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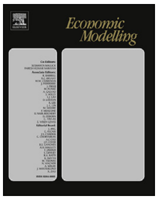

The impact of dividend-protected CEO equity incentives on firm value and risk[☆]

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ABSTRACT

Stock options and restricted stock are the two main vehicles of equity-based compensation. In this paper, we analyze how different dividend treatment of stock options and restricted stock grants impacts stock price and the riskiness of the firm. We find that if a firm's manager's utility function includes contemporaneous dividends (as in the case of restricted stock grants), the manager increases the risk level of equity in order to maintain the preferred risk level of her utility function. Increased risk level negatively impacts stock price, *ceteris paribus*. However, the calibrated model reveals that the impacts are rather trivial, specifically, equity value is lower by 1.5% and leverage is greater by 4%.

1. Introduction

Equity-based compensation is used to align the interests between managers and shareholders. In recent years, the equity component (i.e., the mix of restricted stock and options) of the median chief executive officer (CEO) of all the ExecuComp firms is equal to around half of the total CEO pay (Murphy, 2013). In 2011, options accounted for 21% of S&P 500 CEOs' pay and the proportion of restricted stock increased to 36% (Murphy, 2013). Stock and options differ in several ways: costs to a firm, incentive structures, accounting treatment and tax implications, and dividend treatment. Previous studies have extensively analyzed the above-mentioned differences except for the last one.[1] Despite the executive option grants are reduced significantly over the last decade (see, for example, Murphy (2013)), firms still grant them and, in our view, it is important to understand the different features and implications of stock options and restricted stock in order to properly design the executive remuneration contracts. This study fills the gap. In this paper, we isolate the different dividend treatment of stock options and restricted stock grants from other differences between stock options and restricted stock and analyze how it impacts the stock price and the riskiness of the firm.

There is an extensive literature on how firm value and risk and are impacted by stock options and restricted stock grants. Agrawal and Mandelker (1987) report the positive relation between common stock and option holdings of managers and the riskiness of the firm measured by leverage and return variance. Mehran (1995) finds that Tobin's q and return on assets both increase with the percentage of equity held by managers and with the percentage of their compensation that is equity-based. A more recent study by Habib and Ljungqvist (2005) finds that Tobin's q is positively impacted by CEO stockholdings but negatively impacted by option holdings for the sample of US industrial firms during 1992–1997 period. They argue that CEOs were granted too few shares and too many stock options. Tian (2004) finds that granting more stock options creates greater incentives to increase stock price only if option wealth does not exceed a certain fraction of the total wealth. Additional options reduce incentives and become counterproductive. Further, Tian (2004) finds that stock options lead to lower idiosyncratic (risk and higher systematic risk. Similarly, Armstrong and Vashishtha (2012) find that stock options help increase a firm's total and systematic risks but have no impact on the firm specific risk. The authors argue that this might adversely affect firm values due to excessive systematic risk in equity markets. Lewellen (2006) reports

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[1] We discuss the differences in more details and associated empirical tests in Section 2.

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that leverage is positively impacted by option ownership and negatively impacted by share ownership.

Several recent theoretical studies analyze the optimal contracting and risk-taking incentives. Dittmann et al. (2017) argue that risk-averse firm managers should be provided both risk-taking and effort incentives. The authors illustrate that the inclusion of risk-taking incentives in the standard model leads to the significantly improved explanatory power of the model. Buchner and Wagner (2017) analyze the compensation structure of private equity fund managers. They find that risk-taking incentives depend on fund managers' individual skill levels and the availability of follow-on funds. If the latter are not available, the compensation contract leads to the excessive risk taking. However, if fund managers take consider fees from follow-on funds then skilled managers might even reduce fund risk. According to Citci and Inci (2016), the excessive risk taking of the firm manager might indicate aggressive compensation structure or manager's incompetence. Low-ability manager can undertake risky projects with high probability of failure in order to camouflage his or her incompetence. If a project turns out to be not successful, then the failure would be explained by the high level of the project's risk but not by the incompetence of the manager.

Several recent studies analyze the determinants of the optimal mix of restricted stocks and option grants. Core and Guay (1999) report that the optimal mix of incentives from stock and options – defined as the logarithm of the sensitivity of the total value of stock and options held by the CEO to a 1% change in stock price – depends on firm size, growth opportunities, and monitoring costs. Core and Guay (1999) find that firms use annual grants of options and restricted stock to CEOs to manage the optimal level of equity incentives; that is, firms use new grants of stock options and restricted stock to correct deviations from the optimal incentive levels.[2] A dynamic model in Parrino et al. (2005) implies that the combination of stock options and restricted stock held by managers impacts their risk-taking incentives. Ortiz-Molina (2007) finds that stock option grants and the probability of receiving new option grants decrease in leverage, but they increase in the amount of convertible debt. Kadan and Swinkels (2008) analyze the choice between stocks and options to provide effort incentives to a risk-averse manager. Their theoretical model and empirical tests imply that the proportion of restricted stock in the compensation mix increases with bankruptcy risk (measured in the empirical analysis using Z-score, KMV-Merton default probability, and credit rating).

