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Different Dividends Tax, Growth Prospects and Maturity Structure of Liabilities

Yi Wu and Cunzhi Tian
Economic Research Center, Kunming University of Science and Technology,
650093, Kunming, Yunnan, China

Abstract: This study analyzes the influence of different tax rate on dividends over the company's maturity structure of liabilities. The theoretical model introduces the growth opportunity, based on the external financing analysis framework under asymmetric information. Through theoretical derivation and numerical calculations, this study gets some meaningful conclusions. The long-term debt increases with the increasing of different tax rate on dividends. The short-term debt decreases with the increasing of different tax rate on dividends and growth opportunity. In other words, the debt maturity structure will be influenced by growth opportunity and different tax rate on dividends. Furthermore, the different tax rate on dividends is beneficial to the entrepreneur engaged in long-term investment.

Key words: Differentiated taxes on dividends, growth opportunity, debt maturity structure

INTRODUCTION

In the past forty years, an important change in the global tax policy is the integration tendency of the corporate income tax and profit distribution tax for the tax structure of a country (Sunley, 1992). This is because in most countries, the tax system for investors is a double taxation system before. That means the tax department could levy dividends tax obtained by investors in addition to corporate income tax on profits. This is a manifestation of the classical tax system and its significant feature is the discrete between corporate tax and personal income tax. Arlen and Weiss (1995) believe that the system is "unfair and inefficient". Practice has fully proved that direct consequence of "The dividend tax system" is the increase in tax burden of the equity financing and capital cost, which then allows companies reluctant to equity financing but willing to retained surplus debt. Therefore, reforming the traditional dividend tax system, decreasing the cost of equity financing, optimizing the capital structure and improve economic efficiency become the goal long sought by the countries. In this context, different tax rate on dividends as a new dividend tax policy has attracted much attention. This new tax policy means that, under the condition of a decline in the overall tax burden, the tax department will implement different tax rate according to the holding period. From a dynamic perspective, this change could adjust the investors' tax structure. Ultimately, the different tax rate will optimized the structure of capital market and then encourage long-term investment.

Debt financing is a major financial decision making behavior and debt maturity is an important content of debt contract which regulates the rights and obligations of the creditor and the debtor. The risk and uncertainty of the future increase with the increase in debt maturity and then the creditor will pay more attention to external compliance mechanisms when providing loans. Overall, existing theories explaining the choice of the company's debt maturity structure can be classified into three categories: Agency costs hypothesis, signaling hypothesis and taxes hypothesis. Reducing the agency costs of financing contract is one of the major factors for choosing debt maturity structure. Hart and Moore (1995) hold that governance effect of short-term debt financing contract is mainly reflected in the liquidation of enterprises and constraint of operators' decision for the free cash flow and for long-term debt financing contract, it is mainly reflected in preventing the invalid expansion of managers. Flannery (1986) and Kale and Noe (1990) study the signaling effect of the company's maturity structure of liabilities. The valuation of long-term debt is more sensitive to changes in enterprise value compared with the short-term debt. Brick and Ravid (1985) and Brick and Ravid (1991) put forward the taxes hypothesis with certain and uncertain interest rate respectively. They indicate that issuance of long-term debt is beneficial if the interest rate is certain and the yield curve is upward sloping. The reason is that long-term debt has a higher tax shield than short-term debt and then reduces the company's expected tax burden and increases its market value.

Corresponding Author: Cunzhi Tian,Economic Research Center, Kunming University of Science and Technology, 650093, Kunming, Yunnan, China Tel: 0086-18908807251

On the basis of the fixed-investment model and external financing analysis framework under asymmetric information (Tirole, 2010), this study investigates the effect of different tax rate on dividends over the company's maturity structure of liabilities with the growth opportunity model.

