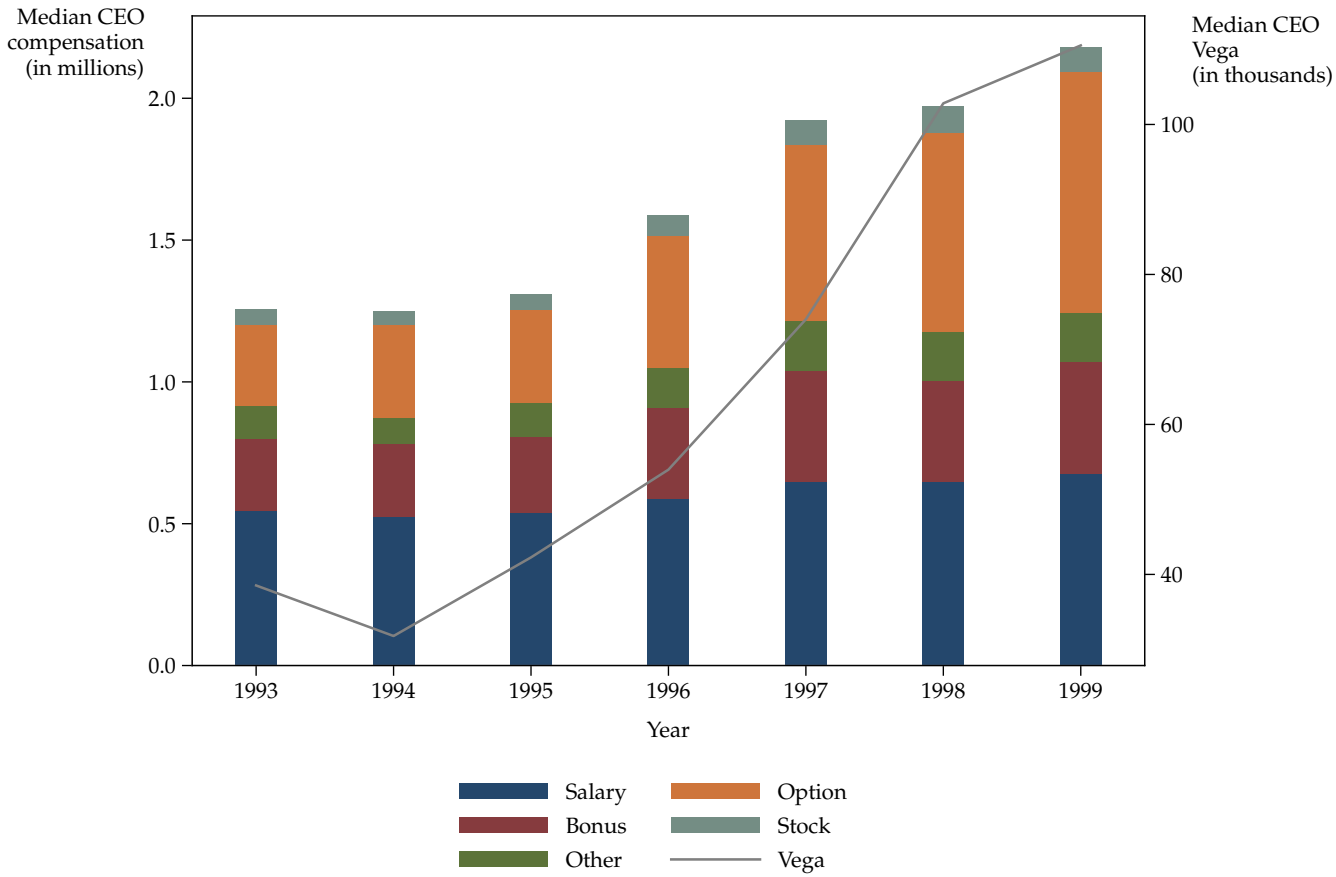
# Why Do CEO Compensation Schemes Feature Convexity? Evidence from a Natural Experiment

Presented by
Yu Zhou, HKUST

January 1, 2022

# A Secular Trend in Convexity

CEO compensation and convexity over time.




- During the course of 1990s, the convexity of the median S&P1500 CEO's compensation package increased by nearly 10-fold!

