if her prior job roles or job descriptions contain any of the following keywords: technology, technologist, technologies, CIO, chief information officer, CTO, chief technology officer, innovation, IT, or information technology. Data source: Hsu, Li, and Pan (2024).
OVERALL RATING	The average of current employees' overall ratings (1 to 5 stars) of a firm. The average is weighted by the number of helpful votes each review receives and is computed for firms with at least 10 reviews in a year. Data source: Glassdoor in Revelio Labs.

SENIOR LEADERSHIP	The average of current employees' ratings (1 to 5 stars) of a firm's senior leadership. The average is weighted by the number of helpful votes each review receives and is computed for firms with at least 10 reviews in a year. Data source: Glassdoor in Revelio Labs.
BUSINESS OUTLOOK	The average of current employees' ratings (1=positive, 0=neutral, and -1 = negative) of a firm's business outlook. The average is weighted by the number of helpful votes each review receives and is computed for firms with at least 10 reviews in a year. Data source: Glassdoor in Revelio Labs.
COMPANY RANK	A firm's rank on the *Fortune* magazine's "100 Best Companies to Work For". This variable is scaled by multiplying -0.001. Data source: Hsu, Lee, and Yi (2024).
FOR VOTES	The average percentage of "for" votes over management-proposed agendas at annual shareholders' meetings. The percentage of "for" votes for each agenda item is calculated as the number of "for" votes divided by the total number of "for", "abstain", and "against" votes. Data source: ISS ESG Voting Analytics.
AGAINST VOTES	The average percentage of "against" votes over management-proposed agendas at annual shareholders' meetings. The percentage of "against" votes for each agenda item is calculated as the number of "against" votes divided by the total number of "for", "abstain", and "against" votes. Data source: ISS ESG Voting Analytics.
FINANCING CASH FLOW	The cash flow of financing activities, calculated as debt issuance (Δat – Δceq – Δtxdb) plus sales of stocks (sstk – prstkc) minus the issuance of dividends (dvc+dvp), scaled by the average of current and lagged total equity. This variable is scaled by multiplying 0.01. Data source: Compustat.
DEBT ISSUANCE	The debt issuance calculated as the change in assets minus the change in book equity [Δ total assets (at) – Δbook equity (ceq) – Δdeferred taxes (txdb)], scaled by the average of current and lagged total equity. This variable is scaled by multiplying 0.01. Data source: Compustat.
CEO TERMINATION	An indicator variable equal to 1 if a firm's CEO is terminated in the following year. Data source: ExecuComp.
FORECAST DISPERSION	The dispersion of analyst forecasts, calculated as the standard deviation of the latest quarterly earnings forecast issued by each stock analyst. Data source: I/B/E/S.
FORECAST SPEED	The speed of analyst forecasts, calculated as the inverse of the median number of days for stock analysts to revise their earnings forecasts after earnings conference calls. Data source: I/B/E/S, Thomson ONE StreetEvents.
EMPLOYEE STOCK OPTIONS	The total number of stock options a firm grant to its rand-and-file employees (in millions). The number of employee stock options is estimated using the methods proposed by Call, Kedia, and Rajgopal (2016) and Holderness, Huffman, and Lewis-Western (2019).
INSTITUTION (DEDICATED)	The ownership of dedicated institutional investors. Dedicated institutional investors are identified following Bushee (1998). This variable is ranked into deciles by year. Data source: Thomson Reuters Institutional Holdings (13F) and Bushee (1998).
INSTITUTION (QUASI-INDEXER)	The ownership of quasi-indexer institutional investors. Quasi-indexer institutional investors are identified following Bushee (1998). This variable is ranked into deciles by year. Data source: Thomson Reuters Institutional Holdings (13F) and Bushee (1998).
INSTITUTION (TRANSIENT)	The ownership of transient institutional investors. Transient institutional investors are identified following Bushee (1998). This variable is ranked into deciles by year. Data source: Thomson Reuters Institutional Holdings (13F) and Bushee (1998).

Table 1. Sample Selection

This table reports the number of observations at each step of the sample screening process. The sample period is from 1992 to 2022.

Description	**Observations**
CEOs with LinkedIn profiles	3,017
Less CEOs with missing profile pictures	(1,106)
CEOs with LinkedIn profile pictures	1,911
Constructing firm-year observations by matching with ExecuComp	16,768
Less observations with missing firm fundamentals	(3,968)
Less observations with missing CEO characteristics	(619)
Less observations with missing dependent variables	(1,534)
Less singleton observations due to year and firm fixed effects	(93)
Final Sample	**10,554**

Table 2. Sample Distribution

This table reports the year and industry distributions. Panel A reports the distribution by year. Panel B reports the distribution by industry (two-digit SIC), with the twenty most represented industries listed. The sample period is from 1992 to 2022.

Panel A. Distribution of Observations by Year

Year	Obs.	Percent	Year	Obs.	Percent
1992	30	0.28	2008	430	4.07
1993	80	0.76	2009	434	4.11
1994	116	1.10	2010	440	4.17
1995	136	1.29	2011	450	4.26
1996	141	1.34	2012	447	4.24
1997	156	1.48	2013	473	4.48
1998	179	1.70	2014	494	4.68
1999	196	1.86	2015	510	4.83
2000	225	2.13	2016	516	4.89
2001	235	2.23	2017	514	4.87
2002	260	2.46	2018	524	4.96
2003	269	2.55	2019	522	4.95
2004	288	2.73	2020	524	4.96
2005	293	2.78	2021	506	4.79
2006	317	3.00	2022	434	4.11
2007	415	3.93	**Total**	**10,554**	**100.00**

Panel B. Distribution of Observations by Industry (Top 20)

SIC	Industry	Obs.	Percent
73	Business Services	1,306	12.37
28	Chemical and Allied Products	864	8.19
36	Electronic and Other Electric Equipment	780	7.39
35	Industrial Machinery and Equipment	735	6.96
38	Instruments and Related Products	633	6.00
49	Electric, Gas, And Sanitary Services	624	5.91
13	Oil and Gas Extraction	390	3.70
60	Depository Institutions	356	3.37
50	Wholesale Trade and Durable Goods	330	3.13
58	Eating and Drinking Places	259	2.45
20	Food and Kindred Products	256	2.43
62	Security and Commodity Brokers, Dealers, Exchanges, And Services	205	1.94
37	Transportation Equipment	198	1.88
56	Apparel and Accessory Stores.	189	1.79
80	Health Services	180	1.71
48	Communications	176	1.67
63	Insurance Carriers	169	1.60
67	Holding and Other Investment Offices	164	1.55
87	Engineering, Accounting, Research, Management and Related Services	160	1.52
34	Fabricated Metal Products	152	1.44

Table 3. Descriptive Statistics

This table reports descriptive statistics. Panel A shows the distribution of all variables. Panel B shows the Pearson correlations of the variables in the main analysis. Summary statistics are reported at the firm-year level. All variable definitions are listed in Appendix 1. The sample period for the main analysis is from 1992 to 2022. In Panel B, * indicates significance at the 10% level.

Panel A. Variable Distributions

	N	Mean	SD	P10	P25	P50	P75	P90
PATENTS	10,554	17.003	67.735	0.000	0.000	0.000	3.000	30.000
FORWARD CITATIONS	10,554	204.684	1566.50	0.000	0.000	0.000	6.000	155.00
CITATIONS PER PATENT	10,554	4.981	21.148	0.000	0.000	0.000	1.543	12.000
$VALUEN	10,554	8.071	24.773	0.000	0.000	0.000	4.636	20.234
$VALUER	10,554	19.835	60.643	0.000	0.000	0.000	10.938	49.033
NOVELTY	10,554	0.353	0.742	0.000	0.000	0.000	0.484	1.105
SCOPE	10,554	0.081	0.155	0.000	0.000	0.000	0.102	0.328
ORIGINALITY	10,554	0.135	0.252	0.000	0.000	0.000	0.000	0.617
CEO TRUST	10,554	0.078	0.476	-0.603	-0.263	0.140	0.445	0.658
SIZE	10,554	7.661	1.687	5.591	6.454	7.563	8.784	9.864
RD	10,554	0.031	0.060	0.000	0.000	0.000	0.035	0.105
FIRM AGE	10,554	2.938	0.801	1.792	2.485	3.045	3.555	3.892
ROA	10,554	0.121	0.101	0.022	0.075	0.119	0.170	0.232
PPE	10,554	0.254	0.238	0.029	0.071	0.163	0.373	0.664
LEVERAGE	10,554	0.247	0.203	0.000	0.071	0.230	0.369	0.515
CAPEX	10,554	0.045	0.047	0.007	0.015	0.031	0.059	0.098
TOBIN Q	10,554	2.772	2.699	1.014	1.304	1.889	3.074	5.430
KZ INDEX	10,554	-9.517	22.547	-24.313	-8.926	-2.152	0.241	1.228
HHI	10,554	0.258	0.201	0.067	0.102	0.201	0.345	0.547
HHI SQUARED	10,554	0.107	0.172	0.004	0.010	0.041	0.119	0.299
INSTITUTION	10,554	0.663	0.337	0.000	0.513	0.770	0.908	0.984
ILLIQUIDITY	10,554	0.029	0.184	0.000	0.000	0.001	0.005	0.023
FEMALE	10,554	0.050	0.217	0.000	0.000	0.000	0.000	0.000
AGE	10,554	55.273	6.965	46.000	51.000	55.000	60.000	64.000
TENURE	10,554	7.833	6.716	2.000	3.000	6.000	11.000	17.000
EDU	10,554	1.452	0.900	0.000	1.000	2.000	2.000	2.000
SALARY	10,554	0.758	0.340	0.351	0.500	0.734	0.981	1.200
BONUS	10,554	1.126	1.362	0.000	0.242	0.707	1.493	2.730
EQUITY HOLDINGS	10,554	53.223	170.304	0.830	3.405	10.867	34.354	100.056
NEW OPTION PPS	10,554	0.022	0.056	0.000	0.000	0.000	0.020	0.067
NEW STOCK PPS	10,554	0.009	0.021	0.000	0.000	0.000	0.011	0.028
DELTA	10,554	0.578	1.898	0.000	0.043	0.146	0.449	1.174