MODEL AND ASSUMPTION

This study introduces different tax rate on the base of the fixed-investment framework and gives the basic assumptions in the following:

- Participants: An entrepreneur and investors
- Three periods: Aate 0 represents ex enter period; date 1 represents intermediate period; date 2 represents ex post period
- At date 0, the entrepreneur has a project requiring a fixed investment I and initially has assets A and needs to borrow I-A from investors
- At date 1, the investment yields deterministic and verifiable income $r \geq 0$. Besides, the firm has a new opportunity to reinvest which requiring reinvesting an amount ρ, where ρ is ex ante unknown and has cumulative distribution function $F(\rho)$ with density $f(\rho)$ on $\rho \in [0, \infty$
- The firm continues whether it could come up with enough cash to reinvest or not. Where the payoffs in the cases of success and failure remain R and 0, respectively
- At date 1, the firm continues and succeeds with probability P in the absence of cash reinjection but the probability of success in the case of reinvestment becomes $P+\tau$, where $\tau>0$ and P is affected by the effort degree of the entrepreneur, however the effort degree of the entrepreneur is unobservable. Behaving yields probability $P = P_H$ of success and no private benefit to the entrepreneur and misbehaving results in probability $P = P_L < P_H$ of success and private benefit $B>0$. Let $\Delta P = P_H < P_L > 0$
- Both the entrepreneur and the investors are risk neutral, the riskless rate is taken to be 0
- The entrepreneur is protected by limited liability
- Investors behave competitively in the sense that the loan, if any, makes zero profit
- The government takes different tax policies to the stock dividends based on the holding period. T_G is the statutory tax rate for short-term income and the statutory tax rate for long-term income is T_G-ΔT. Where $\Delta T>0$ is the parameter of different tax rate

The action timing of participants can be summarized in Fig. 1.

OPTIMAL MODEL

Suppose that the financing contract between the entrepreneur and investors takes the following state-contingent form:

$$\{\rho^c;(0,R_b,0);[(1-T_G)r;R_1,0]\}$$

where, the contract specifies that ρ^c is a cutoff of reinvestment: The firm reinvests only if $\rho \leq \rho^c$; at date 1,

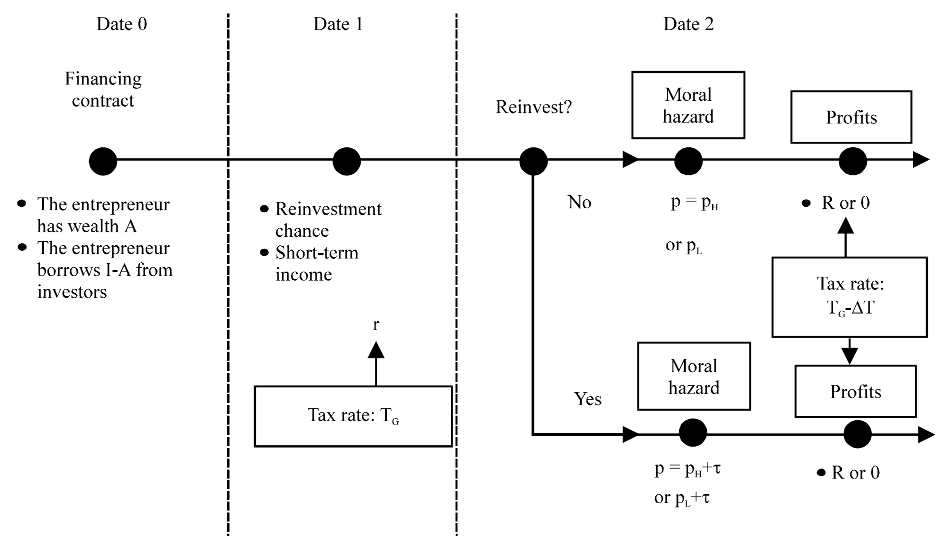

Fig. 1: Action timing of participants

the entrepreneur gets nothing and the short-term income $(1-T_G)r$ will totally owned by investors; if the project success, the entrepreneur and investors get R_b and $R_I = (1-T_G+\Delta T)R-R_b$, respectively; if the project fail, both of them get 0. According to the contract, the probability of reinvestment is:

