ESSAYS ON EXECUTIVE STOCK OPTIONS IN MALAYSIA

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LIST OF ABBREVIATIONS

ABI	Association of British Insurers
SC	Securities Commission of Malaysia
PN17	Practice Note 17/2005
PLCs	Public listed Companies
FTSE	Financial Times Stock Exchange Malaysia
CBOE	Chicago Board Options Exchange
CLCR	Malaysian Corporate Law Reform Committee
FSMA	Financial Services and Markets Act
HMRC	HM Revenue and Customs
LSE	London Stock Exchange
ITA	Income Tax Act 1967
MCCG	Malaysian Code on Corporate Governance
MIRB	Malaysian Inland Revenue Board
MYR	Malaysia Ringgit
NAPF	National Association of Pension Funds
PAYE	Pay as you earn
S & P 500	Standard & Poor's 500
SFA	Securities and Futures Act of 2001
SGX-ST	Singapore Exchange Securities Trading Limited
SO Act	Sarbanes-Oxley Act of 2002
UKLA	UK Listing Authority

ABSTRACT

This thesis examines four questions in the field of executive stock option plans: the legal framework governing their use in Malaysia, their effects on firm performance, managerial turnover and the tax effects. The research presented in this thesis extends the literature on stock options in these directions. Owing to the dearth of studies that have examined the issue of stock option plans, as well as the uniqueness of the Malaysian corporate environment which is dominated by family controlled firms. Using standard event study methodology, in the short-term, the results indicate a negative share price before announcement and a slight positive effect following the announcement. The announcement, however, does not carry any surprise to the market and this seemingly confirms that early information releases before official announcement could be ruled out. Over the long-term, the results indicate that stock option plans have no significant effect on the performance of Malaysian firms, suggesting that executive stock option plans do not entirely improve the value of Malaysian firms. Further examinations over the incentive of stock option plans indicate reductions in top executive turnover in Malaysia listed firms. The effects of executive stock option plans in mitigating unplanned turnover at the executive levels take into account the mediating control variables at firm level such as ownership structure, corporate governance, firm characteristics and level of pay. The consequences of executive turnover are focused on firm performance. Using accounting and market performance measures, the result indicates that poor firm performance lead to high executive turnover. However, the study documents weak support for performance measures in the evaluation of executive turnover. The thesis also examine other factors that are likely to influence executive turnover, of which the empirical results indicate that managerial ownership, board attributes and firm size do not lead to high executive turnover. However, mix payments are found to be influenced the management turnover. This thesis also examines and attempts to understand the effect of stock option and tax benefits between corporate taxpayer and personal taxpayer, which is found to be ambiguous. Although previous empirical results indicate that taxpayers may extend their tax liability usually for three to five following the grant date, but it would seem that Malaysian stock option programs do not produce any tax preferential treatments in our sample. This is due to limitation in the Malaysia tax policy which makes no allowance for expenses-related to stock options. This appears that Malaysia taxation rules do not affect tax benefits. However when the data for tax groups were decomposed according to information disclosed in annual reports for executive and the firm, the result suggests that executive stock options are responsive to changes in personal income tax rate. For firm, awarding stock option is perhaps driven by a psychological contract between executives, rather than tax incentives, which suggest that cash payment salary and bonus are significant component for executive payments in Malaysia.

1.0 INTRODUCTION

1.1 Background and motivation of the study

In the economics and finance literature the most commonly cited justification for the granting of executive stock options is to align the interest of managerial employees and shareholders and by doing so, it is held that stock options will not only help to increase the value of the firm but be also shareholder wealth enhancing. In this way the granting of stock options is argued to tie a managerial employee's wealth to the firm's stock price which, it is hoped, will motivate them to work harder and thereby increase the firm's performance, since both of their interests are intertwined. In this respect, the motivational role of stock options is consistent with the work of Fishman (2000) and Thompson (2003) which indicate that the granting of stock option would also serve as a catalyst not only for motivation and the retention of the existing employees, but crucially it will help to attract new management talents. On this issue, Balsam and Miharjo (2007) point out that the incentive to retain executives is limited to the vesting period because the retentive effect is likely to reduce when the actual vesting period ends. This is because the executive may leave after the vesting period ends without forfeiting the money for unvested stock options. Within this field, it has been argued that the granting of executive stock options may serve as a substitute for cash payment in order to gain some favourable advantage associated with non-expending cash payment, particularly for firms with dividend constraints (Hanlon, Rajgopal and Shevlin, 2003). On the same issue, the literature on corporate governance point note a tendency among companies to invite their employees to purchase a company's shares, particularly companies experiencing financial difficulties, in order to avoid a hostile takeover.