VEGA	10,554	0.103	0.208	0.000	0.000	0.028	0.109	0.279
STEM	9,505	0.450	0.498	0.000	0.000	0.000	1.000	1.000
SCIENCE SKILLS	9,505	0.021	0.143	0.000	0.000	0.000	0.000	0.000
TECH SKILLS	9,505	0.075	0.264	0.000	0.000	0.000	0.000	0.000
OVERALL RATING	2,751	3.256	0.637	2.380	2.816	3.293	3.733	4.065
SENIOR LEADERSHIP	2,751	2.860	0.664	1.977	2.378	2.860	3.307	3.719
BUSINESS OUTLOOK	2,751	0.250	0.383	-0.296	0.000	0.291	0.538	0.722
COMPANY RANK	181	-0.048	0.031	-0.090	-0.074	-0.048	-0.019	-0.005
FOR VOTES	8,681	0.947	0.053	0.884	0.935	0.964	0.980	0.989
AGAINST VOTES	8,681	0.051	0.056	0.010	0.018	0.033	0.062	0.110
FINANCING CASH FLOW	10,554	0.082	0.680	-0.305	-0.113	0.000	0.166	0.566
DEBT ISSUANCE	10,554	0.136	0.636	-0.195	-0.033	0.003	0.198	0.570
CEO TERMINATION	10,554	0.142	0.349	0.000	0.000	0.000	0.000	1.000
FORECAST DISPERSION	9,849	0.055	0.095	0.007	0.013	0.026	0.057	0.121
FORECAST SPEED	4,698	0.447	0.211	0.200	0.333	0.500	0.500	0.500

Panel B. Pearson Correlations

Variable	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**	**(11)**	**(12)**	**(13)**	**(14)**	**(15)**
(1) *Ln(PATENTS)*	1.00														
(2) *Ln(FORWARD CITATIONS))*	0.88*	1.00													
(3) *CEO TRUST*	0.05*	0.02*	1.00												
(4) *SIZE*	0.20*	0.09*	0.08*	1.00											
(5) *RD*	0.38*	0.38*	0.02*	-0.30*	1.00										
(6) *FIRM AGE*	0.05*	-0.03*	-0.03*	0.35*	-0.18*	1.00									
(7) *ROA*	0.07*	0.06*	0.01	0.02*	-0.22*	0.02*	1.00								
(8) *PPE*	-0.20*	-0.18*	-0.01	0.11*	-0.27*	0.16*	0.11*	1.00							
(9) *LEVERAGE*	-0.09*	-0.14*	0.07*	0.28*	-0.21*	0.10*	0.01	0.30*	1.00						
(10) *CAPEX*	-0.09*	-0.04*	-0.02*	-0.08*	-0.11*	-0.06*	0.23*	0.67*	0.07*	1.00					
(11) *TOBIN Q*	0.17*	0.15*	0.06*	-0.13*	0.28*	-0.16*	0.30*	-0.16*	-0.09*	0.01	1.00				
(12) *KZ INDEX*	0.00	0.02	-0.05*	-0.06*	-0.01	0.05*	0.02*	0.36*	0.14*	0.27*	-0.11*	1.00			
(13) *HHI*	0.08*	0.05*	-0.03*	-0.03*	-0.09*	0.13*	0.06*	-0.07*	0.02*	-0.06*	-0.02*	0.10*	1.00		
(14) *HHI SQUARED*	0.07*	0.04*	-0.03*	-0.01	-0.08*	0.13*	0.05*	-0.04*	0.03*	-0.05*	-0.01	0.08*	0.94*	1.00	
(15) *INSTITUTION*	0.07*	0.00	0.03*	0.07*	0.03*	0.04*	0.08*	-0.11*	0.02*	-0.11*	0.05*	0.00	0.09*	0.07*	1.00
(16) *ILLIQUIDITY*	-0.06*	-0.05*	-0.03*	-0.22*	0.03*	-0.03*	-0.13*	-0.03*	-0.03*	-0.03*	-0.05*	0.00	0.03*	0.03*	-0.14*
(17) *FEMALE*	-0.05*	-0.07*	0.07*	0.02*	-0.05*	-0.01	0.03*	0.02*	0.03*	-0.01	0.01	0.01	0.02*	0.02*	0.07*
(18) *AGE*	-0.04*	-0.07*	0.00	0.18*	-0.12*	0.20*	0.00	0.06*	0.08*	-0.01	-0.09*	0.00	0.05*	0.05*	0.04*
(19) *TENURE*	-0.03*	-0.03*	0.00	-0.04*	0.02*	0.00	0.02*	-0.02*	-0.06*	0.00	0.01	-0.02*	-0.06*	-0.06*	0.04*
(20) *EDU*	0.06*	0.05*	0.04*	0.00	0.13*	0.04*	-0.04*	-0.01	0.02*	-0.02*	-0.02*	-0.02*	-0.04*	-0.05*	0.07*
(21) *SALARY*	0.12*	0.00	0.05*	0.66*	-0.22*	0.33*	0.09*	0.05*	0.29*	-0.09*	-0.04*	0.00	0.07*	0.05*	0.18*
(22) *BONUS*	0.12*	0.02*	0.04*	0.54*	-0.15*	0.23*	0.11*	-0.05*	0.16*	-0.10*	0.03*	-0.11*	0.03*	0.03*	0.11*
(23) *EQUITY HOLDINGS*	0.14*	0.12*	-0.01	0.14*	0.02*	-0.07*	0.10*	-0.06*	-0.05*	0.03*	0.27*	-0.04*	-0.03*	-0.04*	-0.03*
(24) *NEW OPTION PPS*	0.24*	0.26*	0.03*	0.21*	0.06*	0.02*	0.11*	-0.04*	-0.02*	0.01	0.21*	0.01	-0.02*	-0.03*	-0.03*

(25) *NEW STOCK PPS*	0.13*	0.05*	0.02*	0.24*	0.00	0.09*	0.02*	-0.02*	0.08*	-0.06*	0.06*	0.00	0.02*	0.02	0.11*
(26) *DELTA*	0.14*	0.14*	0.00	0.15*	0.01	-0.04*	0.10*	-0.06*	-0.05*	0.02*	0.26*	-0.05*	-0.02*	-0.03*	-0.02*
(27) *VEGA*	0.28*	0.26*	0.08*	0.36*	0.03*	0.13*	0.11*	-0.05*	0.03*	-0.03*	0.14*	0.00	0.01	0.00	0.03*
(28) *STEM*	0.15*	0.13*	0.05*	-0.01	0.12*	0.04*	0.00	0.00	-0.01	0.00	-0.01	0.02*	0.01	0.00	0.09*
(29) *SCIENCE SKILLS*	0.10*	0.09*	0.01	-0.03*	0.20*	-0.04*	-0.02*	-0.06*	-0.04*	-0.04*	0.10*	-0.02*	-0.05*	-0.04*	-0.02
(30) *TECH SKILLS*	0.10*	0.04*	0.03*	0.06*	0.06*	0.04*	-0.01	-0.06*	0.03*	-0.04*	0.05*	0.02	0.04*	0.04*	0.05*

Variable	**(16)**	**(17)**	**(18)**	**(19)**	**(20)**	**(21)**	**(22)**	**(23)**	**(24)**	**(25)**	**(26)**	**(27)**	**(28)**	**(29)**	**(30)**
(16) *ILLIQUIDITY*	1.00														
(17) *FEMALE*	0.01	1.00													
(18) *AGE*	-0.03*	-0.03*	1.00												
(19) *TENURE*	-0.01	-0.07*	0.39*	1.00											
(20) *EDU*	-0.02*	0.04*	0.00	0.00	1.00										
(21) *SALARY*	-0.15*	0.07*	0.24*	0.01	-0.01	1.00									
(22) *BONUS*	-0.10*	0.04*	0.15*	0.02*	0.01	0.58*	1.00								
(23) *EQUITY HOLDINGS*	-0.04*	-0.03*	0.05*	0.20*	-0.02	0.02*	0.13*	1.00							
(24) *NEW OPTION PPS*	-0.05*	-0.03*	-0.02*	-0.02*	0.01	0.15*	0.17*	0.26*	1.00						
(25) *NEW STOCK PPS*	-0.06*	0.01	0.03*	-0.01	0.01	0.24*	0.22*	0.01	0.04*	1.00					
(26) *DELTA*	-0.04*	-0.02*	0.03*	0.15*	-0.01	0.07*	0.17*	0.80*	0.33*	0.01	1.00				
(27) *VEGA*	-0.07*	-0.02*	0.04*	0.02*	0.01	0.32*	0.27*	0.24*	0.54*	0.05*	0.38*	1.00			
(28) *STEM*	-0.06*	0.02*	-0.01	-0.04*	0.12*	-0.01	0.01	-0.02*	-0.02*	0.02*	-0.02*	-0.04*	1.00		
(29) *SCIENCE SKILLS*	0.00	0.04*	0.01	0.02	0.08*	-0.02*	-0.01	0.02*	0.01	0.02*	0.00	0.02*	0.10*	1.00	
(30) *TECH SKILLS*	-0.02*	0.03*	-0.04*	-0.06*	0.06*	0.05*	0.04*	0.04*	0.01	0.05*	0.02*	0.02	0.10*	0.06*	1.00

Table 4. CEO Perceived Trustworthiness and Employees' Trust

This table reports the impact of CEO perceived trustworthiness on employees' trust. In columns (1) to (3), the dependent variables are the employees' ratings for the firm, senior leadership, and business outlook, obtained from Glassdoor in Revelio Labs. In column (4), the dependent variable is a firm's rank on *Fortune* magazine's "100 Best Companies to Work For", scaled by multiplying -0.001. All regressions include year fixed effects and firm fixed effects. The set of control variables is defined in Appendix 1. The sample period is from 2012 to 2022 for columns (1) to (3), and from 2000 to 2022 for column (4), respectively. The *t*-statistics (presented in parentheses) are clustered at the firm level. ***, **, and * indicate significance at 1%, 5%, and 10% levels, respectively.