$$\Pr ob\{\rho \le \rho^c\} = F(\rho^c)$$

Firstly, moral hazard occurs after the investment, so the entrepreneur's incentive compatibility constraint is not affected by the reinvestment. In fact, if the firm could come up with enough cash to reinvest, the incentive compatibility constraint would be:

$$F(\rho^c)(p_H+\tau)R_b \ge F(\rho^c)[(p_L+\tau)R_b+B] \quad (1)$$

where, if the firm can't come up with enough cash to reinvest, the incentive compatibility constraint would be:

$$[1-F(\rho^c)]p_H R_b \ge [1-F(\rho^c)](p_L R_b + B) \quad (2)$$

where, simplify equation (1) and (2), the entrepreneur's incentive compatibility constraint is:

$$(\Delta p)R_b \ge B$$

Secondly, the investors' individual-rationality constraint is:

$$(1-T_G)r + F(\rho^c)(p_H+\tau)R_I + [1-F(\rho^c)]p_H R_I \ge \hat{I} \quad (3)$$

where:

$$\hat{I} = [I + \int_0^{\rho^c} \rho f(\rho)d\rho] - A$$

where, is expected totalinvestment of investors. The Eq. 3 can be simplified as:

$$(1-T_G)r + [F(\rho^c)\tau + p_H]R_I \ge \hat{I}$$

where, so the entrepreneur's optimization problem becomes:

$$\begin{cases} \max\limits_{R_b,\rho^c} F(\rho^c)(p_H+\tau)R_b + [1-F(\rho^c)]p_H R_b - A \\ \text{s.t.} \quad (\Delta p)R_b \ge B \\ \quad\quad (1-T_G)r + [F(\rho^c)\tau + p_H]R_I \ge \hat{I} \end{cases} \quad (4)$$

where, objective function is the entrepreneur's net utility. With a competitive capital market, the investors receive no surplus and so the entrepreneur's utility is equal to the NPV. By substituting the breakeven constraint into the objective function, the objective function can be simplified as:

$$(1-T_G)r + [F(\rho^c)\tau + p_H](1-T_G+\Delta T)R - [\hat{I} + A]$$

OPTIMAL CONTRACT

For solving the optimization problem (4), the characteristics of the objective function $U_b(\rho^c)$ and the function $P(\rho^c)$ should be examined. Where,

$$U_b(\rho^c) = (1-T_G)r + [F(\rho^c)\tau + p_H](1-T_G+\Delta T)R - [I + \int_0^{\rho^c} \rho f(\rho)d\rho]$$

$$P(\rho^c) = (1-T_G)r + [F(\rho^c)\tau + p_H][(1-T_G+\Delta T)R - B/\Delta p] - \int_0^{\rho^c} \rho f(\rho)d\rho$$

$U_b(\rho^c)$ represents the entrepreneur's net utility and $P(\rho^c)$ represents the pledge able income deflated by the expected reinvestment.

Proposition 1: In the optimization problem (4): $U_b(\rho^c)$ is increasing with the increase of ρ^c if $\rho^c<\hat{\rho}_1$ but decreasing with the increase of ρ^c if $\rho^c<\hat{\rho}_1$ and reaches its maximum if $\rho^c = \hat{\rho}_1$. Where:

$$\hat{\rho}_1 = \tau(1-T_G+\Delta T)R$$

Proof: Since:

$$\frac{\partial U_b(\rho^c)}{\partial \rho^c} = f(\rho^c)[\tau(1-T_G+\Delta T)R - \rho^c]$$

and $f(\rho^c)>0$, proposition 1 is true.

