

# **An Empirical Analysis of Stock Option Valuation Methodologies in Closely Held US Corporations**

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Boca Raton

*An Empirical Analysis of Stock Option Valuation Methodologies  
in Closely Held US Corporations*

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## Abstract

*The introduction of fair value accounting for stock options has required private companies to apply stock option valuation methodologies that were designed to be applied to their public counterparts. The two recommended methodologies: the Black-Scholes formula and the Binomial Lattice model require the valuator to provide an input for estimated volatility; for private companies that do not have a trading history there is limited guidance regarding the determination of volatility, which results in diverging and incorrect estimates. Based on a sample representing 178 companies who filed and completed an IPO in 2006, this study analyzed the accuracy of the recommended valuation methodologies when applied to closely held US corporations. The study outlines the importance of volatility to the value of the options and proceeds to document, by comparing the private (pre-IPO) and public (post-IPO) data, that in 51% of the cases the volatility was either over- or under-stated by more than 10%. In addition the study shows a bias towards overstatement in the less than 10% variance group. The study further demonstrates that a marginal change in volatility has a significant impact on the company's total stock based compensation expense and consequently misstates earnings.*

## SECTION I – INTRODUCTION

*Hypothesis: “Current stock option valuation methodologies do not produce an accurate value for stock options issued by closely held US corporations”*

Recent changes to accounting and fiscal policy in the US, require private corporations to accurately report, **at fair value**, the cost of stock options issued under the company’s incentive plan. In order to accurately value a stock option one of several option valuation methodologies must be used.

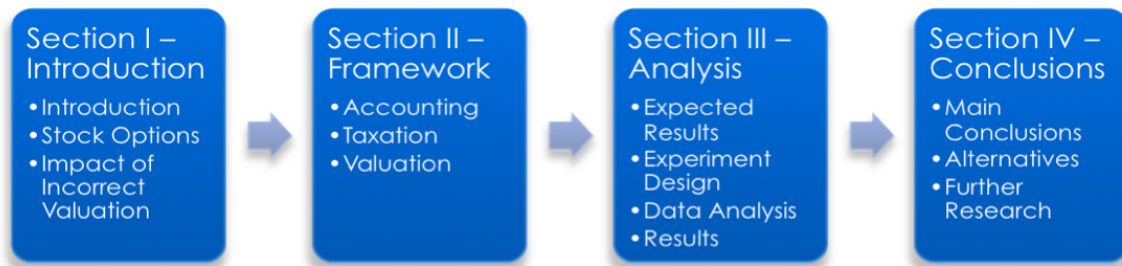
The problem is that these option valuation methodologies were created to be applied to public companies where certain data elements to be used as inputs are freely available. The challenge for closely held corporations applying these established methodologies, is centred on expected volatility which is a required input for either methodology. For public companies, expected volatility can be extrapolated from the past and if the company is mature and the marketplace is efficient, the past may prove to be an accurate representation of the future.

Since volatility is the result of trading price fluctuations in the public market place private companies cannot derive an accurate value for stock options if the volatility data is simply not available. The objective of this paper is to discuss the shortcomings of the current methodologies and to demonstrate that the current

volatility estimates utilized by closely held corporations do not accurately reflect the actual volatility, and hence do not accurately value the stock options.

This study addresses the following research question: Do closely held US corporations, using the stock option valuation methodologies mandated by US Generally Accepted Accounting Principles (GAAP), accurately value their employee stock options? If they do, the hypothesis is refuted and there is not reason to make any changes to the status quo. If they do not, as is expected by the author, the hypothesis stands and changes are needed to ensure that the financial statements provide a true and fair view of the costs associated with an employee stock option plan.

To answer this question this paper has been organized in 4 sections, as shown in the figure 1 below:



*Figure 1 - Document Structure*

Section I, will introduce the topic and provide an overview and discussion of employee stock options and the related valuation issues. Section II, provides an

overview of the regulatory framework applicable to stock option valuations. Section III, contains the empirical analysis component and discusses and analyses the sample data. And Section IV, presents the conclusions in support of (or against) the hypothesis. Should the hypothesis stand, the outlook chapter will discuss alternative courses of action, which may narrow, or close, the valuation gap.

## CHAPTER 1 - Stock Options: An overview

### Purpose of ESOP

The purpose of an Employee Stock Option Plan (ESOP) is first and foremost to financially reward employees in a way that aligns the interests of shareholders and management. By giving management the opportunity to share in the increased value of the company they work for, management is more likely to bring about such an increase. The argument is that in the absence of such an incentive, management's principal objective will be the preservation of their jobs, rather than building value for the shareholders.