	(1) *OVERALL RATING*	(2) *SENIOR LEADERSHIP*	(3) *BUSINESS OUTLOOK*	(4) *COMPANY RANK*
CEO TRUST	0.133**	0.126*	0.111**	0.084**
	(2.03)	(1.68)	(2.52)	(2.13)
SIZE	-0.134***	-0.151***	-0.066**	0.004
	(-2.66)	(-2.94)	(-2.13)	(0.59)
RD	-0.514	-0.924	-0.778	-0.242
	(-0.55)	(-0.98)	(-1.49)	(-1.66)
FIRM AGE	-0.054	-0.122	-0.066	0.056**
	(-0.48)	(-1.03)	(-1.03)	(2.49)
ROA	-0.100	-0.188	0.619***	-0.055
	(-0.33)	(-0.61)	(3.35)	(-0.78)
PPE	-0.582**	-0.756***	-0.416**	-0.040
	(-2.14)	(-2.60)	(-2.27)	(-0.65)
LEVERAGE	-0.020	-0.048	-0.007	0.026
	(-0.15)	(-0.33)	(-0.08)	(0.83)
CAPEX	1.330**	1.112	1.139**	0.099
	(1.98)	(1.59)	(2.56)	(0.87)
TOBIN Q	0.030***	0.036***	0.021***	0.005***
	(4.16)	(4.97)	(4.65)	(3.71)
KZ INDEX	-0.001	-0.000	-0.001	0.001*
	(-0.69)	(-0.29)	(-1.33)	(1.96)
HHI	0.315	0.964	0.548	-0.153
	(0.42)	(1.17)	(1.25)	(-1.02)
HHI SQUARED	0.042	-0.846	-0.050	0.147
	(0.06)	(-1.05)	(-0.12)	(1.17)
INSTITUTION	0.012	0.002	0.025	0.000
	(0.26)	(0.05)	(0.70)	(0.00)
ILLIQUIDITY	0.057	0.146**	0.033	-3.495
	(0.80)	(2.04)	(0.75)	(-0.70)
FEMALE	-0.017	0.054	0.045	0.053**
	(-0.27)	(0.80)	(1.06)	(2.69)
AGE	0.001	0.002	-0.001	0.000
	(0.38)	(0.55)	(-0.43)	(0.23)
TENURE	0.000	0.000	0.001	0.000
	(0.06)	(0.01)	(0.52)	(0.10)
EDU	-0.106**	-0.109**	-0.040	-0.025**
	(-2.49)	(-2.18)	(-1.38)	(-2.09)
SALARY	-0.023	-0.004	-0.017	-0.010
	(-0.40)	(-0.05)	(-0.45)	(-0.97)
BONUS	0.007	0.010	0.024***	-0.000
	(0.70)	(0.93)	(3.68)	(-0.12)
EQUITY HOLDINGS	0.000	-0.000	-0.000	-0.000**
	(0.35)	(-0.24)	(-0.75)	(-2.54)

NEW OPTION PPS	-0.147	-0.220	0.027	0.005
	(-0.60)	(-0.87)	(0.16)	(0.21)
NEW STOCK PPS	-1.306***	-0.953*	-0.316	-0.063
	(-2.74)	(-1.89)	(-0.86)	(-0.71)
DELTA	0.011	0.021	0.022**	0.003
	(0.62)	(1.28)	(2.44)	(1.49)
VEGA	0.055	0.056	-0.010	-0.004
	(0.63)	(0.63)	(-0.18)	(-0.35)
Firm FE and Year FE	YES	YES	YES	YES
Adjusted R^2	0.548	0.514	0.458	0.654
N	2,751	2,751	2,751	181

Table 5. CEO Perceived Trustworthiness and Shareholders' Trust

This table reports the impact of CEO perceived trustworthiness on shareholders' trust. In columns (1) and (2), the dependent variables are the average percentage of for and against votes over management-proposed agendas at annual shareholders' meetings, respectively. The percentage of "for" ("against") votes is calculated as the number of "for" ("against") votes divided by the total number of "for", "abstain", and "against" votes. The key independent variable, *CEO TRUST*, is the trustworthiness score of the CEO. In columns (3) and (4), the dependent variables are the cash flow of financing activities and the debt issuance. For columns (1) to (4), the key independent variable, *CEO TRUST*, is the trustworthiness score of the CEO. Columns (5) and (6) report the subsample analysis based on whether a firm's CEO has high perceived trustworthiness. The dependent variable is an indicator variable equal to one if a firm's CEO is terminated in the following year, and zero otherwise. The key independent variable is an indicator equal to one if the firm has low ROA. A firm is defined to have low (high) CEO perceived trustworthiness or ROA if their measures are in (above) the bottom quintile compared with contemporaneous two-digit SIC peers. All regressions include year fixed effects and firm fixed effects. The set of control variables is defined in Appendix 1. Reflecting the signed nature of the prediction, the test for the difference in coefficients is one-sided. The sample period is from 2003 to 2022 for columns (1) and (2), and from 1992 to 2022 for columns (3) and (6). The *t*-statistics (presented in parentheses) are clustered at the firm level. ***, **, and * indicate significance at 1%, 5%, and 10% levels, respectively.

	(1) ***FOR VOTES***	**(2)** ***AGAINST VOTES***	**(3)** ***FINANCING CASH FLOW***	**(4)** ***DEBT ISSUANCE***	**(5)** ***CEO TERMINATION***	**(6)** ***CEO TERMINATION***
Subsample =					***Low CEO TRUST***	***High CEO TRUST***
CEO TRUST	0.016***	-0.017***	0.015**	0.017***		
	(3.82)	(-3.94)	(2.28)	(3.08)		
LOW ROA					0.025**	0.002
					(2.02)	(0.27)
SIZE	-0.001	0.001	0.020***	0.019***	-0.012	0.007
	(-0.67)	(0.54)	(7.08)	(7.44)	(-1.00)	(1.00)
RD	-0.092	0.084	0.045	0.020	0.389**	-0.140
	(-1.64)	(1.50)	(0.93)	(0.65)	(2.56)	(-1.47)
FIRM AGE	-0.014***	0.014***	-0.021***	-0.014***	0.047**	0.021*
	(-3.25)	(3.09)	(-4.50)	(-3.49)	(2.27)	(1.93)
ROA	0.037***	-0.035***	-0.051***	-0.032***	0.125**	-0.116***
	(3.01)	(-2.82)	(-3.42)	(-2.66)	(2.08)	(-3.23)
PPE	-0.022*	0.020	-0.091***	-0.065***	-0.135**	-0.037
	(-1.74)	(1.53)	(-5.76)	(-4.53)	(-2.12)	(-0.94)
LEVERAGE	-0.003	0.002	0.064***	0.062***	0.079*	0.026
	(-0.46)	(0.28)	(6.05)	(6.09)	(1.76)	(1.14)
CAPEX	0.108***	-0.107***	0.072**	0.101***	0.224**	0.078
	(3.42)	(-3.17)	(2.08)	(3.76)	(2.23)	(0.98)
TOBIN Q	0.000	-0.000	0.002***	0.001**	-0.004*	0.001
	(0.63)	(-0.99)	(3.14)	(2.01)	(-1.88)	(1.01)
KZ INDEX	-0.000**	0.000**	-0.000	-0.000***	-0.000	-0.000

