

An optimal dividend and investment control problem under debt constraints

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In this work, we consider the problem of determining the optimal control on the dividend and investment policy of a firm. There are a number of research on this corporate finance problem. In [1], Décamps and Villeneuve study the interactions between dividend policy and irreversible investment decision in a growth opportunity and under uncertainty. We may equally refer to [2] for an extension of this study, where the authors relax the irreversible feature of the growth opportunity. In other words, they consider a firm with a technology in place that has the opportunity to invest in a new technology that increases its profitability. The firm self-finances the opportunity cost on its cash reserve. Once installed, the manager can decide to return back to the old technology by receiving some cash compensation.

As in a large part of the literature in corporate finance, the above papers assume that the firm cash reserve follows a drifted Brownian motion. They also assume that the firm does not have the ability to raise any debt for its investment as it holds no debt in its balance sheet. In our study, as in the Merton model, we consider that firm value follows a geometric Brownian process and more importantly we consider that the firm carries a debt obligation in its balance sheet. However, as in most studies, we still assume that the firm assets is highly liquid and may be assimilated to cash equivalents or cash reserve. We allow the company to make investment and finance it through debt issuance/raising, which would impact its capital structure and risk profile. This debt financing results therefore in higher interest rate on the firms outstanding debts. Furthermore, we consider that the manager of the firm works in the interest of the shareholders, but only to a certain extent. Indeed, in the objective function, we introduce a penalty cost P and assume that the manager does not completely try to maximize the shareholders value since it applies a penalty cost in the case of bankruptcy. This penalty cost could represent, for instance, an estimated cost of the negative image upon his/her own reputation due to the bankruptcy under his management leadership. Mathematically, we formulate this problem as a combined singular and multiple-regime switching control problem. Each regime corresponds to a level of debt obligation held by the firm.

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References

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