A large portion of literature is dedicated to the principal-agent problem, which discusses how to deal with the relationship between principal (in this case, shareholder) and agent (in this case, employee) when asymmetric information exists. The shareholders do not have all the information and trust the agent to look after their interest. Naturally, the agent has his own self-interests in mind and needs to be motivated to act in the best interest of the shareholders. The question is one of balance: what is the "right" amount of motivation (in this case stock options) to get the employee to act in the best interest of the shareholders. In reality this is a delicate balance that may change over time as the employee and the company mature and may be different for every individual, a simple "one size fits all" solution may not be available. If the right balance is not in place the employee will look after his own interests and may take actions that harm the company (and the shareholders) in the short- or long-term. The following paragraphs highlight, for

both principal (shareholder or grantor) and agent (employee or grantee), some of the benefits that can occur when the balance is struck just right and the risks if it is not.

A lot of discussion remains about whether or not employee stock options provide a suitable incentive for employees and thus in effect solve the principal-agent problem. The reality is that companies continue to issue stock options, which in the current regulatory environment must be valued.

A further use of stock options is that they allow companies who are in an early stage of development to attract experienced management without putting an additional strain on already scarce cash resources. A risk minded manager could accept a base salary and risk the premium he could command in the market place, on the performance of the company, by instead including a stock option component that could provide even greater returns. To a degree, this risk is mitigated by the manager's own capabilities since many of the value drivers are under his control. This strategy has been commonplace for quite some time and has delivered significant, sometimes even exorbitant, returns for those risk-taking executives, especially during times of economic growth.

### **Risks and Benefits of Employee Stock Options**

Although the valuation issues represent the fabric of this document, it is important to provide a brief overview of some of the other issues encountered when

implementing an Employee Stock Option Plan (ESOP). This section discusses, in detail, the risks and benefits of issuing employee stock options.

### *For Employee*

#### Benefits

First and foremost employee stock options are incentives, they are meant to motivate the employees and align their interests with those of the shareholders.

A further incentive is that the stock options have the possibility of realizing unlimited gains, unlike a bonus, or profit sharing plan, which have limitations, a stock option, or share once vested, can continue to appreciate indefinitely.

If the employee participates in a Incentive Stock Option Plan, as defined by the Internal Revenue Service (IRS), the employee may be able to get capital gains tax treatment on the gain when realized, and since capital gains tax rates tend to be lower there is a direct benefit to the employee. If the stock options do not qualify, they are deemed (for tax purposes) to be part of an unqualified stock option plan. In this case the employee is still able to split the benefit between income and capital gains but in different proportions, the details of which are discussed in the taxation section.

## Risks

The benefit of holding a stock option can quickly disappear when the market price drops below the strike price (the price at which the underlying stock can be purchased). Paper gains can disappear overnight and for some who exercised their stock options and are still holding the shares, losses can become an uncomfortable reality.

By holding stock options or, once exercised, shares in the company the employee works for, he is putting all his eggs in one basket. When Enron went into bankruptcy many employees found themselves losing both their livelihood and their savings. A less extreme example, but still very stressful and demoralizing for the employee, is when the company's share price falls substantially, which leaves the employee with a declining, or disappearing, option value while at the same time battling lay-offs.

An ESO turns employees into shareholders, a role they may, or may not, be comfortable with and which may, or may not, benefit them financially.

## *For Employer*

### Benefits

One of the basic benefits of a stock option plan is that it reduces the attrition rate, if the options are "in-the-money" but cannot be exercised until some future date, or, if the options have vested but the underlying shares are expected by the employee to



increase in value, the employee has a measurable incentive to stay with the company and help it grow further.

Another benefit for the company is that although there is a price to pay for stock options in the form of a charge to earnings and, in the long term, dilution; the issuance of options by startup companies can serve to attract premium management talent while at the same time conserving cash.

### Risks

The disappearance of value to option holders that happens when the market price of the share drops below the option strike price, is often accompanied by a decrease in employee morale. All the benefits of implementing the plan can disappear overnight; and if the employees understood and appreciated the plan, it can cause them to look for other opportunities where they will be offered a new set of options and start the “options race” again.

In essence this means that an option plan is great at retaining and motivating people if the company continues to grow, but the moment the situation reverses it can cause the employees to “jump ship” and look for greener pastures elsewhere. The implications could be that key individuals are leaving when the company needs them the most.

To mitigate this situation some companies re-price the options but this approach should be taken with caution since it changes the fundamental objective of aligning the employees and shareholders, by effectively signaling that employees are only

willing to participate in the upside of the plan, which should be of little interest to the shareholders.