	(-1.99)	(2.19)	(-1.22)	(-3.60)	(-0.52)	(-0.43)
HHI	0.007	-0.007	-0.063*	-0.059**	-0.083	-0.036
	(0.24)	(-0.24)	(-1.93)	(-2.00)	(-0.54)	(-0.35)
HHI SQUARED	-0.013	0.010	0.046	0.046	0.162	0.071
	(-0.37)	(0.27)	(1.35)	(1.60)	(0.94)	(0.53)
INSTITUTION	0.001	-0.001	0.003	0.001	0.012	0.005
	(0.29)	(-0.32)	(0.62)	(0.13)	(0.83)	(0.46)
ILLIQUIDITY	-0.010	0.010	0.003	0.005	-0.011	0.021
	(-0.92)	(0.96)	(0.36)	(0.68)	(-0.62)	(1.33)
FEMALE	0.008**	-0.008**	0.003	0.000	0.027	-0.005
	(2.21)	(-2.18)	(0.47)	(0.06)	(0.51)	(-0.21)
AGE	0.000	-0.000	-0.000	-0.000	0.002*	0.001*
	(0.17)	(-0.10)	(-0.93)	(-0.99)	(1.72)	(1.93)
TENURE	-0.000	-0.000	0.000	0.000	-0.002*	-0.001
	(-0.07)	(-0.33)	(1.30)	(1.50)	(-1.72)	(-1.54)
EDU	-0.001	0.002	-0.013***	-0.011**	-0.011	-0.012
	(-0.43)	(0.68)	(-2.61)	(-2.47)	(-0.46)	(-0.74)
SALARY	-0.005	0.006	-0.028***	-0.021***	-0.135***	-0.107***
	(-1.15)	(1.31)	(-5.00)	(-3.97)	(-2.98)	(-4.34)
BONUS	-0.001	0.001	-0.001	-0.001	-0.003	-0.003
	(-1.30)	(0.92)	(-0.68)	(-1.21)	(-0.66)	(-1.48)
EQUITY HOLDINGS	0.000	0.000	-0.000**	-0.000	-0.000	-0.000**
	(0.31)	(0.43)	(-2.20)	(-1.62)	(-1.14)	(-2.01)
NEW OPTION PPS	-0.011	0.020	0.045***	0.043**	-0.074	0.050
	(-0.52)	(0.80)	(2.67)	(2.39)	(-1.02)	(1.30)
NEW STOCK PPS	0.038	-0.031	-0.016	0.030	0.155	0.153
	(1.25)	(-0.91)	(-0.33)	(0.66)	(0.66)	(1.00)
DELTA	-0.000	0.000	0.001	0.001	0.004**	0.001
	(-0.38)	(0.44)	(1.61)	(0.78)	(2.13)	(0.69)
VEGA	-0.002	0.002	-0.001	-0.001	-0.038	-0.032***
	(-0.46)	(0.41)	(-0.25)	(-0.21)	(-1.26)	(-3.03)
Equal *LOW ROA? (F-stat)*					2.83**	
					(*p*=0.05)	
Firm FE and Year FE	YES	YES	YES	YES	YES	YES
Adjusted R^2	0.322	0.321	0.163	0.144	0.091	0.035
N	8,681	8,681	10,554	10,554	2,779	7,775

Table 6. CEO Perceived Trustworthiness and Stock Analysts' Trust

This table reports the impact of CEO perceived trustworthiness on stock analysts' trust. The dependent variable *FORECAST SPEED* is calculated as the inverse of the median number of days for stock analysts to revise their earnings forecasts after earnings conference calls. All regressions include year fixed effects and firm fixed effects. The set of control variables is defined in Appendix 1. The sample period is from 2001 to 2020. The *t*-statistics (presented in parentheses) are clustered at the firm level. ***, **, and * indicate significance at 1%, 5%, and 10% levels, respectively.

	(1) ***FORECAST SPEED***
CEO TRUST	0.059**
	(2.14)
SIZE	0.027**
	(2.24)
RD	0.032
	(0.20)
FIRM AGE	0.028
	(1.41)
ROA	0.141***
	(2.88)
PPE	-0.059
	(-0.98)
LEVERAGE	-0.104***
	(-3.25)
CAPEX	0.232**
	(1.99)
TOBIN Q	0.000
	(0.18)
KZ INDEX	0.000
	(1.57)
HHI	-0.208
	(-1.25)
HHI SQUARED	0.233
	(1.38)
INSTITUTION	-0.025
	(-1.32)
ILLIQUIDITY	-0.102
	(-1.60)
FEMALE	0.022
	(1.03)
AGE	-0.000
	(-0.22)
TENURE	-0.000
	(-0.26)
EDU	-0.029*
	(-1.84)
SALARY	-0.006
	(-0.29)
BONUS	0.007**
	(2.08)
EQUITY HOLDINGS	0.000
	(1.14)
NEW OPTION PPS	0.141*
	(1.70)
NEW STOCK PPS	-0.099

	(-0.74)
DELTA	0.000
	(0.09)
VEGA	-0.029
	(-1.11)
Firm FE and Year FE	YES
Adjusted R^2	0.425
N	4,698

Table 7. Main Results

This table reports the regression results of the baseline model. In columns (1) to (3) of Panel A, the dependent variable *Ln(PATENTS)* is the natural logarithm of one plus the number of patents a firm filed in year *t*+1. In columns (4) to (6) of Panel A, the dependent variable *Ln(FORWARD CITATIONS)* is the natural logarithm of one plus the number of forward citations received by a firm's patents in year *t*+1. Columns (1) to (3) and (4) to (6) show the specifications with (i) *CEO TRUST* only, (ii) *CEO TRUST* and firm fundamental variables, and (iii) *CEO TRUST*, firm fundamental variables, and CEO characteristics, respectively. In Panel B, the dependent variables include: *Ln(CITATIONS PER PATENT)* is the natural logarithm of one plus the average number of citations received by a firm's filed patents in year *t*+1; *Ln($VALUER)* is the natural logarithm of one plus the average real dollar value of a firm's filed patents in year *t*+1; *Ln($VALUEN)* is the natural logarithm of one plus the average nominal dollar value of a firm's filed patents in year *t*+1; *Ln(NOVELTY)* is the natural logarithm one plus the average patent novelty of a firm's filed patents in year *t*+1; *Ln(SCOPE)* is the natural logarithm of one plus the average patent scope of a firm's filed patents in year *t*+1; *Ln(ORIGINALITY)* is the natural logarithm of one plus the average patent originality of a firm's filed patents in year *t*+1. The patent citations and dollar values are retrieved from the Kogan et al. (2017) database. The novelty, scope, and originality of each patent are computed following Dong, Hirshleifer, and Teoh (2021). The key independent variable, *CEO TRUST*, is the trustworthiness score of the CEO. The control variables are defined in detail in Appendix 1. All regressions include year fixed effects and firm fixed effects. The sample period is from 1992 to 2022. The *t*-statistics (presented in parentheses) are clustered at the firm level. ***, **, and * indicate significance at 1%, 5%, and 10% levels, respectively.

Panel A. Innovation Performance

	(1)	(2)	(3)	(4)	(5)	(6)
	Ln(PATENTS)	***Ln(PATENTS)***	***Ln(PATENTS)***	***Ln(FORWARD CITATIONS)***	***Ln(FORWARD CITATIONS)***	***Ln(FORWARD CITATIONS)***
CEO TRUST	0.232***	0.233***	0.246***	0.536***	0.515***	0.545***
	(3.34)	(3.24)	(3.48)	(3.67)	(3.47)	(3.68)
SIZE		0.202***	0.191***		0.165**	0.158**
		(4.71)	(4.75)		(2.29)	(2.26)
RD		1.262***	1.237***		1.742*	1.723*
		(2.68)	(2.62)		(1.91)	(1.91)
FIRM AGE		-0.003	-0.007		-0.051	-0.058
		(-0.04)	(-0.11)		(-0.40)	(-0.46)
ROA		-0.025	-0.024		-0.364	-0.343
		(-0.16)	(-0.16)		(-1.22)	(-1.14)
PPE		0.512***	0.525***		1.000***	1.003***
		(2.85)	(2.97)		(2.94)	(2.94)
LEVERAGE		-0.113	-0.104		-0.310	-0.299
		(-1.27)	(-1.17)		(-1.62)	(-1.57)
CAPEX		0.073	0.107		-0.481	-0.420
		(0.26)	(0.39)		(-0.87)	(-0.76)
TOBIN Q		0.014**	0.012*		0.024*	0.020
		(2.31)	(1.80)		(1.89)	(1.58)
KZ INDEX		-0.000	-0.000		0.001	0.001
		(-0.03)	(-0.10)		(0.89)	(0.85)

HHI		0.804	0.697		1.523	1.385
		(1.09)	(1.11)		(1.24)	(1.27)
HHI SQUARED		-0.806	-0.680		-1.715	-1.549
		(-0.91)	(-0.94)		(-1.17)	(-1.21)
INSTITUTION		-0.048	-0.051		0.134	0.127
		(-0.76)	(-0.81)		(1.23)	(1.17)
ILLIQUIDITY		0.001	-0.007		-0.054	-0.061
		(0.03)	(-0.16)		(-0.58)	(-0.66)
FEMALE			0.050			0.065
			(0.74)			(1.00)
AGE			0.000			0.003
			(0.03)			(0.98)
TENURE			0.001			-0.003
			(0.45)			(-0.80)
EDU			-0.033			-0.022
			(-0.63)			(-0.55)
SALARY			-0.055			0.018
			(-0.73)			(0.27)
BONUS			0.005			0.006
			(0.51)			(0.53)
EQUITY HOLDINGS			0.000			-0.000
			(0.36)			(-0.93)
NEW OPTION PPS			0.389*			0.316
			(1.65)			(0.90)
NEW STOCK PPS			2.378**			0.558
			(2.38)			(0.87)
DELTA			-0.007			0.004
			(-0.65)			(0.38)
VEGA			0.039			-0.100
			(0.41)			(-1.05)
Year FE and Firm FE	YES	YES	YES	YES	YES	YES
Adjusted R^2	0.860	0.863	0.864	0.787	0.789	0.790
N	10,554	10,554	10,554	10,554	10,554	10,554