A dynamic model should be used to analyze how different dividend treatment of stock options and restricted stock grants impacts stock price and the riskiness of the firm at least for two reasons. Firstly, static models ignore the risk and time preferences of the firm's manager that impact on how the firm's future cash flows will be distributed over time. Dividends are one of the inputs of the manager's utility function. Thus, static models would not be able to capture the dynamic relation between the dividend treatment and corporate policies. Secondly, the firm's financing, investment, and operating policies are interrelated with each other. The different dividend treatment of stock options and restricted stock grants might impact stock price and the riskiness of the firm through various channels and even indirectly. For example, it could impact firm's investing decisions which eventually lead to certain changes in debt-to-asset ratio. To account for the endogenously determined firm policies, a model that incorporates simultaneous operating, financing, and investment decisions should be used in the analysis.

We expand the dynamic partial equilibrium model developed in Karpavičius (2014b) to include dividends in the manager's utility function. That is, we assume that the firm's manager maximizes either *a*) the market value of equity or *b*) the sum of the market value of equity and total contemporaneous dividends. The model replicates the life and simplified behavior of a representative firm in a dynamic world with a changing environment. We assume that in each period, to respond to the changes in the environment (i.e., exogenous shocks), the firm's manager makes several simultaneous decisions, specifically, how much to produce, how much to invest in capital stock, and how much capital to raise in the external equity and debt markets. The relation among all endogenous variables and their dynamics are jointly determined in equilibrium.

Suppose, initially, the manager's objective is to maximize stock price (or market value of equity) which does not include contemporaneous dividends. Given that dividends are less risky than equity, once contemporaneous dividends are added to a firm manager's utility function (as in the case of restricted stock grants), the weighted average of the riskiness levels of the equity and total dividends drops below the preferred risk level from the manager's perspective. As a result, the manager increases the riskiness of equity, and the weighted average of the riskiness levels of the equity and total dividends reaches the initial riskiness level again. Assuming that dividends per share are constant, the higher risk level of the equity implies higher effective discount rate and, thus, a lower share price.

We calibrate the model as in Karpavičius (2014b). The calibrated parameter values imply quite reasonable firm characteristics in the steady state and reveal that the impact of the inclusion of contemporaneous dividends in a firm's manager's utility function on stock price is −1.5%. Given the constant dividend stream, lower stock price leads to higher return on shareholder capital. We show that firms run by managers who maximize the sum of the market value of equity and contemporaneous dividends are riskier; that is, they have a greater financial leverage (by 4.0%) and slightly greater probability of default. The magnitude of the effects is rather trivial. Nevertheless, the non-inclusion of dividends in the payoff of stock options reduces to some extent managerial risk incentives associated with non-linearity of the option's payoff.

The rest of the paper is structured as follows. Section 2 discusses the key differences between restricted stock and stock options grants. Section 3 develops a dynamic stochastic partial equilibrium model. Obtained results are detailed in Section 4. Finally, Section 5 concludes.

2. Restricted stock vs. option grants

Dittmann and Maug (2007) calibrate the standard principal-agent model with constant relative risk aversion and show that the optimal contract should include stock and lower base salaries but not options. However, the model with loss-averse CEOs in Dittmann et al. (2010) can explain observed option holdings and high base salaries. Thus, theoretical models can explain why firms use both restricted stock and option grants to motivate and remunerate their managers.

Stock grants and option grants are different to a firm in four ways: riskiness, incentives provided to executives, accounting and tax implications, and dividend treatment.[3] Below, we discuss the differences between restricted stock and option grants in more details.

2.1. Riskiness

CEO vega rather than pay-performance sensitivity (which is equivalent to CEO delta) reflects managerial risk preferences and helps encourage risk-taking (Coles et al., 2006; Low, 2009). Managers with higher

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[2] Most of the literature on optimal CEO compensation has focused on the CEO incentives measured by CEO portfolio delta (the change in the CEO's wealth for an incremental change in the stock price or pay-performance sensitivity) and vega (the dollar change in the CEO's wealth for a 0.01 change in standard deviation of stock returns) rather than on optimal ratio of restricted stock to stock options. See Murphy (2013) for recent survey on executive compensation.

[3] In addition, restricted stockholders have voting rights whereas option holders have no voting rights.

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