To avoid adverse tax consequences, stock options should not be issued with a strike price that is below the then current market price at the time of issuance of the options. As such, one of the items a company should watch very carefully when implementing an Employee Stock Option Plan is that there is an incentive for the recipients to depress the share price when options will be issued to ensure that employees receive their options with the lowest possible strike price. An article in *Accountancy* magazine<sup>1</sup> (Brooks, 2006) referred to an ex-executive who was describing that it was commonplace in his company to “search” for bad news when the option awards were pending.

Another risk of implementing an ESOP is that it can incentivize the recipients to focus on short-term performance at the expense of the long-term. Why make a corporate investment that will have a payback of 10 years when your own stock options vest in 2? If the employee decides to hold the shares it may be worthwhile but if their intent is to sell, the investment may not be in their personal best interest. In fact it can be said that the employee’s appetite for long-term investment by their employer is aligned to the employee’s personal goals. We discussed earlier that aligning the interests of employees and the shareholders was one of the goals of the ESOP but it should be noted that a perfect alignment would involve similar risk appetites and investment horizons, a purely theoretical goal.

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<sup>1</sup> Brooks, M. (2006). The trouble with options. *Accountancy*. Surrey, UK, CCH. **138**.

## History

### *Stock Options*

In its simplest form a stock option is an agreement between two parties, where the purchaser is buying the right (not the obligation) to buy (call option) or sell (put option) an asset at an agreed upon price (strike price), on or before an agreed upon date.

Stock options for publicly traded companies can be purchased on various exchanges around the world. A stock option whose strike price is equal to the price of the underlying stock is said to be at-the-money. Conversely a stock option whose strike price is below the price of the underlying stock is said to be in-the-money, or out-of-the-money if the strike price is above the price of the underlying stock. Naturally the cost of an in-the-money option is substantially higher than an out-of-the-money option.

Uncorroborated information suggests that the history of options dates back to the 7<sup>th</sup> century BCE when Thales of Miletus speculated that the year's olive harvest would be particularly bountiful and he put deposits on every available olive press in his region of Greece. The harvest was huge and the demand for olive presses skyrocketed, at which time Thales sold his option rights at a substantial profit.

The establishment of the Chicago Board of Trade market for options, and the development of the Black-Scholes option-pricing model, which allows for the option price to be calculated, raised the use of stock options to another level.

### *Employee Stock Options*

In the 1950's stock options were primarily used by top executives as a tax shelter to provide some relief from the punishing top US income tax rates of 91%. The gain on stock options, when exercised, would be treated as capital gains which attracted a much more palatable tax rate of 25%.

The first broad application of employee stock options, as outlined by The Financial Policy Forum<sup>2</sup> (Hoody, 2001), dates back to 1957 when eight semiconductor whiz kids left Shockley Semiconductor to start their own company; they received startup equity from Fairchild Camera and Instrument, the terms and conditions of which included an option for the investor to purchase the company if things went well. Things went well and the founders were bought out for a considerable amount of money.

The deal convinced many employees in Silicon Valley to leave their employers and start their own business. To avoid an exodus of employees, many employers were forced to issue a considerable amount of stock options.

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<sup>2</sup> Hoody, J. (2001). Recent History of Employee Stock Options. Washington, DC, Financial Policy Forum - Derivative Study Center: 14.

During the 60's and 70's Washington targeted high taxpayers and the benefit of the tax shelters, and by 1976 the tax shelters, and the stock options they contained, had completely disappeared.

In 1981 the Reagan administration cut the top personal income tax rate to 50% and followed this up with an additional cut to 28% in 1986. The first to take advantage of this new environment were the management and executives of Toys-R-Us who had received 15% of the company equity in stock options when it emerged from bankruptcy in 1978. CEO Charles Lazarus cashed in \$43 Million, an amount that other executives could not ignore. The resulting sentiment was, stock options are a great motivational tool for all employees so why not use them for everyone?

It became increasingly apparent that stock options could play a significant role in aligning the interests of shareholders and executives. In those days companies were typically populated with two types of executives: those with large expense accounts and luxurious benefits- and those with an insatiable appetite for growth, which led to endless acquisitions; both types operated with little regard for shareholder value. Stock options were seen to be the answer since the option benefits provided to the grantee would be aligned with the share value interests of the shareholders.

