

# On capital gain taxation\*

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## Abstract

This note provides an explanation for why tax rates on capital gains are usually lower than ordinary income tax rates based on manager's agency problem related to "empire-building" or the underinvestment problem.

## 1 Introduction

In many countries (USA, Canada, Australia, United Kingdom, France, Germany etc.) capital gains are taxed at a lower rate than ordinary income, but there is no unanimously supported theoretical explanation for this phenomenon. Some argue that capital gains occur unexpectedly, and thus it is unfair to tax them at the same tax rate as ordinary income because capital gains require taking on additional risk. In addition to that, there is disutility from abstaining from current consumption. Opponents of lower capital gains tax rates argue that other kinds of income have a risk component as well. Furthermore, disutility from taking on a job is not necessarily less sacrificing than disutility from investing.

Another justification for reduced capital gains tax rates is that preferential tax treatment is needed in order to stimulate more investment and capital growth. However, a reduction in the dividend tax rate reduces the cost of

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equity financing and thus can also increase investments. The debate between these two policy alternatives is particularly relevant since the introduction of the Job Growth and Taxpayer Relief Reconciliation act of 2003 in the United States, that introduced dividend and capital gain tax changes (see, for example, Poterba, 2004). One result of these debates is that without taking other factors into consideration rather than taxes it is difficult to give an advantage to either point of view given that both dividends and capital gain represent returns on equity investments and both are important for equityholders. In addition note that a social planner is not concerned about increasing investments as much as possible but rather about attaining an optimal level of investments. It is not clear why the latter cannot be achieved when dividends and capital gains are taxed equally.

This paper does not rely on fairness or temporary policy objectives. It builds on Chetty and Saez (2005) who argue that more Principal-Agent models are needed in order to understand how a difference in capital gain taxation and dividend taxation affect the firm investment policy. We argue that if capital gains and dividends are taxed equally firms underinvest due to managers' moral hazard problem in using available free cash. Reducing the tax rate on capital gains may improve societal welfare by increasing the equilibrium level of investments.

## 2 Model.

Consider a firm with an investment project available. The amount of earnings generated by the project depends on the amount of investment. If the firm invests  $i$ , the project will return a cash flow of  $r(i)$ ,  $r' \geq 0$ ,  $r'' \leq 0$ ,  $r(0) = 0$ . Initially, the firm possesses an amount  $c$  of cash available. The firm belongs to an entrepreneur who owns 100% of the firm's equity. The entrepreneur hires a manager who makes the investment decision. Everybody is assumed to be risk-neutral and the risk-free interest rate is normalized to zero. The manager's reservation payoff is  $w_0$ . Besides investment in the project, the manager can decide to invest in other (inefficient from the firm's point of view) projects. This moral hazard problem or agency problem (in this case it can also be called the free cash flow problem) is well documented in existing theoretical and empirical literature (see, among others, Jensen (1986) and Dittmar, Mahrt-Smith and Servaes (2003)). More specifically we assume that if the manager has an amount of funds  $e$  available he has a choice

between  $i$  and  $b$  such that  $e = i + b$  and  $b$  is the amount of funds invested inefficiently. For simplicity it is assumed that  $b$  increases the manager's utility by the same amount. This can represent utility from giving the job to family members, friends and other benefits from investment in socially inefficient projects. A direct control of manager's actions is impossible so the entrepreneur cannot prevent the manager from investing inefficiently. The manager's decision depends on its contract. We assume that the entrepreneur and manager should determine a fixed initial payment  $w$  to the manager,  $w \leq c$  and a fraction  $a$  of earnings generated by the main project belonging to the manager. The higher  $a$  is, the more incentive the manager has to invest efficiently.

The firm exists for two years. In the first year the firm makes all decisions about the project (the sequence of events is described below) and earnings from the project are generated in year 2. After the project is completed and earnings are generated the entrepreneur may either sell their shares in the firm or to liquidate the firm and distribute dividends. Also, the entrepreneur may sell his shares at the end of period 1 before investment is made. Dividends will be taxed with the ordinary tax rate and capital gain (in case the entrepreneur decides to sell shares) are taxed with capital gain tax rate. Let  $t_d$  be the ordinary income tax rate and  $t_c$  be the tax rate on capital gains.

The entrepreneur faces the following trade-off. High dividends in year 1 may reduce the manager's "entrenchment" problem (since it reduces the amount of cash on which the manager has discretion) but, on the other hand, it can also reduce the amount of investments in the efficient project.