Through the granting of employee stock options, the firm is explicitly seeking to align the interests of managers with shareholders, but the granting of such options may also give rise to the risk-adverse type employees, while at the same time encouraging excessive risk-taking behaviour among top executives. The reported empirical evidence in this area shows that while stock options might be a popular

method for executive payments, its popularity tends to wane when the stock option is largely allocated to non-executive employees (Core and Guay, 2001; and Kedia and Mozumdar,2002). Other sections of this wide and extensive field note that the use of stock option compensation plans are not entirely consistent with the intention of awarding stock options, which therefore raises questions on the efficiency of stock options (Meulbroek, 2001; and Hall and Murphy, 2002). The efficiency of stock option has also received attention in the corporate governance literature with emphasis placed on managerial efforts to increase firm value within the spirit of agency theory. Notably, the application of stock option plans in an emerging market, such as Malaysia is not a new phenomenon, since the first use of stock option was first documented in the last two decades, and to the best of our knowledge studies on the use of stock options in Malaysia has not featured in the literature.

As a result of the growing use and influence of stock options in corporations, a substantial literature has focused on the application of stock options, with attention given to uncovering the positive role stock options may have on firm performance. One of the reasons for the wide use of executive stock options is to provide incentives for managers so that they take decision that is, from the standpoint of the firm, value enhancing. A review of numerous contributions to the field indicate that when firms announce stock option plans, the usual response is for the market to process the new information which then shifts the share price in terms of its short-term and long-term performance. But while there's agreement that stock options might result in improvements in firm performance, some studies counter this by noting that the use of stock options have little or no influence in improving firm performance and thus firm value. In light of this observation, it is crucial for this study to examine the impact of stock options on the performance of Malaysian firm, given the prevalence of different ownership types. This should go some way towards helping to shed light on the effects stock options plans have on, in particular, family owned versus non-family owned firms, as well as the corporate governance structure of Malaysian firms. In the latter respect, Claessens, Djankov and Lang (2000) point out that in the corporate sector of Malaysia, there is significant involvement of owners in management as represented, especially in family owned firm. This immediately suggests that the agency problem might be widespread within

Malaysian family owned firms due to the high number of major shareholders who are also members of the board of directors whose attributes directly contrast to what is directly observed in developed markets such as the United States and the United Kingdom in which firms are managed by outside executives. According to the literature, under this arrangement there is a tendency for executives to pursue their own interests rather than the interests of the firm which suggests that stock options might be the best mechanism to counter this problem, while at the same time allowing the interests of both parties to be aligned. The question of whether stock options plans is the best mechanism to align the interest of executives and shareholders provides a further motivation to the study of the effects of stock options on the performance of Malaysian firms.

Another reason for the present investigation derives from a number of notable studies which shed light on the incentive effect of stock option plans in the United States and the United Kingdom using firm level data. Although few studies have examined the incentive effects of stock option plans in Malaysia, perhaps due to the statutory requirements for a centralised government-managed retirement fund (Obiyathulla, Syarifah Raihan, Mohd Eskandar and Azhar, 2009), the literature is more partial towards accounting disclosure. Closer examination suggests that many Malaysia PLCs began to adopt stock option plans as part of a wider compensation package, which might explain why there is a dearth of studies that have examined the use of stock options in Malaysia. On a practical level, all the indications are that the use of stock option plans in Malaysia is widespread due to the perceived benefits which, in turn, has motivated Malaysia PLCs to increase the size of their stock options, while the Malaysian government in seeking to seize an opportunity launched, in 2011, a Private Pension Fund for the benefit of private sector employees and the self-employed.

