Compensation & Risk Research Spotlight

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Key Concepts

- Stock options counteract risk aversion.
- Executives with a large investment in company equity might become risk averse to preserve their wealth.
- Two measures of their investment are relevant:
  - **Delta**: ratio of change in value of wealth to 1 percent change in price. (Measures how much executive gains (loses) if stock price goes up (down).
  - **Vega**: ratio of change in value of wealth to 1 percent change in volatility. (Measures how much executive gains (loses) if stock volatility goes up (down).
Key Concepts

• Executive holding stock:
  – *Delta*. Wealth moves dollar-for-dollar (linearly) with stock price.
    (1 percent change in stock = 1 percent change in wealth).
  – *Vega*. Wealth is unaffected by volatility of stock. *Vega* = zero.

• Executive holding options:
  – *Delta*: Wealth moves nonlinearly with stock price.
    (1 percent change in stock produces a greater than 1 percent change in wealth).
  – *Vega*. Wealth increases with volatility.

• Stock options encourage risk taking by giving incentive to increase volatility (*vega*).
Stock Options Encourage “Risky” Investment

- Rajgopal and Shevlin (2002) examine whether stock options encourage executives to invest in “risky” projects.


- Findings: executives with stock options:
  - Make riskier bets on oil exploration, measured by variation in future cash flows.
  - Are less likely to hedge exposure to oil prices.

- Conclusion: stock options encourage managers to invest in higher risk, higher reward projects.
Stock Options Can Lead to “Extreme” Outcomes


- Findings: executives with stock options:
  - Increase investment in R&D, capital expenditures, and acquisitions.
  - Shareholder returns are more “extreme”—both positive and negative.
    (In this sample, outcomes were more likely to be negative than positive.)

- Conclusion: stock options lead to higher risk, higher return outcomes.

“High levels of stock options appear to motivate CEOs to take big risks… to ‘swing for the fences.’”
Further Evidence that Options Encourage Risk Taking

• Coles, Daniel, and Naveen (2006) find that executives with large stock option exposure spend more on R&D, reduce diversification, and increase leverage.
  – Isolate the effects of vega and delta (prior studies do not).
  – Find that higher vega leads to riskier choices.
  – Conclusion: higher sensitivity to stock price volatility gives incentive to take risk.

• Gormley, Matsa, and Milbourn (2013) find that executives with fewer options reduce leverage, reduce R&D, hold more cash, and diversify.
  – Sample: 143 firms with workers exposed to newly discovered carcinogen, 1980s-2000s.
  – Company volatility increases due to litigation risk.
  – Boards reduce vega of executive portfolio; executives respond by reducing firm risk.
  – Conclusion: lower sensitivity to stock price volatility gives incentive to reduce risk.
Armstrong and Vashishtha (2012) demonstrate that stock options give CEOs incentive to increase systemic (market) risk but not idiosyncratic (firm-specific) risk.

- Isolate the effects of vega on systemic and idiosyncratic risk.
- Systemic risk can be hedged; idiosyncratic risk cannot.
- Find that vega is associated with total and systemic risk, but not idiosyncratic risk.
  (Total risk = systemic risk + idiosyncratic risk.)
- Conclusion: higher sensitivity to stock price volatility gives incentive to increase systemic risk, even if choices do not increase firm value.
Did Stock Options Cause the Financial Crisis?

- Larcker, Ormazabal, Tayan, and Taylor (2014) demonstrate a significant increase in risk-taking incentives among banks prior to the crisis.
  - Average vega of securitizing bank CEO wealth was **15-fold higher** in 2006 than 1992.
  - Average vega was **quadruple** that of average nonbank CEO in 2006.
  - Suggests that incentives did play a role in bank risk taking.

Plot of average portfolio vega for all CEOs in ExecuComp
Did Stock Options Cause the Financial Crisis?

- Fahlenbrach and Stulz (2011) find no evidence that stock options caused the financial crisis.
  - No evidence that banks whose CEOs had greater vega performed worse during the crisis.
  - No evidence that incentives and performance were different between firms that did and did not receive TARP funding from the government.
  - Conclusion: incentives did not cause the crisis.

“Ex ante, these risks looked profitable for shareholders. Ex post, these risks had unexpected poor outcomes. These poor outcomes are not evidence of CEOs acting in their own interest at the expense of shareholder wealth.”
Stock Options Might Encourage Financial Misreporting

- Armstrong, Larcker, Ormazabal, and Taylor (2013) examine whether stock options are associated with financial misreporting.
  - Find that \textit{vega} is positively related to future financial restatements.
  - Conclusion: higher sensitivity to stock price volatility gives incentive to misreport.

“Equity portfolios provide managers with incentive to misreport not because they tie the manager’s wealth to equity value, but because they tie the manager’s wealth to equity risk.”
Further Evidence that Options Encourage Manipulation

• Kim, Li, and Zhang (2011) examine whether CFOs with large option holdings have hide bad news to prevent (delay) stock price declines.
  – Find that abnormally high option holdings are associated with future crashes. (Crash = one-week stock returns 3.2 standard deviations below mean.)
  – Conclusion: options encourage managers to hide bad news.
Conclusion

• Stock options encourage risk taking.

• Risk taking is positive when it increases company value through investment in attractive (but uncertain) projects.

• Risk taking is negative when it involves decisions and behaviors not in the interest of shareholders.

• Unfortunately, no standard litmus test exists to differentiate between “acceptable” risk and “excessive” risk.

• The board of directors and shareholders need to weigh the potential positive and negative implications of stock option compensation in their company.