Panel B. Additional Dimensions of Innovation Performance

	(1) *Ln(CITATIONS PER PATENT)*	(2) *Ln($VALUER)*	(3) *Ln($VALUEN)*	(4) *Ln(NOVELTY)*	(5) *Ln(SCOPE)*	(6) *Ln(ORIGINALITY)*
CEO TRUST	0.248***	0.777*	0.805*	0.076***	0.020**	0.034***
	(3.00)	(1.93)	(1.88)	(2.94)	(2.22)	(2.73)
SIZE	0.020	0.894***	0.950***	0.012	0.007*	0.020***
	(0.51)	(4.49)	(4.53)	(1.13)	(1.89)	(3.69)
RD	0.475	5.784**	6.071**	-0.089	0.104*	0.182**
	(0.96)	(2.22)	(2.20)	(-0.58)	(1.65)	(2.33)
FIRM AGE	-0.087	-0.496	-0.532	-0.011	0.004	0.001
	(-1.24)	(-1.43)	(-1.45)	(-0.61)	(0.46)	(0.15)
ROA	-0.144	0.631	0.706	0.014	-0.040**	-0.007
	(-0.82)	(0.75)	(0.80)	(0.27)	(-2.18)	(-0.25)
PPE	0.404*	1.642	1.715	0.041	0.065***	0.057**
	(1.92)	(1.61)	(1.60)	(0.76)	(2.90)	(2.03)
LEVERAGE	-0.132	-0.158	-0.151	-0.017	-0.007	-0.020
	(-1.14)	(-0.29)	(-0.26)	(-0.55)	(-0.56)	(-1.31)
CAPEX	-0.200	0.569	0.675	0.051	-0.019	-0.093*
	(-0.52)	(0.24)	(0.27)	(0.40)	(-0.45)	(-1.74)
TOBIN Q	0.016**	0.118***	0.123***	0.005**	0.002**	0.000
	(2.10)	(3.25)	(3.20)	(2.34)	(2.44)	(0.41)
KZ INDEX	0.001	0.002	0.001	0.000	0.000	0.000
	(1.41)	(0.34)	(0.30)	(0.23)	(1.14)	(0.49)
HHI	0.614	0.145	0.020	0.149	0.044	-0.024
	(1.03)	(0.07)	(0.01)	(1.11)	(0.74)	(-0.33)
HHI SQUARED	-0.727	0.236	0.377	-0.155	-0.066	0.010
	(-1.18)	(0.11)	(0.16)	(-1.25)	(-0.98)	(0.13)
INSTITUTION	0.100*	-0.028	-0.046	-0.003	0.006	0.004
	(1.69)	(-0.08)	(-0.13)	(-0.20)	(1.02)	(0.52)
ILLIQUIDITY	-0.048	-0.196	-0.213	-0.021	-0.004	-0.026*
	(-0.94)	(-0.82)	(-0.83)	(-1.36)	(-0.67)	(-1.87)
FEMALE	0.065	0.458	0.482	0.020	0.003	0.011
	(1.00)	(0.98)	(0.98)	(1.05)	(0.28)	(0.85)
AGE	0.003	-0.007	-0.008	0.001	0.000	0.000
	(0.98)	(-0.39)	(-0.43)	(1.12)	(0.07)	(0.67)
TENURE	-0.003	0.007	0.008	-0.001	-0.000	-0.000
	(-0.80)	(0.36)	(0.40)	(-0.88)	(-0.62)	(-0.48)
EDU	-0.022	-0.125	-0.135	-0.012	-0.005	-0.009
	(-0.55)	(-0.53)	(-0.55)	(-1.07)	(-1.25)	(-1.22)

SALARY	0.018	-0.005	-0.011	0.001	0.002	-0.007
	(0.27)	(-0.01)	(-0.02)	(0.06)	(0.30)	(-0.60)
BONUS	0.006	0.123*	0.132*	0.005	0.002*	0.002
	(0.53)	(1.87)	(1.89)	(1.45)	(1.83)	(1.23)
EQUITY HOLDINGS	-0.000	0.001	0.001	0.000	-0.000	0.000
	(-0.93)	(0.80)	(0.82)	(0.22)	(-0.87)	(1.19)
NEW OPTION PPS	0.316	-0.710	-0.805	0.018	0.022	0.045
	(0.90)	(-0.45)	(-0.49)	(0.17)	(0.70)	(1.29)
NEW STOCK PPS	0.558	8.464***	8.886***	0.241	0.050	0.085
	(0.87)	(2.76)	(2.76)	(1.57)	(0.69)	(0.80)
DELTA	0.004	-0.060	-0.065	-0.002	0.000	-0.001
	(0.38)	(-1.34)	(-1.37)	(-0.65)	(0.55)	(-0.99)
VEGA	-0.100	0.387	0.461	0.018	-0.010	0.006
	(-1.05)	(0.69)	(0.77)	(0.59)	(-1.05)	(0.40)
Year FE and Firm FE	YES	YES	YES	YES	YES	YES
Adjusted R^2	0.657	0.703	0.703	0.607	0.550	0.620
N	10,554	10,554	10,554	10,554	10,554	10,554

Table 8. The Quasi-exogenous Shock of Corporate Financial Scandals

This table reports the effects of the quasi-exogenous shock of corporate financial scandals on corporate innovation. For each event of corporate financial scandal, we create a cohort of treated and control firms around the event window of 7 years (i.e., -3 to 3, including the event year *t*=0). *POST* is an indicator for years of events and onward. *TREAT* is an indicator for treated firms. A firm is identified as a treated firm if it operates in the same industry (three-digit SIC) as the firm involves a financial scandal but does not have a scandal itself. A firm is identified as a control firm if it operates in an industry (three-digit SIC) with no financial scandal throughout the sample (i.e., never-treated). The treated firms are expected to have a comparable trust effect with the control firms before scandals but to experience an exogenous increase in the importance of trust afterward, which predicts a larger effect of *CEO TRUST* on corporate innovation. Corporate financial scandals are identified using the AAER (Accounting and Auditing Enforcement Releases) dataset. In columns (1) and (2), the dependent variable *Ln(PATENTS)* is the natural logarithm of one plus the number of patents a firm filed in year *t*+1. In columns (3) and (4), the dependent variable *Ln(FORWARD CITATIONS)* is the natural logarithm of one plus the number of forward citations received by a firm's patents in year *t*+1. All regressions include cohort-specific control variables, and cohort-specific year and firm fixed effects. In columns (1) and (3), the standalone terms of *TREAT* and *POST* are absorbed by cohort-specific firm fixed effects and year fixed effects, respectively. In the dynamic tests reported in columns (2) and (4), the year before the AAER release (i.e., *t*=-1) is used as the baseline, so its interactions (i.e., *CEO TRUST* × *TREAT* × *PRE_1*, *CEO TRUST* × *PRE_1*, and *TREAT* × *PRE_1*) are omitted because of multicollinearity. The set of control variables is defined in Appendix 1. The sample period is from 1992 to 2022. The *t*-statistics (presented in parentheses) are clustered at the cohort-firm level. ***, **, and * indicate significance at 1%, 5%, and 10% levels, respectively.

	(1) *Ln(PATENTS)*	(2) *Ln(PATENTS)*	(3) *Ln(FORWARD CITATIONS)*	(4) *Ln(FORWARD CITATIONS)*
CEO TRUST × TREAT × POST	0.211***		0.249**	
	(2.84)		(2.03)	
CEO TRUST × TREAT × PRE_3		0.022		0.091
		(0.26)		(0.51)
CEO TRUST × TREAT × PRE_2		0.044		0.027
		(0.71)		(0.21)
CEO TRUST × TREAT × POST_0		0.085		0.073
		(1.48)		(0.60)
CEO TRUST × TREAT × POST_1		0.221***		0.372**
		(2.96)		(2.54)
CEO TRUST × TREAT × POST_2		0.289***		0.325*
		(2.69)		(1.89)
CEO TRUST × TREAT × POST_3		0.419***		0.445**
		(3.58)		(2.27)
CEO TRUST × POST	0.029***		0.029	
	(2.64)		(1.42)	
TREAT × POST	-0.050		-0.301***	
	(-1.55)		(-5.02)	
CEO TRUST × PRE_3		-0.021*		-0.005
		(-1.66)		(-0.19)
CEO TRUST × PRE_2		-0.013		0.006
		(-1.21)		(0.24)
CEO TRUST × POST_0		0.003		0.021
		(0.24)		(0.95)
CEO TRUST × POST_1		0.008		0.016
		(0.62)		(0.64)
CEO TRUST × POST_2		0.027*		0.030
		(1.80)		(1.03)
CEO TRUST × POST_3		0.046***		0.058*
		(2.74)		(1.79)
TREAT × PRE_3		-0.046		0.036

		(-1.19)		(0.40)
TREAT × *PRE_2*		0.014		0.062
		(0.49)		(0.92)
TREAT × *POST_0*		-0.044		-0.162**
		(-1.50)		(-2.43)
TREAT × *POST_1*		-0.080**		-0.294***
		(-2.18)		(-3.81)
TREAT × *POST_2*		-0.042		-0.291***
		(-0.94)		(-3.41)
TREAT × *POST_3*		-0.070		-0.380***
		(-1.49)		(-4.02)
CEO TRUST × *TREAT*	-0.146	-0.215	-0.371	-0.460*
	(-1.09)	(-1.49)	(-1.39)	(-1.70)
CEO TRUST	0.160***	0.169***	0.358***	0.355***
	(5.35)	(5.55)	(7.16)	(6.89)
Cohort FE × (Controls, Firm FE, and Year FE)	YES	YES	YES	YES
Adjusted R^2	0.913	0.913	0.851	0.851
N	56,357	56,357	56,357	56,357