The third motivation for this thesis derives from the response to the statement made by Samsa and Scheidt (2003) who note that the nature of Malaysian laws and regulations' should be compiled separately because it does not provide clear guidance as to how the law should be enforced. In consequence, the speed of law

enforcement is seriously impeded. Seemingly, there is no interrelation among the legal structure practised in Malaysia. The law that is currently enforced is not compatible with laws on stock options that have been enforced in countries such as the United States and the United Kingdom. By studying the laws applied to the use of stock options will go some way towards shedding light on best practices in countries that have employed wide use of stock options, as well as providing an input for government to update the regulatory frameworks in line with international standards. One of the areas that should be given due emphasis are the rules applied to taxation, which is closely associated with the issue of tax benefits. In this area Malaysian taxation rules do not provide favourable tax, either for individuals or firms. However, in countries where stock option plans have a long history, such plans do offer tax benefits in the form of a tax shield due to the absence of any expenditure at the time of the granting of stock options (Aier and Moore, 2008). Besides, it defers the tax liability until such time the employee realises the gains from exercising his or her stock options, which provides us with a further motivation to embark on a study of Malaysian PLCs to uncover the personal tax effects associated with the use of stock options.

Having recognized the effects stock options plans can have on firm performance, understanding its role and influence in Malaysia becomes an important issue to detect. As it stands however, while the literature is large, it is often at odds regarding the overall effects of stock option plans. And although this is not entirely surprising due to the complexity of the problem at hand, it suggests that any contribution to the literature should carefully explore the robustness of the conclusions drawn. This therefore represents one of the key motivations for this thesis. Accordingly, our purpose is to examine the effects of executive stock option grants in Malaysia along a number of dimensions that contributes to the existing literature.

1.2 Research methodology

The literature on executive stock options is not explicit about which particular statistical approach should be applied to this question. It rather consists of a combination of empirical methods to explore several related aspects. The present research follows in this line and makes use of the range of statistical approaches used in the literature.

The subsequent essays in this thesis address specific issues, commencing with Essay 1, which assess the legal and regulatory framework governing the use of executive stock option plan in Malaysia. The study use a common method used in legal studies which draw on both positive and normative analysis. The positive analysis approach is based on descriptions to explain the phenomena of using executive stock option and evaluate the impact of the legal policy changes given the ways to respond to the incentives of the policy, whereas the normative analysis approach is conducted on a prescriptive and judgmental basis. Thus making policy recommendations based on the economic consequences of various policies have affected the application of executive stock options.

Essay 2 examines the effects of the announcement of executive stock option on firm performance, testing for both short-term market reaction and long-term performance. An event study methodology is used to investigate the effects of stock options on share price performance, which allows us to determine whether there is an abnormal stock price effect associated with an event. From this, it infers the significance of the event based on the assumption of an efficient market. It should be noted that the length of time period used in this study accounts for the possibility that investors might respond to event signals in cases where the share prices does not immediately or fully reflect all available information.

Essay 3 examines the consequences of executive stock option plans on executive turnover. The relationship is empirically examined using the logit regression model. This method is appropriate for the response takes one of only two possible values representing executive turnover and no turnover in given years for the study.

Moreover, using the logit regression model allows us to provide valid estimates, regardless of the design of the study (Harrell 2001).

Essay 4 examines the effects of executive stock option grants on taxation. In particular, the study identifies the impact of changes in tax policy (marginal tax rates) on stock option grants in relation to cash pay received by executives. Gritsch and Snyder (2007) employ both logit and tobit model to determine tax savings, in which two tax rates, personal and capital gain tax entered the equation. There are some studies that use ordinary regression model to capture its effects. However, since the dependent variable is not binary in nature and also given non-presence of censored data, the logit and tobit regression model could not be employed in this study. As a result, I use an ordinary regression model which is more appropriate for this study to examine the degree of impact stock option has on total compensation. Therefore, from the tax standpoint, stock options are likely to have a positive relation during periods of good corporate performance, and therefore the tax saving is likely increase. Thus, stock options may be used as a means of producing tax preferential for executives and the firm, and seemingly a clear relationship should exist between tax incentives and stock option plans.