Proposition 2: In the optimization problem (4): $P(\rho^c)$ is increasing with the increase of ρ^c if $\rho^c<\hat{\rho}_0$ but decreasing with the increase of ρ^c if $\rho^c>\hat{\rho}_0$ and reaches its maximum if $\rho^c = \hat{\rho}_0$. Where:

$$\hat{\rho}_0 = \tau[(1-T_G+\Delta T)R - B/\Delta p]$$

Proof: Since:

$$\frac{\partial P(\rho^c)}{\partial \rho^c} = f(\rho^c)\{\tau[(1-T_G+\Delta T)R - B/\Delta p] - \rho^c\}$$

and $f(\rho^c)>0$, proposition 2 is true.

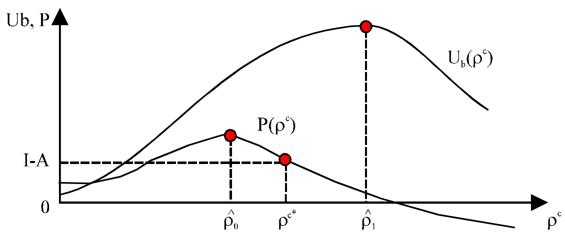

Fig. 2: Optimal policy of further investment

According to propositions 1 and 2, Fig. 2 illustrates the shape of the objective function $U_b(\rho^c)$ and function $P(\rho^c)$ in the optimization problem (4).

Then consider three cases for the solution of the optimization problem (4).

$$P(\hat{\rho}_1) \geq I - A$$

- If $P(\hat{\rho}_1) \geq I-A$, the entrepreneur can get funding and the first-best solution is: $\rho^{c*} = \hat{\rho}_1$ and:

$$R_b^* = (1 - T_G + \Delta T) + \frac{(1 - T_G)r + A - I - \int_0^{\hat{\rho}_1} \rho f(\rho) d\rho}{F(\hat{\rho}_1)\tau + p_H}$$

This equilibrium outcome corresponds to an efficient amount of liquidation that the "first-best cutoff "$\rho^{c*} = \hat{\rho}_1$ which maximizes the entrepreneur's net utility, leaves sufficient income to investors:

- If $P(\hat{\rho}_1) < I - A \leq P(\hat{\rho}_0)$, the entrepreneur can get funding, the first-best solution is $R_b^* = B/\Delta p$, where the cutoff $\rho^{c*} \in [\hat{\rho}_0, \hat{\rho}_1)$ is then given by:

$$(1 - T_G)r + [F(\rho^{c*})\tau + p_H]\hat{\rho}_0 / \tau - \int_0^{\rho^{c*}} \rho f(\rho) d\rho = I - A \qquad (5)$$

In order to be able to invest more ex ante, the borrower accepts a level of reinvestment below the ex post efficient level. The intuition is that, because incentives must be preserved, the entrepreneur cannot pledge to the investors the entire benefit of the reinvestment decision. Also, ρ^{c*} exceeds the per-unit pledgeable income $\hat{\rho}_0$, which is the level that maximizes the borrowing capacity:

- If $P(\hat{\rho}_0) < I - A$, funding is not feasible

COMPARATIVE STATIC ANALYSIS

Defining a cash-rich firm as one that is meant to disgorge money at the intermediate stage: $(1-T_G)\, r > \rho^{c*}$, in particular, $(1-T_G)\, r > \hat{\rho}_1$, suffices to ensure that the firm is cash rich. In the case of (2), For a cash-rich firm, the optimal contract can be implemented through a combination of short-term debt d and long-term debt D, where:

$$d = (1 - T_G)r - \rho^{c*}, \quad D = [1 - (T_G - \Delta T)]R - B/\Delta p$$

The firm could reinvest as long as:

$$\rho^{c*} < (1 - T_G)r$$

Proposition 3: In the case of Eq. 2, the "first-best cutoff" of reinvestment is increasing with the increase of different tax rate, decreasing with the increase of tax rate and increasing with the increase of growth opportunity. That means:

$$\frac{\partial \rho^{c*}}{\partial \Delta T} > 0, \quad \frac{\partial \rho^{c*}}{\partial T_G} < 0, \quad \frac{\partial \rho^{c*}}{\partial \tau} > 0$$