Table 9. Robustness Checks

This table shows robustness tests of the baseline result. Panel A shows robustness using alternative dependent variables. Columns (1) to (3) use arcsinh(*PATENTS*), which is the inverse hyperbolic sine of the number of patents a firm files in year *t*+1, *Ln(PATENTS*$_{t+1,t+3}$*)*, which is the natural logarithm of one plus the average number of patents a firm filed from year *t*+1 to *t*+3, and *PATENT INDICATOR*, which is an indicator equal to one if a firm filed patents in year *t*+1, and zero otherwise, respectively. Columns (4) to (6) use arcsinh(*FORWARD CITATIONS*), which is the inverse hyperbolic sine of the number of forward citations received by a firm's patents in year *t*+1, *Ln(FORWARD CITATIONS* $_{t+1,t+3}$*)*, which is the natural logarithm of one plus the average number of forward citations received by a firm's patents in year *t*+1 to *t*+3, and *FORWARD CITATIONS*, which is an indicator equal to one if a firm' patents in year *t*+1 receives at least one forward citations, and zero otherwise, respectively. Panel B shows robustness using alternative specifications. Columns (1) to (4) use Poisson regression and negative binomial regression for dependent variables of *Ln(PATENTS)* and *Ln(FORWARD CITATIONS)*, respectively. Panel C shows robustness using alternative subsamples. Columns (1) to (6) use a subsample of firms with non-zero patents filed in year *t*, a subsample before 2010, and a subsample after 2010, for dependent variables of *Ln(PATENTS)* and *Ln(FORWARD CITATIONS)*, respectively. Panel D shows robustness with additional control variables. Columns (1) to (6) include additional controls of CEO facial-to-height ratio (*FWHR*), CEO youthfulness and attractiveness (*YOAT*) and CEO dominance (*DOM*), and CEO education discipline and skills (*STEM*, *SCIENCE SKILLS*, *TECH SKILLS*), for dependent variables of *Ln(PATENTS)* and *Ln(FORWARD CITATIONS)*, respectively. The CEO education discipline and skills variables are only available after 2000. The key independent variable, *CEO TRUST*, is the trustworthiness score of the CEO. The set of control variables is defined in Appendix 1. Unless otherwise specified, the sample period is from 1992 to 2022. The *t*-statistics (presented in parentheses) are clustered at the firm level. ***, **, and * indicate significance at 1%, 5%, and 10% levels, respectively.

Panel A. Alternative Dependent Variables

	(1) *arcsinh(PATENTS)*	(2) *Ln(PATENTS*$_{t+1,t+3}$*)*	(3) *PATENT INDICATOR*	(4) *arcsinh(FORWARD CITATIONS)*	(5) *Ln(FORWARD CITATIONS*$_{t+1,t+3}$*)*	(6) *FORWARD CITATION INDICATOR*
CEO TRUST	0.285***	0.248***	0.050*	0.606***	0.501***	0.084***
	(3.44)	(3.23)	(1.87)	(3.66)	(3.35)	(2.95)
Controls, Firm FE, and Year FE	YES	YES	YES	YES	YES	YES
Adjusted R^2	0.861	0.870	0.696	0.783	0.812	0.658
N	10,544	10,554	10,554	10,554	10,554	10,554

Panel B. Alternative Specifications

	(1) *PATENTS*	(2) *PATENTS*	(3) *FORWARD CITATIONS*	(4) *FORWARD CITATIONS*
Specification =	***Poisson***	***Negative Binomial***	***Poisson***	***Negative Binomial***
CEO TRUST	0.616***	0.538***	1.057***	0.967***
	(2.61)	(2.97)	(2.95)	(3.38)
Controls, Firm FE, and Year FE	YES	YES	YES	YES
Pseudo R^2	0.920	0.375	0.943	0.254
N	6,173	10,554	5,526	10,554

Panel C. Alternative Subsamples

	(1) *Ln(PATENTS)*	(2) *Ln(PATENTS)*	(3) *Ln(PATENTS)*	(4) *Ln(FORWARD CITATIONS)*	(5) *Ln(FORWARD CITATIONS)*	(6) *Ln(FORWARD CITATIONS)*
Subsample =	***PATENT>0***	***Before 2010***	***After 2010***	***FORWARD CITATIONS > 0***	***Before 2010***	***After 2010***
CEO TRUST	0.476***	0.253*	0.252**	0.968***	0.775**	0.369**
	(3.13)	(1.77)	(2.44)	(4.00)	(2.34)	(2.40)
Equal *CEO TRUST? (F-stat)*		0.00			1.26	
		(*p*=0.99)			(*p*=0.26)	
Controls, Firm FE, and Year FE	YES	YES	YES	YES	YES	YES
Adjusted R^2	0.829	0.904	0.858	0.787	0.843	0.744
N	4,005	4,640	5,914	3,569	4,640	5,914

Panel D. Additional Control Variables

	(1) *Ln(PATENTS)*	(2) *Ln(PATENTS)*	(3) *Ln(PATENTS)*	(4) *Ln(FORWARD CITATIONS)*	(5) *Ln(FORWARD CITATIONS)*	(6) *Ln(FORWARD CITATIONS)*
CEO TRUST	0.233***	0.268***	0.207***	0.504***	0.595***	0.443***
	(3.27)	(3.63)	(2.79)	(3.38)	(3.80)	(3.10)
FWHR	-0.005			-0.018**		
	(-1.31)			(-2.01)		
YOAT		0.108			0.255	
		(0.80)			(1.14)	
DOM		-0.014			0.167	
		(-0.10)			(0.69)	
STEM			0.051			0.075
			(1.32)			(0.98)
SCIENCE SKILLS			-0.107			-0.070
			(-0.89)			(-0.27)
TECH SKILLS			-0.160			-0.359*
			(-1.51)			(-1.88)
Controls, Firm FE, and Year FE	YES	YES	YES	YES	YES	YES
Adjusted R^2	0.864	0.864	0.866	0.790	0.790	0.782
N	10,554	10,554	9,505	10,554	10,554	9,505

Table 10. Tests for Mechanisms

This table reports the regression results for potential mechanisms. In Panel A, the dependent variables include *Ln(PATENTS)*, which is the natural logarithm of one plus the number of patents a firm filed in year *t*+1, and *Ln(FORWARD CITATIONS)*, which is the natural logarithm of one plus the number of forward citations received by a firm's patents in year *t*+1. The key independent variables include *CEO TRUST*, which is the trustworthiness score of the CEO, and *EMPLOYEE STOCK OPTIONS*, which is the total number of stock options granted to its rank-and-file employees. The number of employee stock options is estimated using the methods proposed by Call, Kedia, and Rajgopal (2016) and Holderness, Huffman, and Lewis-Western (2019). In Panel B, the dependent variable *RD* is the research and development (R&D) expenditure divided by the book value of total assets for a firm in year *t*+1. The key independent variables include *CEO TRUST*, which is the trustworthiness score of the CEO, and *INSTITUTION*, which is the institutional ownership to total shares outstanding from Thomson Reuters Institutional Holdings (13F). Institutional ownership (*INSTITUTION*) is decomposed into dedicated, quasi-indexer, and transient institutional ownership (denoted as *DEDICATED, QUASI-INDEXER,* and *TRANSIENT*, respectively) following Bushee (1998). To mitigate the influence of extreme values on the estimation results, the institutional ownership variables in this test are ranked into deciles by year. In Panel C, the dependent variable is the analyst earnings forecast dispersion, *FORECAST DISPERSION*, which is calculated as the standard deviation of the latest earnings forecast issued by all analysts covering a firm. All regressions include year fixed effects and firm fixed effects. The set of control variables is defined in Appendix 1. The sample period is from 1992 to 2022. The *t*-statistics (presented in parentheses) are clustered at the firm level. ***, **, and * indicate significance at 1%, 5%, and 10% levels, respectively.

Panel A. Employee Motivation

	(1) ***Ln(PATENTS)***	**(2)** ***Ln(FORWARD CITATIONS)***
CEO TRUST × EMPLOYEE STOCK OPTIONS	0.010***	0.029***
	(2.75)	(3.68)
EMPLOYEE STOCK OPTIONS	0.005**	0.012**
	(2.12)	(2.48)
CEO TRUST	0.236***	0.517***
	(3.32)	(3.50)
Controls, Firm FE, and Year FE	YES	YES
Adjusted R^2	0.864	0.790
N	10,554	10,554

Panel B. Institutional Investors' Support

	(1) ***RD***	**(2)** ***RD***
CEO TRUST × INSTITUTION	0.056**	
	(2.06)	
CEO TRUST × INSTITUTION (DEDICATED)		0.044**
		(2.13)
CEO TRUST × INSTITUTION (QUASI-INDEXER)		0.033
		(1.15)
CEO TRUST × INSTITUTION (TRANSIENT)		0.089***
		(3.23)
INSTITUTION	-0.010	
	(-0.43)	
INSTITUTION (DEDICATED)		0.029*
		(1.88)
INSTITUTION (QUASI-INDEXER)		0.029*
		(1.87)
INSTITUTION (TRANSIENT)		0.010
		(0.77)
CEO TRUST	-0.242	-0.836**

	(-1.09)	(-2.42)
Controls, Firm FE, and Year FE	YES	YES
Adjusted R^2	0.910	0.910
N	10,554	10,554

Panel C. Information Asymmetries of Financial Analysts

	(1) ***FORECAST DISPERSION***
CEO TRUST	-0.028**
	(-2.39)
Controls, Firm FE and Year FE	YES
Adjusted R^2	0.535
N	9,849

Table 11. Heterogeneous Effects of Trustworthiness

This table reports the subsample regression results based on CEO characteristics. Panel A shows the results using subsamples of internal and external CEO, while Panel B shows the results using subsamples of high and low CEO tenure. In columns (1) and (2) of Panels A and B, the dependent variable *Ln(PATENTS)* is the natural logarithm of one plus the number of patents a firm filed in year *t*+1. In columns (3) and (4) of Panels A and B, the dependent variable *Ln(FORWARD CITATIONS)* is the natural logarithm of one plus the number of forward citations received by a firm's patents in year *t*+1. The key independent variable, *CEO TRUST*, is the trustworthiness score of the CEO. In Panels A and B, columns (1) and (2) split the sample by CEO type of internal or external CEO. A CEO is defined to be external (internal) if the CEO is appointed from outside (inside) the firm; columns (3) and (4) split the sample by CEO tenure. A CEO is defined to have a high (low) tenure if the number of years a CEO has worked for a firm is above (below) the sample median. All regressions include year fixed effects and firm fixed effects. The set of control variables is defined in Appendix 1. Reflecting the signed nature of the prediction, the test for the difference in coefficients is one-sided. The sample period is from 1992 to 2022. The *t*-statistics (presented in parentheses) are clustered at the firm level. ***, **, and * indicate significance at 1%, 5%, and 10% levels, respectively.