1.3 Structure of the thesis

In the subsequent section I review the literature on executive stock options placing emphasis on the main themes of this thesis. In this context, I review a number of studies dealing with the use and effect of stock options plans that divides into employee and executive stock options comprising a number of incentive effects and the effect of stock option grants on taxation. This section of the thesis extends and reinforces some of the points made in this introduction. In addition to this general literature review, I also provide a brief survey of the literature in each of the corresponding chapters. Based on the literature reviewed, the discussion in this chapter discusses the main findings as they relate to the incentive effects on firm performance, executive turnover and taxation. Essay 1 introduces our first investigation, which examines the legal and regulatory frameworks governing executive stock option plans in Malaysia. It begins with a brief discussion on the

feature, basis and legal aspects on how stock options operates within the market at the international level which principally focus on the U.S, U.K., Japan and Singapore. The essay then proceeds to examine the regulatory frameworks underpinning stock option plan in Malaysia and discusses the associated issues under which the plans operate (that is accounting and taxation), before discussing the reform in jurisdictions that would benefit Malaysian firms as Malaysia moves closer into line with international standards.

Essay 2 examines the effect of announcement executive stock option on firm performance in the short-term and long term. Using a standard event study methodology, the results reveal a negative share price before announcement in the short-term followed by a positive effect which is in line with conclusions obtained in previous studies. However, such announcements do not carry any surprise to the market which confirms that early information releases before official announcement can be ruled out. For the long-term effect, the results indicate that stock option plans do not have a significant effect on long-term firm performance, which implies that executive stock option plans do not entirely improve firm value in Malaysia.

The next essay is essay 3 which examines the relationship between executive stock option plans and top executives turnover in Malaysian listed firms. In brief, the study examines the effects of executive stock option plans in mitigating unplanned turnover at executive levels by taking into account the mediating control variables at firm level such as ownership structure, corporate governance, firm characteristics and level of pay. The consequences of executive turnover are focused on firm performance. The result shows that poor firm performance lead to high executive turnover based on the use of accounting and market performance measures. In evaluating executive turnover, the study found no evidence that accounting measures are any better than market–based performance measures. When examining executive replacement decisions according to turnover types such as routine and forced turnover, the empirical results indicate that current firm performance influence decisions taken for executives to be dismissed. Other factors are also found to influence executive turnover, as the finding indicate that managerial ownership,

board attributes and firm size do not leads to high turnover. However mix pay is found to influence top management turnover.

The last essay is Essay 4 which examines the tax incentives on executive stock option plans. In brief the study identifies the preferential tax treatment for personal taxpayer and the firm. The result indicates that personal taxpayer may extend their tax liability usually for three to five year following the grant date. For granting firms, however, executive stock options do not provide any preferential tax treatments. This is due to limitation in taxation rules which do not allow expenses-related stock option for tax deduction. Further analysis indicates that tax policy changes affect the tax benefits received by executives and the firm. The empirical result suggests that changes in the income tax rate influence equity-based payments. Similar effects are observed for gains from stock option exercised which implies that executive stock options are responsive to changes in ordinary income tax rate. Moreover, the study emphasize that by imposing similar tax rate for executive stock options and cash pay is likely to be driven by a psychological contract between executives and the firm, which implies that changes in tax policy (i.e. a decrease or increase in the marginal tax rate) will not reflect the stock option value of the firm.

Finally, the thesis concludes by providing a summary of the main conclusions of each essay and assesses the implications for prior empirical findings, and also offer suggestions for future research.

2.0 EXECUTIVE STOCK OPTION PLANS: A REVIEW OF THE LITERATURE

2.1 Introduction

There is a large number of studies that constitute the literature on the role and use of stock option plans in corporations. In the last 30 years scholars have studied different aspects of the use of stock option plans and their effects on the corporation. Developments along this dimension of enquiry have produced important theoretical and empirical contributions accordingly. To date, researchers have examined several aspects of the use of stock options in corporations with the majority of research papers focusing on executives and employee stock option plans that comprise a number of incentive effects in stock options usage, as well as the effect of stock option grants on taxation.

The main objective of this section of the thesis is to provide an overview of the literature on stock option plans as well as to highlights the approaches used for the valuation of stock option pricing and the rationale for adopting stock option plans in corporations. Our goal is to place the research topics of this thesis in a broader context, emphasising the relationship to different strands of the literature. I intend to review these branches of the literature in order to mark the sensitivities of our main variables of interest.