Proof: Taking partial derivative about ΔT on both sides of Eq. 5:

$$\frac{\partial \rho^{c*}}{\partial \Delta T} = -\frac{[F(\rho^{c*})\tau + p_H]R}{f(\rho^{c*})(\hat{\rho}_0 - \rho^{c*})} > 0$$

where, taking partial derivative about T_G on both sides of Eq. 5:

$$\frac{\partial \rho^{c*}}{\partial T_G} = \frac{r + [F(\rho^{c*})\tau + p_H]R}{f(\rho^{c*})(\hat{\rho}_0 - \rho^{c*})} < 0$$

where, taking partial derivative about τ on both sides of Eq. 5:

$$\frac{\partial \rho^{c*}}{\partial \tau} = \frac{F(\rho^{c*})[(1 - T_G + \Delta T)R - B/\Delta p]}{f(\rho^{c*})(\hat{\rho}_0 - \rho^{c*})} > 0$$

Proposition 4: In the case of (ii), the firm's long-term debt has nothing to do with growth opportunity but increasing with the increase of different tax rate. The short-term debt is decreasing with the increase of growth opportunity and decreasing with the increase of different tax rate ΔT. That means:

$$\frac{\partial D}{\partial \tau} = 0, \quad \frac{\partial D}{\partial \Delta T} > 0, \quad \frac{\partial d}{\partial \tau} < 0, \quad \frac{\partial d}{\partial \Delta T} < 0$$

Proof: For:

$$d = (1 - T_G)r - \rho^{c*}, \quad D = [1 - (T_G - \Delta T)]R - B/\Delta p$$

Table 1: Impact of growth opportunity on financing

τ	$P(\dot{\rho}_1)$	$P(\dot{\rho}_0)$	ρ^{c*}	d	D
0.05	6.2825	6.3528	0.8000	3.4500	3
0.08	6.1772	6.3572	0.9165	3.3335	3
0.10	6.0800	6.3613	1.0000	3.2500	3
0.13	5.8937	6.3690	1.1330	3.1170	3
0.15	5.7425	6.3753	1.2262	3.0238	3
0.20	5.2700	6.3950	1.4718	2.7782	3

Table 2: With the increase of different rate, short-term debt is decreasing and long-term debt is increasing

ΔT	$P(\dot{\rho}_1)$	$P(\dot{\rho}_0)$	ρ^{c*}	d	D
0.00	4.5450	5.6700	1.1483	3.1017	2.0
0.01	4.6892	5.8142	1.7490	2.5010	2.2
0.02	4.8338	5.9588	2.1742	2.0758	2.4
0.03	4.9788	6.1038	2.5276	1.7224	2.6
0.04	5.1242	6.2492	2.8389	1.4111	2.8
0.05	5.2700	6.3950	3.1219	1.1281	3.0

It is easy to get that:

$$\frac{\partial D}{\partial \tau} = 0,\ \frac{\partial D}{\partial \Delta T} = R > 0$$

$$\frac{\partial d}{\partial \tau} = -\frac{\partial \rho^{c^*}}{\partial \tau} < 0,\ \frac{\partial d}{\partial \Delta T} = -\frac{\partial \rho^{c^*}}{\partial \Delta T} < 0$$

Proposition 5: In the case of (ii), the firm's long-term debt is increasing with the increase of tax rate. The increase of tax rate has positive and negative effects on the firm's short-term debt. The positive effect is that the short-term debt is increasing with the increase of the "first-best cutoff" of reinvestment; the negative effect is that the short-term debt is decreasing with the decrease of the short-term income.

Proof: It is easy to get that:

$$\frac{\partial D}{\partial T_G} = -R < 0,\ \frac{\partial d}{\partial T_G} = -r - \frac{\partial \rho^{c^*}}{\partial T_G}$$

Since, $\partial\rho^{c^*}/\partial T_G<0$, it is not surewhether it'spositiveor negative for $\partial d/\partial T_G$. Specifically, if $\partial\rho^{c*}/\partial T_G<-r$, the total effect is positive; if $\partial\rho^{c*}/\partial T_G<-r$, the total effect is negative; if $\partial\rho^{c*}/\partial T_G = -r$, the total effect is 0.