# Possible Explanations

- Risk-related incentives.
  - Risk-averse managers will forgo some risky but profitable investment opportunities (Holmstrom, 1999; Gormley and Matsa, 2016);
  - Convex payment acts as a remedy to this risk-related agency conflict (namely, "playing-it-safe") by providing an insurance for the downside risk and leave the upside potential unchanged (Lambert, 1986; Holmstrom and Costa, 1986; Hirshleifer and Suh, 1992).
- Accounting benefit + effort-related incentives.
  - Prior to 2006, firms are allowed to expense option compensation using the realized value (i.e., $\max(S - K, 0)$);
  - Option is used to replace stock to increase pay-performance sensitivity (Core et al., 2003; Hayes et al., 2012; Shue and Townsend, 2017);
  - Convexity is purely a by-product.

# Research Questions

- This paper studies the incentiving-risk-taking motive of designing CEO compensation to be convex.
- **How do boards adjust the convexity of CEO compensation in response to known changes in subsequent investment opportunities?**

# Literature

- Firm's investment opportunities v.s. convexity (designed by boards)
  - Smith and Watts (1992), Gauy (1999), Coles et al. (2006);
  - This paper: A clean identification of the impact of increases in the incentiving-risk-taking motive on the convexity of CEO compensation.
- Convexity (received by managers) v.s. managers' risk-taking behaviors
  - Gormley et al. (2013), Shue and Townsend (2017), Carline et al. (2021);
  - This paper: Boards response.

# Identification strategy: The Federal Trademark Dilution Act

# Change

- On January 16, 1996, The Federal Trademark Dilution Act (FTDA) was signed into law for the first time granted federal protection to U.S. famous trademarks against dilution.
- What is dilution?
  - Unlike infringement (Similar trademarks confuse the customers about the source of products.)
  - Dilution is more related to product proximity.
    - Logic: Because the peer's product are similar to mine, the next time when my customer see my product, it is very likely that my peer's trademark also jumps into her mind.
    - Example: *Nabisco, Inc., v. PF Brands, Ltd. (1999)*
- "The FTDA . . . depriving competitors of a sufficient range of alternative choices, thereby hindering their ability to compete. . . " (Rierson, 2012)
- Regulation-granted product differentiation and the subsequent monopoly rents will make protected firms' product market expansions more profitable.

# Evidence

- Anecdotal evidence:
  - The food producer Campbell Inc., in 1996, registered the Campbell's logo in fifteen new trademark classes.
- Empirical evidence:
  - Heath and Mace (2020) show that protected firms registered 3.3% more trademarks in new classes, and eventually increased the number of goods-and-services classes in which they were active by 1.4.
  - Following their design, I further find that treated firms increased capital expenditure over assets by 0.9% (pretreament mean: 6.7%)

# Assumptions

- I argue that this regulatory change
  - increased the profitability of risky product market expansions;
  - Firm's investment opportunity set included many new expansion opportunities;
  - These new expansion opportunities are risky enough which require additional incentives.

# Treatment

- Which firms?
  - The FTDA neglected to define the term “famous”;
  - A plausibly famous trademark is the one being registered in 1974 or earlier and still active on January 16, 1996. (Heath and Mace, 2020)
  - Shareholders’ “enjoy-the-quiet-life” motive?

# Specification

$$Y_{it} = \beta \text{FamousTM1995}_i \times \text{PostFTDA}_t + F_i + \lambda_{jt} + \gamma X_{it} + \epsilon_{it} \quad (1)$$

- $Y_{it}$ (measure of convexity): the change in the CEO option portfolio's value for a 0.01 change in the annualized stock return volatility, namely Vega.
  - Other sources of convexity: CEO stock portfolio, and performance-vesting structure.
  - They are negligible within our sample period (Guay, 1999; Bettis et al., 2018).
- $\text{FamousTM1995}_i$: equals 1 if the firm held one or more famous trademarks in 1995.
- $\text{PostFTDA}_t$: equals 0 if year is in 1992-1995, and 1 if the year is in 1996-1999.
- $F_i$: firm fixed effects.
- $\lambda_{jt}$: NAICS4-Year fixed effects.
- $X_{it}$: firm-level controls, including log(asset), CEO cash payment (salary + bonus), and CEO tenure.