2.2 Main strands of the literature

According to Gelderblom and Jonker (2003) and Espen and Nassim (2009), the application of stock option plans is a not a recent development. Historically, the first use of option contracts occurred in the 1600s, although no specific information is known about the exact time and date when options were first traded. Nevertheless, it has been argued that the first trading in options contracts was conducted in Holland when they were first used by Amsterdam grain dealers in 1550. Since 1550, the extensive use of this instrument was observed around the time of tulip options

trading in 1637, followed by trading on London's financial market during 1700s. Since the 1700s, stock options have been widely used across European countries.

The development of stock options is common place and has been increasingly available in the U.S. since 1920s, though some studies note that the origin of stock option plans in the U.S. only became widely used in the 1930s when they were seen as a means of tax avoidance among salaried executives. The 1960s is the period in which stock options became more pronounced at the non-executive levels when new economy firms such as the high tech firms in Silicon Valley began to offer stock options at all levels of the firm. Since then, stock options have gained popularity and are now increasingly used within the corporate sector.

In the 1970s, trading in stock options was expedited by the development of the theory of option pricing as well as the emergence of organized stock options exchanges such as the Chicago Board Options Exchange (CBOE), which was the first exchange to commence trading in stock options. In the 1980s, the deregulation of financial markets combined with enhanced market volatilities stimulated activity in the use of options, and now options exchanges are to be found in international markets. Over the years, a growing number of the listed options have shown positive developments in response to the passing of new laws which allowed financial institutions to incorporate options in their portfolios. As the use of options grew, so too was the trend in the use of stock option grants which continued well into the 1990s as a result of a growing number of U.S. corporations showing interest in equity sharing. Further emphasis was given to stock options during economic expansion and, with it, the rapid growth of technology-based companies in the 1990s which led to the popularity of stock options as a method for executive pay in a number of countries (Hall, 1998). However, it is widely acknowledged that the misuse of stock options can affect not only grant value but may also have a detrimental effect on the reputation of the firm, thereby giving rise to two major effects. These effects include the allocation of stock options extended to non-executive employees. This has been highlighted by the reported evidence of Sharma (2006) who notes that that stock option size has been reduced by one-third (from $119 billion to $71 billion) and that non-executive are predominantly holders within the US corporations. In addressing this issue, Hall and Murphy (2003) note that it

makes little economic sense to provide all employees with stock options as it incurs unnecessary expenses particularly when it comes to the administration of options plans.

In addition, the U.S. corporate scandal over accounting methods produced additional effects with stock option grants which become a source of public debate among academics and finance experts. One of the debates revolved around packages offered to executives, which contend that the roles of stock options are not consistent with the real intention of awarding equity plans (Meulbroek, 2001; and Hall and Murphy , 2002). It is also argued that stock options might substitute the manager's interest in the place of the shareholders. This particular perspective suggests that stock option grants help executives to mitigate moral hazard problem in the context of pay-setting designs. This would ensure that the stock option grants for senior executives are not exceeding the optimal level of existing shareholders (Hanlon, Rajgopal and Shevlin, 2003). Related studies on this issue conclude that stock options would be best served as an alternative to cash payment which would go some way towards motivating existing staff and at the same time helping to attract new talents into the firm. Other than that, the likelihood of some firms granting stock options to employees is primarily for the purpose of gaining the non-expending cash payment incentive, so that their profits can be retained. However, it is widely acknowledged that all firms believe that attractive compensation plans would enhance staff performance and firm value and, if successful, will ultimately minimise potential agency problems.

2.3 Stock option pricing model

The growth and application in the use of derivatives and, in particularly, in the use of warrants begun in 1900s in the U.S and European countries. With regard to the development of warrants, Wang and Ma (2008) divide its growth into three phases involving an early pricing and method theory as the first phase which covers the period in which the mathematical formulation that influence finance theory and improvement in results. The second phase of development highlights the impact on the practice of finance and the application of option pricing models such as the Black and Scholes (1973) option pricing model which become more influential owing to

the ease at which practitioners could use the model to price options. Thus the Black-Scholes model provides a reliable method of pricing stock options that is widely employed by the industry. The third phase is a modification of the Black-Scholes model whereby many scholars have made amendments to the model and as a result the model has become more applicable.

