

# **Tournament-Based Incentives, Corporate Cash Holdings, and the Value of Cash**

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## **Internet Appendix:**

### **Options Valuation in the Post-FAS 123R Period**

We use the dividend-adjusted Black – Scholes model (Black and Scholes (1973), Merton (1973)) to value options and estimate delta and vega. The risk-free rate is proxied by the average yield on U.S. Treasury bonds with a seven-year term. As most stock options are granted at-the-money, we use the market price per share at grant date as the option strike price ( $X$ ) for newly granted options, unless otherwise noted. The time to maturity ( $T$ ) of a newly granted option is first calculated as the number of years from the assumed date of July 1 in the reported grant year to the expiration date disclosed in a firm's proxy statement. Since most executive stock options are exercised well before their expiry date, we adjust an option's time to maturity to equal 70% of its nominal term, which is similar to the procedure ExecuComp uses. To estimate stock price volatility, we calculate and annualize the standard deviation of monthly stock returns over the prior 60 months. We use the average dividend yields over the past 3 years as a proxy for the dividend yield input. Following ExecuComp methodology, we winsorize stock return volatility at the 5th and 95th percentile and dividend yields at the 95th percentile levels.

Because ExecuComp only reports  $T$  and  $X$  for newly granted options, we follow Core and Guay (2002) and Kini and Williams (2012) in making assumptions on  $T$  and  $X$  for vested and unvested options. Specifically, we determine time to expiration for previously granted options as follows: i) if no current option grant is reported, the time to maturity for unvested options (vested

options) is 9 years (6 years); ii) if current option grants are reported with the time to maturity less than 3 years, we set  $T$  for all vested and unvested options to equal that of the current option grants; and iii) if current option grants are reported with a time to maturity of 3 years or more, we set the time to maturity for unvested options to  $T - 1$  and vested options to  $T - 2$ .

To estimate the average exercise price of previously granted options, we first approximate the extent to which previously granted options are in-the-money by taking the difference in realizable values between all options and newly granted options. Next, we estimate the “moneyness” per option by dividing the realizable value of previously granted options by the number of previously granted options. The average strike price for previously granted options is calculated by subtracting the average “moneyness” per option from the current stock price.

We use the dividend-adjusted Black – Scholes (1973) model and the above-mentioned estimations as inputs to calculate option values for the period 2006 to 2010. Next, we follow Guay (1999) and Coles et al. (2006) in estimating CEO delta as the sum of the delta of a CEO’s portfolio of shares and the delta of her portfolio of options, and CEO vega as the vega of her portfolio of options.

To ensure the consistency of option valuation and CEO pay gap calculation between the pre- and post-FAS 123R periods, we follow Coles et al. (2006) and Kini and Williams (2012) in recalculating TDC1 for the post-2005 period as:

$$(5) \quad \text{TDC1} = \text{SALARY} + \text{BONUS} + \text{NONEQ\_INCENT} + \text{OTHCOMP} + \\ \text{STOCK\_AWARD\_FV} + \text{calculated values of option awards} + \\ \text{DEFER\_RPT\_AS\_COMP\_TOT}$$