# Data

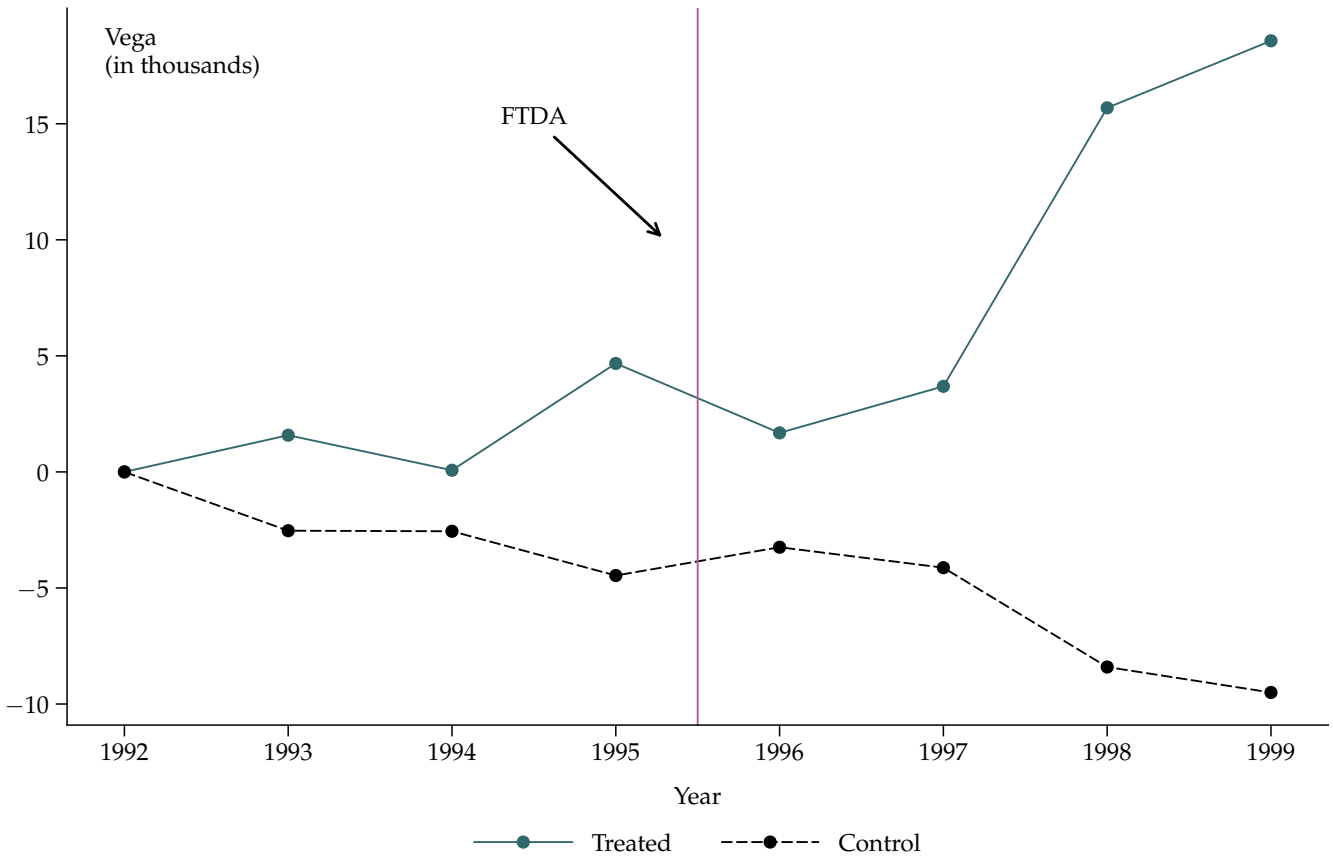
- Execucomp: CEO compensation, CEO personal information
- Compustat: Firms' accounting data
- CRSP: Firms' stock prices
- USPTO: Trademark data
- The sample: 10,174 firm-year observations, 2,090 firms, from 1992–1999.

# Risk-taking Incentive

| | Dependent variable: Vega (thousands) | | |
|---|---|---|---|
| | (1) | (2) | (3) |
| $\text{FamousTM1995}_i \times \text{PostFTDA}_t$ | $18.44^{***}$ | $20.50^{***}$ | $23.35^{***}$ |
| | (4.48) | (5.06) | (5.42) |
| Controls | No | No | Yes |
| Year FEs | Yes | No | No |
| Firm FEs | Yes | Yes | Yes |
| NAICS4×Year FEs | No | Yes | Yes |
| Adjusted $R^2$ | 0.64 | 0.67 | 0.68 |
| Observations | 9,868 | 9,458 | 8,691 |

- Economically signicant: 23% of treated firms' average pretreament Vega, which is $79,000.
- Boards increase the convexity of CEO compensation in response to the profitable expansion opportunities.

# Parallel Trend




- There is one-year lag of the treatment effects.
- Explanation: More than 85% firms in ExecuComp with a 1996 fiscal year have a fiscal year start date in 1995, and equity grants are typically decided at the beginning of the fiscal year (Lie 2005).