The earliest theoretical work on option pricing is attributed to Bachelier, a French mathematician, whose thesis deals with the pricing of options in speculative markets, an activity which is an essential part of modern finance. Bachelier's work provides a framework on option pricing which marks the path of continuous-time mathematics of stochastic processes and the continuous-time economics of derivatives security pricing. Bachelier's only influenced Kiyoshi Ito's work on stochastic calculus but also Paul Samuelson's (1965) theory of rational warrant pricing. The new financial models that emerged, such as stochastic differential dynamic portfolio theory, the capital asset pricing model and derivative-security pricing which appeared towards the end of the 1960s and in the early 1970s were developed using the aforementioned mathematical tools.

Among the most notable progress in the financial application literature is the period between the 1960s and 1970s, just prior to the development of the Black-Scholes model, which witnessed a series of innovative finance papers which was to have a significant bearing on modern finance. These include Sprenkle (1961), Ayres (1963), Boness (1964), Samuelson (1965), Thorp and Kassouf (1967), Samuelson and Merton (1969) and Chen (1970), all of which make some contribution prior to the publication of the Black-Scholes-Merton option pricing models which helped to provide a more profound understanding of option pricing. Schaefer (1998), for example, point out that the pricing formula of Sprinkle (1961) is very close to the model of Black-Scholes (1973) with the assumption that stock prices are log-normally distributed and drifted in the random walk, but had overlooked the negative share price that allowed risk aversion and had also failed to estimate the value of the parameter for share price growth and the degree of risk aversion. Another significant development is the work of Samuelson (1965) which includes the stock risk level by

the arbitrary parameters, dependent upon investors' preferences towards the level of risk and rate of returns. Samuelson (1965) used a Brownian motion to eliminate the occurrence in negative asset prices and, in combination with Merton (1969), the extension of the theory is primarily in the use of a discount rate to establish investors' decision to hold the option and the fact the option price is a function of the stock price. Both papers are built on a strong set of assumptions that:

i) the stock price is log-normally distributed,

ii) the investors utility function is ISO-elastic, and

iii)the bond and option are in zero net supply

These approaches are similar to Black-Scholes option pricing formula which, it has been argued, is a milestone for splitting between warrant and option. A stock option is a simple-type of European call option, whilst the parameters of Black and Scholes formula are easy to estimate. The derivation of the Black-Scholes options pricing model is based on a number of assumptions as follows:

a) The short term interest is known and is constant through time,
b) The stock price follows a random walk in continuous time,
c) The stocks pay no dividend,
d) The option is European and it can only be exercised at the maturity date,
e) No transaction costs of buying or selling the option,
f) It is possible to borrow any fraction of the price of a security and to buy or to hold it at the short term interest rate,
g) Short selling is allowed such that an investor can sell shares that he does not own and trading takes place continuously.

Based on the above assumptions, stock option value seemingly could be affected by the factors of price and time and other constant variables. If a long and short position in the stock option is relied on the time and the value of known constants, it would therefore create a hedge position. As a consequence, the stock option value is derived as a function of the stock price and time. The principal contribution of Merton to option-pricing relates to the dynamic trading strategy as prescribed by Black-Scholes which is used to offset the exposure risk of stock option. It also

provides a hedge in the continuous trading limit, while the payoffs on the options will be exactly replicated, if one can conduct trading continuously without cost combined with the use of the underlying traded and riskless assets.

The final stage in the development of option pricing models lies in the study of Wang and Ma (2008) which covers the period following the publication of Black-Scholes model when some scholars discovered that pricing models formulated on strict assumptions seemingly predicted that the market does not exist for investment opportunities. It is also observed that the existing Black-Scholes model fails to take into account dilutive effect and the volatility of stock prices, while the literature on model improvement in the traditional Black-Scholes model involved several modifications to the existing assumption on dividend payments, dilution and volatility. The traditional Black-Scholes model indicates that a dividend would not be paid in advance, but in reality this is not impossible, as highlighted by Merton (1973).