### *Stock Option Expensing*

The regulatory framework for stock option expensing will be discussed in detail in the next section. However, from a historical perspective it is important to note that

the initial treatment of stock options was centered on the intrinsic value method. This method required the company to expense the amount by which the current stock price exceeded the option strike price. For example: company A issues stock options with a two-year vesting period and a strike price of \$50.00, at the time of issue the company's stock is trading at \$60.00. Under the intrinsic value method the company would record an expense of \$10.00 ( $\$60.00 - \$50.00$ ). If the strike price was equal to market price of \$60.00 no expense would be recorded.

The proponents of the intrinsic value method feel that this approach is reasonable and easily quantifiable. The opponents point out that the option has value even when the strike price is equal to the current market price, which is why people pay for it and executives gladly accept them as part of their compensation.

Not expensing stock options affects: the balance sheet, the income statement, the cash-flow statement and consequently many of the performance metrics of the company, as follows:

- Income Statement – The net income of the company is overstated due to the omission of expenses relating to the issuance of options.
- Balance Sheet – The balance sheet is affected by the reduced tax liabilities which result from the deductibility of employee compensation expenses realized when the options are exercised. In addition, when the options are exercised the shareholders equity is increased to reflect the newly issued shares.

- Cash-Flow Statement – The reduction of tax liabilities resulting from option exercise is reflected as a source of cash.
- Price/Earnings Ratio – The inflated earnings will increase earnings per share which in turn will lower the PE multiple and make the company look more attractive to investors.

Although the shortcomings were apparent there was no viable alternative methodology available which would provide a fair value for the option at the time of issue. This changed in 1973 when professors Black and Scholes formulated the Black-Scholes formula, which provided a more thorough methodology of determining the value of stock options.

The implications of the intrinsic value method as outlined above, paired with the widespread use of options in the 1980's caused regulators to propose an alternative approach in 1993. Under the proposed Statement of Financial Accounting Standard (SFAS) rule 123 the objective was to calculate the true, fair (market) value of the options based on either the Black-Scholes or the Binomial option pricing model, and to recognize that value as a compensation expense at the time of issue.

The opposition was massive, led primarily by industries making widespread use of stock options, who claimed that the losses resulting from the expensing of stock options would depress their share prices. In addition, smaller companies claimed that this would put them at a competitive disadvantage with larger companies who would be more capable of absorbing the expenses.

The corporations found and ally in senator Joseph Lieberman who in 1993 introduced a bill that would have mandated the Securities and Exchange Committee (SEC) to require that no compensation expense be reported relating to the issuance of stock options, thus negating the effect of SFAS 123. This bill would have set a dangerous precedent since it would take the first step towards shifting the responsibility for standard setting from the Financial Accounting Standards Board (FASB) to the SEC. To compromise and remove the threat, the FASB decided in 1995 to modify SFAS 123 and encourage, rather than require, the recognition of compensation costs.

One of the most vocal critics of the failure to expense stock options was Warren Buffet who stated, on several occasions, that he had to manually adjust reported earnings figures of comparative companies by 5 to 10% to compensate for stock options issued but not expensed. In fact, in an article published in the CPA Journal in August 2005<sup>3</sup> (Apostolou, 2005) the authors test Buffet's assertions relating to the required adjustments for stock option expensing. From a sample of 20 companies, the difference between expensing and not expensing issued options, negatively impacts earnings by more than 10% and for 6 companies their net profit would have been turned into a net loss.

In the wake of the Enron scandal the option expense issue returned to the forefront in 2001, and in 2004 the FASB had sufficient momentum to amend SFAS 123 to

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<sup>3</sup> Apostolou, N. C., D (2005). "Accounting for Stock Options." The CPA Journal(August 2005).



become SFAS 123(R) and require, not encourage, the recognition of stock options expenses effective January 1, 2006.

### Rationale of the Study

In the interest of protecting the investing public, financial statements should provide a true and fair view of the operations of an entity. If a transaction, or series of transactions, have a material impact on the operation or composition of the enterprise it should be disclosed to the shareholders. The degree of disclosure, notes vs. financial statements can be debated, but if a transaction affects some financial statements and not others it creates an imbalance that should be corrected.

By recognizing stock options as compensation expense the shareholders are made aware of the fact that there is indeed a cost to this additional element of compensation and that options should be issued with care. Far too many companies have issued astronomical amounts of options to the detriment of shareholders.

The broad application of stock options has created an entitlement culture in many companies and has shifted the rationale for issuing options away from its early objectives of aligning the interests of shareholders with those who are in a position to deliver value, to a broad non-performance based application.

In today's marketplace closely held corporations are continually facing demands for stock options by all levels of the organization. And since the issuance of stock options has no direct impact on management, they are inclined to support the