The sequence of events is as follows. Year 1. The firm gets cash  $c$  and an investment project. The entrepreneur offers a contract  $(w, a)$  to the manager. The game is over if the manager rejects the offer (the manager's gets his reservation utility  $w_0$ ; the firm does not undertake the project; the entrepreneur is stuck with initial cash  $c$ ). Otherwise the manager is hired and gets  $w$ . The entrepreneur determines the year 1 dividends  $d_1$  (an alternative sequence can be considered where dividends are determined before the manager is hired. Although this is technically plausible because the manager's role is limited to making the investment, in reality the manager exists all the time. This changes nothing in the solution). The manager determines  $i$  and  $b$ ,  $i + b = c - w - d_1$ . Year 2. Project generates earnings  $r(i)$ ; the manager gets  $ar(i)$ ; the entrepreneur determines the year 2 dividends  $d_2$  and sells the firm's shares.

The first-best choice of  $i$  maximizes  $r(i) - i$ . Thus socially optimal in-

vestments  $i^*$  is determined by:

$$r'(i^*) = 1 \tag{1}$$

We assume

$$r(i^*) > c > i^* + w_0 \tag{2}$$

meaning that firstly the firm has sufficient funds to cover the optimal investment needs and secondly the project's net present value is positive.

Before beginning the formal solution let us present the outline of the major ideas. If there is no moral hazard and the manager invests only in the efficient project ( $b$  is always equal to 0) then the entrepreneur should retain an amount of earnings  $i^*$  and distribute the rest as dividends. An optimal contract for the manager is just fixed initial payment  $w_0$ . Since the entrepreneur holds 100% of the project earnings he does not have any incentive to retain an amount of earnings different from  $i^*$ . In the model with moral hazard the key problem is the entrepreneur's year 1 dividend decision. When the capital gain tax equals the ordinary income tax rate, the entrepreneur will anticipate the manager's moral hazard problem, and will react by distributing more dividends than is socially optimal. Reducing the capital gains tax may improve the entrepreneur's incentive and improve the dividends decision.

We solve the model by backward induction.

*Year 2 dividend.* The entrepreneur's decision depends on whether the capital gains tax rate is higher or lower than then ordinary income rate. If it is higher then the entrepreneur will prefer dividends; otherwise he prefers capital gain (it is assumed for simplicity that assets can be freely sold without value loss so the dividends can be as high as the firm's value).

Let  $V_2$  be the firm's value at the beginning of year 2 (after earnings from the project are realized but before dividends are determined). Let  $V_1$  be the cost of shares for the entrepreneur (it affects the capital gains tax). If the entrepreneur holds shares until year 2 then  $V_1 = 0$ . If the entrepreneur sells shares at the end of year 1 then  $V_1$  is the firm's value at that moment. In the latter case the firm has a new decision-maker at year 2 (new shareholders) because the shares were sold at year 1 end (this fact does not affect the derivations below). When making year 2 dividend decision, the entrepreneur (or new shareholders) maximizes:  $W_2 = d_2(1 - t_d) + (V_2 - d_2) - \max\{(V_2 - d_2 - V_1), 0\}t_c$ . This means that dividends are taxed with the rate  $t_d$ , the remained

value of the firm is  $V_2 - d_2$ . The entrepreneur's capital gain is  $V_2 - d_2 - V_1$  and this amount will be taxed with tax rate  $t_c$ .

**Lemma 1.** *If  $V_2 > V_1$ , and  $t_c \geq t_d$ ,  $d_2 = V_2 - V_1$ ,  $W_2 = (V_2 - V_1)(1 - t_d) + V_1$ . If  $t_c < t_d$ , then  $d_2 = 0$  and  $W_2 = V_2 - (V_2 - V_1)t_c$ . If  $V_2 < V_1$ ,  $d_2 = 0$ ,  $W_2 = V_2 - (V_2 - V_1)t_c$ .*

*Proof.* The proof is rather technical so it is delegated to the Appendix.

Now consider the manager's investment decision. Let  $e = c - w - d_1$  (retained cash after year 1 equal initial cash minus dividend payment and salary payment). The manager maximizes the sum of private benefits and bonus paid at year 2:  $W_M = b + ar(c - d_1 - b)$ .

$$\frac{\partial W_M}{\partial b} = 1 - ar'(i) \quad (3)$$

It follows from (1) and (3) that if  $a = 1$ , the manager retains 100% of earnings from the socially efficient project and hence the first-best level of investment is achieved. In this case however, the manager has positive rent (i.e. his budget constraint is not binding) by (2) because  $r(i^*) > w_0$ . If  $a < 1$ , the manager underinvests because from (3)  $r'(i) = 1/a > 1$ . Thus  $i < i^*$ . The following lemma summarizes the above analysis.