With regard to the dilution effects, it is noted that upon the employee exercising the options that the likely result is for an increase in the equity capital of the firm. On this particular issue, Wang and Ma (2008) note a number of studies that consider the impact of dilution on option pricing, including Gala and Schneller (1978) and Hall (2003). Several extensions to the Black-Scholes option pricing formula have also been documented by Jennergren and Naslund (1993) which include the variable of forfeiture and early exercise behaviour in the Black-Scholes-Merton model. Pandher (2003), for example, finds that the model ignored the realisation value of early exercise that would generate loss or in other words the stock option becomes worthless, while Finnerty (2005) modified the Black-Scholes-Merton frameworks by including four critical factors involving vesting requirements, early exercise, forfeitures and transfer restrictions. The modified model emphasises that the employee cannot exercise the stock option before the vesting ends and that the value will be worthless if the employee leaves the firm with reasons such as resignation, retirement, death or voluntary termination. All these reasons are considered as the risk-type that cannot be hedged by firms, though the effects would be different if the

holder voluntary forfeits within the allowed period and exercises after the vesting period. Thus if an employee decides to voluntarily forfeit his benefits of the stock options, the probability for the stock options to expire and render it to be worthless is high. This is due to the fact that stock options are non-transferable. Finnerty (2005) classifies this kind of risks as idiosyncratic which can be diversified away if the risk adverse investors value the stock options based on the risk-neutral probability of vesting. It is noteworthy to mention that if the value of options is in-the-money, then the employee will be able to exercise the option freely between the vesting date and the expiration date in the annual fraction value. In addition, Finnerty (2005) provides reasons under which the stock options' holder may exercise early to accommodate financial liquidity needed through diversifying the portfolio (risk adverse type), even though it will be very costly to sacrifice the remaining time value of stock options. Thus in order to gain the liquidity, the holder must exercise and sell the share in which the stock option provides risk on the defer payment for the shares until exercised. It should be noted that early exercise behaviour might occur until the vested and, if-in-the-money, will require adjustment during the vesting period. Finnerty (2005) treats the exercise and forfeiture of stock options as the type of stochastic process in the Black-Scholes-Merton model that leads the employee stock options to be overvalued. In a more recent study, Espen and Nassim (2009) review the historical evidence and report no invention pricing formula in the Black, Scholes and Merton due to the removal of some economic determinants of the "risk" parameter through "dynamic hedging".

Several attempts have also been made to develop alternative option pricing models post the Black-Scholes and Merton era. Models include Huddart (1994) and Kulatikala and Marcus (1994) who developed computations for a certain price between trade and hedge-restriction option and non-option in the risk-free asset, while Rubinsten (1995) using forfeiture risk faced by option holders developed an alternative option pricing model based on the binomial utility-based model, and Carr and Linetsky (2000) who drew on a continuous-time executive stock option (ESO) valuation model to develop a model based on the assumption of constant exercise and forfeiture intensity. These developments aside, some studies have focused on extending the existing models. For example, Aboody (1996) extended the binomial

model introduced by Cox, Ross and Rubinsten (1979) to value employee stock options under the assumption that ESO price must be adjusted downward due to probability of early termination in the firm. However, since this is not one of the main research themes of the thesis, I do not devote further attention to other strands of the literature except to note that from an accounting standpoint; only two models are used to value option grants through the use of either the lattice model or the Black-Scholes-Merton model. But it stands to reason that the Black-Scholes-Merton model has made the most significant of contribution to the academic literature.

2.4 Employee stock option plans

A considerable amount of literature has discussed at length the use of stock options across the firm (Yermack,1995; Aboody,1996; Baker, 1999; Murphy,1999 and Core and Wayne, 2001). These studies generate evidence about interests amongst firms that establish stock option plans which gained popularity during the 1980s and over recent times due an increase in economic activity and the growth technology based firms. Stock option plans are now more commonplace and are therefore frequently used to compensate executive and non-executive employee pay. In essence, stock option plans refer to the right of employees to purchase a firm' shares at a pre-specified price (exercise price) with the terms that they cannot immediately exercised. Moreover, the common exercise price charged to employees is equal to the market price on the grant date (at-the-money) and expires in several years (normally in a ten year period). The expiry date occurs due to the non-transferable feature of stock option plans, which will be automatically forfeited should the employee leaves the job before the vesting ends.

Generally, stock option grants are split based on the beneficial groups and it serves as an explanation for the observed application which might vary substantially across firms. Several studies emphasise the application of stock option plans allocated at executive levels (Bettis, Bizjak and Lemmon, 2005; Core and Guay, 2001; and Kedia and Mozumdar (2002). Bettis, Bizjak and Lemmon (2005) note that the executive positions encompasses posts such as chief executive officer (CEO), chairman of the board, president, chief operating officer (CEO), non-management