Panel A. Internal and External CEO

	(1)	**(2)**	**(3)**	**(4)**
	Ln(PATENTS)	***Ln(PATENTS)***	***Ln(FORWARD CITATIONS)***	***Ln(FORWARD CITATIONS)***
Subsample =	***Internal CEO***	***External CEO***	***Internal CEO***	***External CEO***
CEO TRUST	0.145	0.383***	0.245	0.728***
	(1.55)	(3.11)	(1.06)	(3.08)
Equal *CEO TRUST? (F-stat)*	2.30*		2.15*	
	(*p*=0.06)		(*p*=0.07)	
Controls, Firm FE, and Year FE	YES	YES	YES	YES
Adjusted R^2	0.886	0.863	0.808	0.814
N	5,693	4,861	5,693	4,861

Panel B. CEO Tenure

	(1)	**(2)**	**(3)**	**(4)**
	Ln(PATENTS)	***Ln(PATENTS)***	***Ln(FORWARD CITATIONS)***	***Ln(FORWARD CITATIONS)***
Subsample =	***High CEO Tenure***	***Low CEO Tenure***	***High CEO Tenure***	***Low CEO Tenure***
CEO TRUST	-0.044	0.260***	0.265	0.557***
	(-0.26)	(2.91)	(0.83)	(2.77)
Equal *CEO TRUST? (F-stat)*	2.58*		0.60	
	(*p*=0.05)		(*p*=0.22)	
Controls, Firm FE, and Year FE	YES	YES	YES	YES
Adjusted R^2	0.881	0.902	0.810	0.844
N	5,781	4,773	5,781	4,773

Online Appendix

for

"The Face Value of Innovation: An AI-Based Analysis of CEO Trustworthiness and Corporate Innovation"

- OA1. Technical Details on Measuring CEO Perceived Trustworthiness
- Figure OA1. Example of an Annotated Face
- Table OA1. List of 65 Facial Attributes and Calculation Descriptions
- Table OA2. Sample Comparison

OA1. Technical Details on Measuring CEO Perceived Trustworthiness

To measure CEO perceived trustworthiness, we adopt a four-step procedure based on Vernon et al. (2014) and Peng et al. (2022). This procedure is detailed below.

Step 1: Collect photos

In the first step, we collect CEO photos from their LinkedIn profiles. We start with the ExecuComp database, which provides a list of 10,171 unique CEO names. We then manually search these names on Google and identify 3,017 LinkedIn profiles. To ensure matching accuracy, we apply the following criteria: (i) the first and last name of the individual on LinkedIn needs to match the CEO name in ExecuComp, (ii) the working experience of the individual on LinkedIn needs to match the CEO's working experience in ExecuComp, and (3) the job title of the individual on LinkedIn needs to include at least one of the following terms: "CEO", "Chief Executive Officer", "Board", "Chief Manager", "Chairman", "President", "Principal", "Director", or "Chairperson". Among these identified profiles, 1,911 have publicly visible profile photos, and we collect them for analysis.[1]

Step 2: Annotate faces

In the second step, we annotate 68 fiducial points for each photo. We use the *dlib*'s facial landmark detector, which is trained on the iBUG dataset, to delineate 68 fiducial landmark points and obtain their corresponding coordinates.[2] See Online Appendix Figure OA1 for an illustration of annotated fiducial points.

Step 3: Compute facial attributes

In the third step, we use the coordinates of the 68 fiducial points to compute 65 facial attributes. The raw attributes are standardized following Vernon et al. (2014). Specifically, we apply a square-root transformation to area attributes, divide attributes by the average distance between all pairs of points outlining the head to account for photo size differences, and then scale all attributes linearly into the range [-1,1]. The mapping of key fiducial points to facial attributes is adopted from Vernon et al. (2014) and is listed in Online Appendix Table OA1.

Step 4: Calculate trustworthiness

In the last step, we calculate the trustworthiness score for each CEO using the computed facial attributes. Following Vernon et al. (2014) and Peng et al. (2022), we linearly combine

[1] Among these collected profiles, 1,106 CEOs do not have public visible profile photos. Two possibilities for missing profile photos are: (i) the CEO has not uploaded a profile photo, and (ii) the CEO's privacy settings restrict public access to their profile photo (e.g., only visible to 1st-degree or 2nd-degree connections). Online Appendix Table OA2 shows that our LinkedIn-photo sample has similar characteristics to the LinkedIn sample without profile photos, which alleviates potential concerns on sample representativeness.

[2] The detector model is publicly available at https://ibug.doc.ic.ac.uk/.

significant facial attributes using the weights provided by Vernon et al. (2014). The resulting values are then linearly scaled into the range [-1,1]. The formula is as follows:

$$
\begin{aligned}
CEO\ TRUST\ = \ & 0.14 \times attribute3 + 0.17 \times attribute5 + 0.19 \times attribute6 \\
& - 0.16 \times attribute7 - 0.15 \times attribute8 - 0.26 \times attribute11 \\
& - 0.20 \times attribute12 - 0.30 \times attribute13 - 0.13 \times attribute14 \\
& - 0.31 \times attribute15 + 0.26 \times attribute16 + 0.45 \times attribute18 \\
& + 0.37 \times attribute19 - 0.37 \times attribute20 + 0.17 \times attribute21 \\
& + 0.18 \times attribute22\ + 0.18 \times attribute24 + 0.69 \times attribute25 \\
& + 0.51 \times attribute26 - 0.24 \times attribute27 - 0.35 \times attribute28 \\
& + 0.73 \times attribute29 + 0.71 \times attribute30 + 0.36 \times attribute31 \\
& + 0.75 \times attribute32 + 0.22 \times attribute33 + 0.16 \times attribute34 \\
& - 0.23 \times attribute36\ + 0.38 \times attribute39 - 0.39 \times attribute42 \\
& - 0.60 \times attribute47 - 0.13 \times attribute50\ + 0.13 \times attribute52 \\
& + 0.12 \times attribute55 - 0.24 \times attribute59 - 0.15 \times attribute65
\end{aligned}
$$

Figure OA1. Example of an Annotated Face

This figure illustrates the 68 annotated key fiducial points. Specifically, #1 to #17 define the contour of the face, points #18 to #27 capture the shape of eyebrows, points #28 to #36 map the bridge and nostrils, points #37 to #48 include the contours of eyes, and points #49 to #68 outline the lips and inner mouth structure.