NUMERICAL CALULATION

Now, make some numerical calculations on the theoretical results.

Table 1 reveals that with the increase of growth opportunity, the first-best cutoff of reinvestment is increasing, short-term debt is decreasing and long-term debt is unchanged. Where, basic parameters are I = 10, A = 3.7,R = 20, P_H = 0.7, P_L = 0.3, J = 0.2, B = 6, r = 5, ρ~U[0,4], T_G = 0.15, ΔT = 0.05.

Table 3: With the increase of the tax rate, short-term debt is increasing and long-term debt is decreasing

T_G	$P(\dot{\rho}_1)$	$P(\dot{\rho}_0)$	ρ^{c*}	d	D
0.10	6.4032	7.5282	3.7080	0.7920	4.2
0.11	6.2050	7.3300	3.3768	1.0732	4.0
0.12	6.0072	7.1322	3.0089	1.3911	3.8
0.13	5.8098	6.9348	2.5850	1.7650	3.6
0.14	5.6128	6.7378	2.0593	2.2407	3.4
0.15	5.4162	6.5412	1.2141	3.0359	3.2

Table 4: With the increase of the tax rate, both of short-term debt and long-term debt are decreasing

T_G	$P(\dot{\rho}_1)$	$P(\dot{\rho}_0)$	ρ^{c*}	d	D
0.100	34.6216	48.6841	2.4355	42.5645	1.56
0.105	34.3816	48.4441	2.3535	42.3965	1.47
0.110	34.1425	48.2050	2.2698	42.2302	1.38
0.115	39.5288	46.5600	2.1845	42.0655	1.29
0.120	39.2538	46.2850	2.0972	41.9028	1.20
0.125	38.9793	46.0105	2.0078	41.7422	1.11

Table 2 reveals that the firm's short-term debt is decreasing with the increase of the different rate and the long-term debt is increasing with the increase of the different rate. Where, basic parameters are I = 10, A = 4.4, R = 20, P_H = 0.7, P_L = 0.7, J = 0.2, B = 6, r = 5, ρ~U[0,4], T_G = 0.15.

Table 3 indicates that the firm's short-term debt is increasing with the increase of the tax rate and the long-term debt is decreasing with the increase of the tax rate. Where, basic parameters are I = 10, A = 4.4, R = 20, P_H = 0.7, P_L = 0.3, J = 0.2, B = 6, r = 5, ρ~U[0,4], ΔT = 0.06.

Table 4 indicates that the firm's short-term debt is decreasing with the increase of the tax rate and the long-term debt is decreasing with the increase of the tax rate. Where, basic parameters areI = 48, A = 3.5, R = 18, P_H = 0.7, P_L = 0.3, J = 0.2, B = 6, r = 5, ρ~U[2,2.5], ΔT = 0.02.

CONCLUSION AND SUGGESTIONS

This study analyzes the influence of different tax rate on dividends over the company's maturity structure of liabilities with the fixed growth opportunity model. The theory and numerical calculations show that: (1) The company's long-term debt increases with the increase of the different tax rate on dividends but short-term debt decreases with that, which is beneficial to the entrepreneur engaged in long-term investment. (2) The company's liquidity risk management may be influenced by the different tax rate on dividends. (3) The entrepreneur's profit will increase with the increase of the different tax rate on dividends. (4) The better the company's growth prospects, the lower the company's short-term liabilities and the company may receive the greater the probability of re-investment. The conclusion that different tax rate on dividends is good for long-term investment in the market has rich policy implications and so reducing market transaction cost, improving the efficiency of the market, lightening investor's burden have become a general idea of the regulatory authorities for reform.

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