- In the last 5 years we have seen a complete failure of the efficient markets theory
- This is at the heart of the capital markets based modern economics
- Who failed us (other than academics and the theory itself…)
  - Analysts' analysis of comp values
  - Accountants inability to provide economically correct information
  - …the two are clearly related
- We urgently need to know

I. Why we use options instead of salary?

II. How to price these options?

III. How to mark-to-market comps' financial statements?

I. Why Use Options?

- Options are worth far less to employee than they cost the employer.
  - Kaul, Liu, and Longstaff (2003) study effect of holding stock that can't be sold. Find large costs: a 5 year restriction when assets represent 50% of wealth may lead to a discount of up to 70%.
  - Hall and Murphy (2000) calculates certainty equivalent of ESOs using assumption about utility function to be applied to option payoffs. Find value to executive may be 50% lower than Black-Scholes value if stock represents a sizeable fraction of wealth.
- Real bad way to provide incentives (Meulbroek, 2001)

➔ Why used???

Tax treatment: Granting of an option does not constitute a taxable event for either employer or employee.

- Non-qualified options: On exercise, spread between market and exercise price is taxable income to employee, and deductible compensation expense for employer.
- Since 1994, compensation over $1 million paid to "proxy-named executives" (typically five highest paid executives) is considered unreasonable and is not deductible. Not true for "performance-based" compensation such as options.

Save cash: Core and Guay (2001) find that firms facing financial constraints more likely to use options.

II. Valuation

- Hull and White (2004) list important features ESO models need to capture
  - There is usually a vesting period.
  - Employees who leave during the vesting period forfeit their unvested options.
  - Employees who leave after the vesting period forfeit out-of-the-money options, and have to exercise in-the-money options immediately.
  - Employees may not sell their options. They must exercise and sell the shares in order to get cash or diversify their portfolios. This leads to employee stock options being exercised early relative to regular options.
  - Exercise of employee stock options leads to dilution.

- They suggest a model based on FASB 123 that also includes:
  - A fixed annual termination rate.
  - Faster exercise - holder assumed to exercise when stock price reaches a certain multiple of the exercise price, M*K.
- Aspects relevant for pricing that are more difficult to capture
  - Departure (→ forfeiture) related to stock price
  - Options are often reset to lower exercise price (legally…)

III. Accounting for Stock Options

- Traditional method - intrinsic value method. Cost = excess of market price over exercise price on grant date. This is **the original sin…**
- FASB 123, published in October 1995, *suggests* (but does not require) using a fair-value based method. Appendix B there suggests
  - Estimate life of option.
  - Use either Black and Scholes (1973) or Cox et al. (1979) binomial trees to value option with that expected life.
  - Adjust value to allow for employee leaving during vesting period.

- Bulow and Shoven (2004) (as well as others such as Merton, Rubinstein etc…) argue that we do not need to expense the full estimated value of the option, taking into account employees' expected exercise behavior etc., since we don't do this with salary.
  - A pay raise of $2,000 a year is expensed as $2,000 per year, not the expected present value of all future extra $2,000 payments.
  - Basic idea: treat options like salary, and recognize what has actually been earned.

- Guay et al. (2003) example –
  - Firm A starts with $200 in assets funded by 20 shares of common stock issued at $10 per share.
  - Firm A sells the assets for $220, recognizes $220 of revenue, $200 of expenses
  - Earnings = $20, EPS = $1, so ROE = 10%.
  - Firm B has $100 of assets funded by 10 shares @ $10, and grants $100 worth of shares to a new employee in return for labor worth $100.
  - Firm B sells assets + labor for $220.
  - If labor cost not expensed, earnings = $120, EPS = 120/20 = $6, so ROE = 60%.
- Point is we need to deduct cost of employee expense as well as *taking dilution into account*.
  - The issue of shares, ESOs etc. is a cost.
  - Comment that marking to market poses some inconsistencies, since we are reflecting changes in stock price which is PV of future earnings, not something we generally consider.

- Financial Accounting Standards Board (2004) proposes measuring the cost of employee services using the grant-date fair value of any equity instruments issued.
  - Cost would be recognized over vesting period.
  - For public entities, cost would be remeasured at each reporting date, and change in value would be reported.