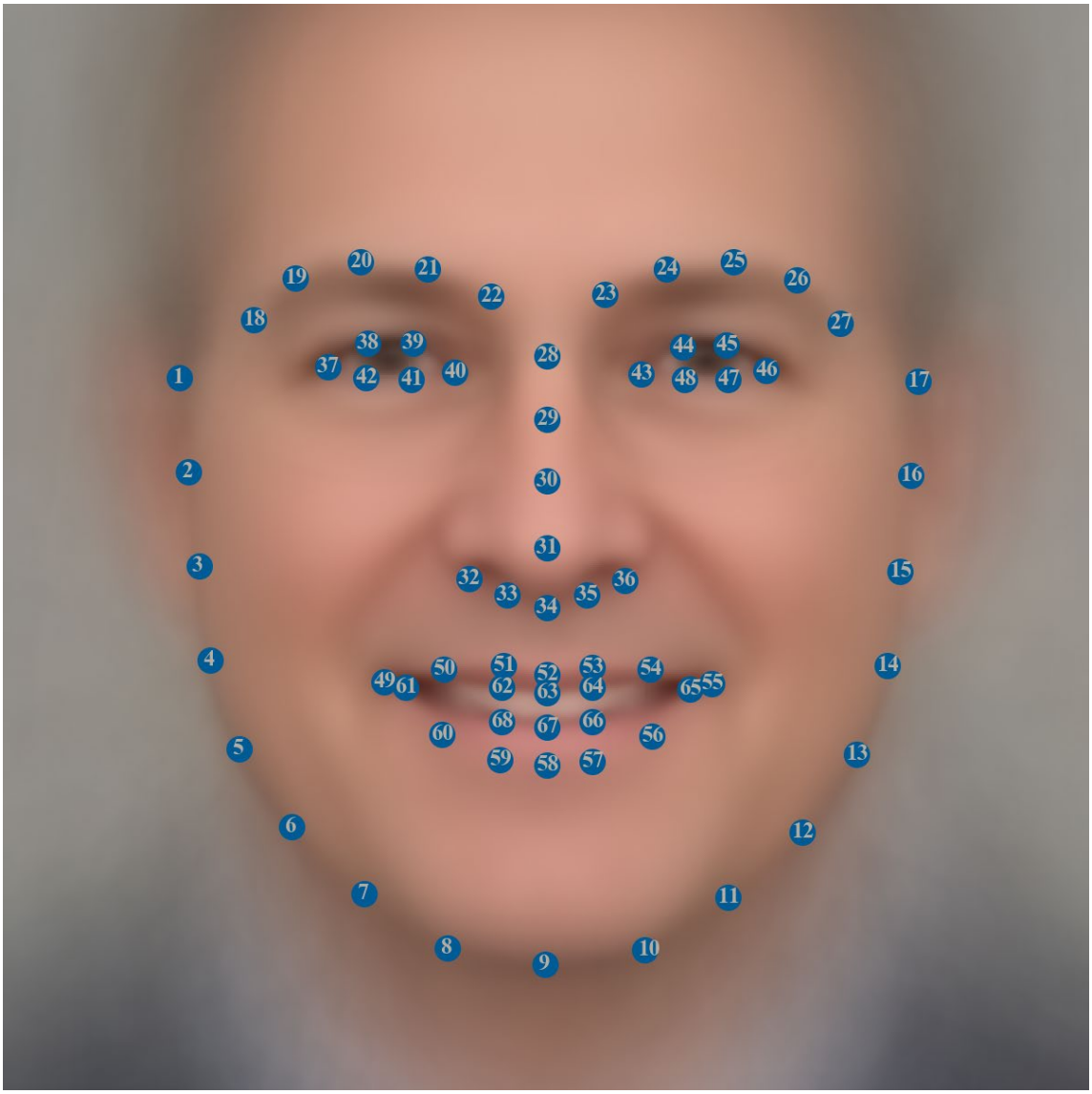


Table OA1. List of 65 Facial Attributes and Calculation Descriptions

This table illustrates the 65 facial attributes and how they are calculated from the 68 fiducial landmarks

No.	Attributes	Calculation Description
01.	Head area	Area enclosed by points 1:27
02.	Head height	Vertical distance between centroid of 8:10 and centroid of 20:25
03.	Head width	Horizontal distance between centroid of 1:2 and centroid of 16:17
04.	Head orientation 1	Absolute x-axis coordinate of middle of nose (centroid of 28:36)
05.	Head orientation 2	Absolute y-axis coordinate of middle of nose (centroid of 28:36)
06.	Head tilt	Return 0 as images are standardized profile photos
07.	Eyebrow area	Area enclosed by points 18:22, 23:27
08.	Eyebrow height	Vertical distance between centroid of 18, 22, 23, 27 and centroid of 19:21, 24:26
09.	Eyebrow width	Horizontal distance between points 18, 22 and 23,27
10.	Eyebrow gradient	Absolute gradient of linear polynomial fitted through points 20:22
11.	Eye area	Average of areas enclosed by points 37:42 and 43:48
12.	Iris area	Average of areas enclosed by points 38, 39, 41, 42 and 44, 45, 47, 48
13.	Eye height	Vertical distance between centroid of 41,42,47,48 and centroid of 38,39,44,45
14.	Eye width	Horizontal distance between points 40,46 and 37,43
15.	% Iris	$(1/\pi r^2) \times$ Iris area, where r is 1/2 of eye height
16.	Nose area	Average of area enclosed by points 31:36, 28, 31, 32, and 28, 31, 36
17.	Nose height	Vertical distance between points 34 and 28
18.	Nose width	Horizontal distance between points 36 and 32
19.	Nose curve	Coefficient of x^2 from quadratic polynomial fitted through points 32:36
20.	Nose flare	Vertical distance between centroid of 35,33 and centroid of 32,36
21.	Jaw height	Vertical distance between centroid of 8,10 and centroid of 3,15
22.	Jaw gradient	Absolute gradient of linear polynomial fitted through points 7:9
23.	Jaw deviation	SD of distances between all points on jaw (3:15) and point at the top of the jaw (x = average of 3:15; y = average of 3,15)
24.	Chin curve	Coefficient of x^2 from quadratic polynomial fitted through points 7:11
25.	Mouth area	Area enclosed by points 49:60
26.	Mouth height	Vertical distance between centroid of 49:55 and centroid of 56:60, 49, 55
27.	Top lip height	Vertical distance between centroid of 49:55 and centroid of 61:65, 49, 55
28.	Bottom lip height	Vertical distance between centroid of 66:68, 49, 55 and centroid of 56:60, 49, 55
29.	Mouth width	Horizontal distance between points 55 and 49
30.	Mouth gap	Vertical distance between centroid of 66:68, 49, 55 and centroid of 61:65, 49, 55
31.	Top lip curve	Coefficient of x^2 from quadratic polynomial fitted through points 61:65, 49, 55
32.	Bottom lip curve	Coefficient of x^2 from quadratic polynomial fitted through points 66:68, 49, 55
33.	Nose line separation	Horizontal distance between centroid of 33,51 and centroid of 35,53

34.	Cheekbone position	Vertical distance between points 8,10 and points 3,4,32,49
35.	Cheek gradient	Absolute gradient of linear polynomial fitted through centroid of 3,4 and centroid of 32,49
36.	Eye line gradient	Absolute gradient of linear polynomial fitted through 28 and centroid of 4 and 29
37.	Eyes position	(1/head height) × (vertical distance between centroid of 8:10 and centroid of 37:48)
38.	Eyebrow position	(1/head height) × (vertical distance between centroid of 8:10 and centroid of 18:27)
39.	Mouth position	(1/head height) × (vertical distance between centroid of 8:10 and centroid of 49:60)
40.	Nose position	(1/head height) × (vertical distance between centroid of 8:10 and centroid of 28:36)
41.	Eye separation	Horizontal distance between centroid of 38:42 and centroid of 44:48
42.	Eyes-to-mouth distance	Vertical distance between centroid of 40,43 and centroid of 51,53
43.	Eyes-to-eyebrows distance	Vertical distance between centroid of 18,22,23,27 and centroid of 38,39,44,45
44.	Left head to left eye	Horizontal distance between centroid of 1:3 and 37
45	Right head to right eye	Horizontal distance between centroid of 15:17 and 46
46.	Mouth-to-chin distance	Vertical distance between centroid of 57,59 and centroid of 8,10
47.	Mouth-to-nose distance	Vertical distance between centroid of 33:35 and centroid of 51:53
48.	Skin hue	Color information (HSV format) for area enclosed by points 1:17, 18:27
49.	Skin saturation	
50.	Skin value	
51.	Eyebrow hue	Color information (HSV format) for area enclosed by points 18:22,23:27
52.	Eyebrow saturation	
53.	Eyebrow value	
54.	Lip hue	Color information (HSV format) for area enclosed by points 49:60
55.	Lip saturation	
56.	Lip value	
57.	Iris hue	Color information (HSV format) for area enclosed by points 38,39,41,42 and 44,45,47,48
58.	Iris saturation	
59.	Iris value	
60.	Hue entropy	These attributes are based on Python module "scipy.stats.entropy," used on the hue, saturation, and value channels of the face.
61.	Saturation entropy	
62.	Value entropy	
63.	Glasses	Signifies whether the person has glasses (1) or not (0)
64.	Facial hair	Signifies whether the person has facial hair (beard, mustache) (1) or not (0)
65.	Stubble	Signifies whether the person has stubble (1) or not (0)

Table OA2. Sample Comparison

This table shows the sample comparisons. Columns (1) to (3) tabulate the mean values of key variables for (1) the sample with LinkedIn profile photos, (2) the sample with LinkedIn profiles but no profile photo, and (3) the entire Compustat/ExecuComp sample, respectively. Columns (4) and (5) compare the differences across samples. These variables are defined in the Appendix of the main text. The sample period is from 1992 to 2022. The *t*-statistics are clustered at the industry level (three-digit SIC) to account for broader dependence in the error terms within each industry. ***, **, and * indicate significance at 1%, 5%, and 10% levels, respectively.

	LinkedIn		**ExecuComp**	**Diff.**	
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
	Photo	**No Photo**		**(1) – (2)**	**(1) – (3)**
Variables					
PATENTS	0.975	1.100	1.014	-0.125	-0.038
SIZE	7.662	7.670	7.638	-0.009	0.023
RD	0.031	0.031	0.029	0.000	0.002
FIRM AGE	2.939	3.008	2.945	-0.069	-0.006
ROA	0.121	0.117	0.122	0.004	-0.001
PPE	0.254	0.268	0.269	-0.014	-0.015
LEVERAGE	0.247	0.243	0.242	0.004	0.005
CAPEX	0.045	0.048	0.049	-0.003	-0.004
TOBIN Q	2.753	2.559	2.576	0.194	0.177
KZ INDEX	-9.433	-9.649	-10.116	0.210	0.679
HHI	0.258	0.276	0.256	-0.018	0.002
HHI SQUARED	0.107	0.125	0.109	-0.018	-0.002
INSTITUTION	0.662	0.646	0.608	0.016	0.054***
ILLIQUIDITY	0.024	0.036	0.033	-0.012*	-0.009**
FEMALE	0.050	0.034	0.032	0.015*	0.018***
AGE	55.279	56.601	56.096	-1.321***	-0.817**
TENURE	7.831	8.508	8.223	-0.676**	-0.393*
SALARY	0.758	0.735	0.735	0.023	0.023
BONUS	1.126	1.103	1.072	0.022	0.053
EQUITY HOLDINGS	53.392	66.264	59.251	-12.869	-5.871
NEW OPTION PPS	0.022	0.023	0.025	-0.001	-0.002
NEW STOCK PPS	0.009	0.008	0.008	0.001**	0.001**
DELTA	0.561	0.662	0.618	-0.102	-0.058
VEGA	0.101	0.104	0.104	-0.003	-0.003
Number of Firms	1,163	1,562	3,648		
N	10,554	8,754	47,246		