# Accounting Benefit

| | Dependent variable: Delta | | |
|---|---|---|---|
| | (1) | (2) | (3) |
| $\text{FamousTM1995}_i \times \text{PostFTDA}_t$ | −43.47 | 44.25 | 75.17 |
| | (56.89) | (60.83) | (68.53) |
| Controls | No | No | Yes |
| Year FEs | Yes | No | No |
| Firm FEs | Yes | Yes | Yes |
| $\text{NAICS}_4 \times$ Year FEs | No | Yes | Yes |
| Adjusted $R^2$ | 0.79 | 0.81 | 0.83 |
| Observations | 9,318 | 8,902 | 8,198 |

- If options are used to providing pay-performace sensitivity, and the increase in Vega is purely a by-product, we expect to see Delta increases signicantly.

# Heterogenous Response

- Brand recognition;
- Product distinction;
- Mechanism: Career concern.

# Brand Recognition

| | Variable used to form subsamples: Industry ad/sale | | |
|---|---|---|---|
| | High | Medium | Low |
| | (1) | (2) | (3) |
| $\text{FamousTM1995}_i \times \text{PostFTDA}_t$ | 25.28*** | 14.26* | 18.34* |
| | (9.76) | (8.08) | (9.56) |
| Firm FEs | Yes | Yes | Yes |
| $\text{NAICS}_4 \times$ Year FEs | Yes | Yes | Yes |
| Adjusted $R^2$ | 0.65 | 0.64 | 0.83 |
| Observations | 2,604 | 2,470 | 2,563 |

- When the brand is well-recognized by customers, then the expansions are more profitable due to brand awareness and brand loyalty.
- For firms operating in higher advertisement spending industries, the treatment effects is larger in magnitude.

# Product Distinction

| Within sample: High industry ad/sale | Variable used to form subsamples: Industry price-cost margin | | |
|---|---|---|---|
| | High | Medium | Low |
| | (1) | (2) | (3) |
| $\text{FamousTM1995}_i \times \text{PostFTDA}_t$ | 17.44 | 25.66* | 30.19** |
| | (16.41) | (14.05) | (12.35) |
| Firm FEs | Yes | Yes | Yes |
| $\text{NAICS4} \times \text{Year FEs}$ | Yes | Yes | Yes |
| Adjusted $R^2$ | 0.63 | 0.56 | 0.66 |
| Observations | 1,346 | 1,247 | 1,272 |

- After controlling for ad spendings, the remaining product distinction comes from other factors such as product quality, and innovation, which are positively correlated with shareholders' "enjoy-the-quiet-life" motives.
- For firms operating in higher product distinction industries, the treatment effects is lower in magnitude.

# Career Concern

| | Variable used to form subsamples: CEO age | |
|---|---|---|
| | Young | Old |
| | (1) | (2) |
| $\text{FamousTM1995}_i \times \text{PostFTDA}_t$ | $30.13^{***}$ | $18.92^{**}$ |
| | (8.05) | (7.90) |
| Firm FEs | Yes | Yes |
| NAICS4×Year FEs | Yes | Yes |
| Adjusted $R^2$ | 0.69 | 0.65 |
| Observations | 3,633 | 3,716 |

- If the the performace of risky investments provide a signal of managers' talent, the risk-averse managers with longer careers will be more reluctant to adopt risky but profitable investments, and therefore receiving more convex payment.

# Takeaways

- Boards discreetly adjust the convexity of managers compensation in response to the variations in firms' investment opportunity set.
- One of the sources of risk-related agency conflicts is managers' career concerns.

# Thank you!

# Appendix: Weak Governance

| | Dependent variable | | | |
|---|---|---|---|---|
| | Total Risk | | Idiosyncratic Risk | |
| | (1) | (2) | (3) | (4) |
| $\text{FamousTM1995}_i \times \text{PostFTDA}_t$ | $0.053^{***}$ | $0.090^{***}$ | $0.036^{***}$ | $0.073^{***}$ |
| | (0.013) | (0.016) | (0.013) | (0.016) |
| Year FEs | Yes | No | Yes | No |
| Firm FEs | Yes | Yes | Yes | Yes |
| $\text{NAICS4} \times \text{Year FEs}$ | No | Yes | No | Yes |
| Adjusted $R^2$ | 0.81 | 0.84 | 0.83 | 0.83 |
| Observations | 7,885 | 7,484 | 8,198 | 7,484 |