**Lemma 2.** *If  $a = 1$ ,  $i = i^*$ . If  $a < 1$  and  $r'(e) \geq 1/a$ ,  $r'(i) = 1/a$ . If  $r'(e) < 1/a$ ,  $i = e$ .*

Next let us analyze the entrepreneur's decision about selling shares at the end of year 1 (after the year 1 dividends are paid and before managers make investment decision). This depends on whether the dividend tax rate is higher or lower than the capital gain(s) tax rate. Without formal proof, the entrepreneur's decision can be described as follows. If the entrepreneur does not sell shares then by Lemma 1 (given that  $V_1 = 0$ ), the entrepreneur earnings are either  $(1 - a)r(i)(1 - t_d)$  or  $(1 - a)r(i)(1 - t_c)$ , depending on whether  $t_c$  is greater or less than  $t_d$  ( $i$  is determined by Lemma 2). If the entrepreneur sells shares at the end of year 1. The firm's value at the end of year 1 is  $(1 - a)r(i)$  (again  $i$  is determined by Lemma 2). Outside investor will be willing to pay this amount since the firm's value in year 2 after completing the project will be equal to the same amount so they can resell the firm for this amount without incurring any capital gain tax. The entrepreneur selling shares get thus  $(1 - a)r(i)(1 - t_c)$ . Comparing this with the case when he retains shares until year 2 we conclude that if dividend tax is lower then the entrepreneur earnings are  $(1 - a)r(i)(1 - t_d)$  (the entrepreneur does not sell

shares). Otherwise it is  $(1 - a)r(i)(1 - t_c)$  (he is indifferent between either decision).

Thus we have the following result.

**Lemma 3.** *If  $t_c \geq t_d$ , the entrepreneur does not sell shares and  $W_2 = (1 - a)r(i)(1 - t_d)$ . If  $t_c < t_d$ , the entrepreneur sells shares and  $V_1 = (1 - a)r(i)(1 - t_c)$ .*

*Proof.* See Appendix.

Let us now turn to the first-period dividend decision.

if  $t_c > t_d$  then the entrepreneur's earnings  $W$  equal  $W_1 + W_2 = d_1(1 - t_d) + (1 - a)r(i)(1 - t_d)$ .

$$\frac{\partial W}{\partial d_1} = 1 + (1 - a)r'(i)\frac{\partial i}{\partial d_1} \quad (4)$$

if  $t_c \leq t_d$  then  $W = d_1(1 - t_d) + (1 - a)r(i)(1 - t_c)$ .

$$\frac{\partial W}{\partial d_1} = 1 - t_d + (1 - a)r'(i)\frac{\partial i}{\partial d_1}(1 - t_c) \quad (5)$$

Note that in the first case the manager's objective function does not depend on  $t_c$  and from (4) and (5) the first case is equivalent to the second case when  $t_c = t_d$ . So we just ignore the first case and analyze the second case.

Two situations may exist. 1. When  $d_1 < c - w - i^{**}$ , where  $i^{**} \equiv i^{**}(a)$  is such that

$$r'(i^{**}) = 1/a \quad (6)$$

we have by Lemma 2  $\frac{\partial i}{\partial d_1} = 0$ . This means that if the manager's has enough funds to cover investment  $i^{**}$  he will invest this amount in the efficient project (by Lemma 2). Anticipating this, the entrepreneur distributes as much dividends as possible just to leave the amount  $i^{**}$  for investment and not leaving any private benefits for the manager:  $d_1^{**} = c - w - i^{**}$  ( $\frac{\partial i}{\partial d_1} = 0$  implies by (5) that  $\frac{\partial W}{\partial d_1} = 1 - t_d > 0$ ) and hence  $b = 0$ .

2. When  $d_1 > c - w - i^{**}$ , we have by Lemma 2  $i = e$  or  $i = c - w - d_1$ . Thus  $\frac{\partial i}{\partial d_1} = -1$ ;  $\frac{\partial W}{\partial d_1} = 1 - t_d - (1 - a)r'(i)(1 - t_c)$  and  $b = 0$ . Let  $i^{***} \equiv i^{***}(a)$  such that

$$r'(i^{***}) = \frac{1 - t_d}{(1 - a)(1 - t_c)} \quad (7)$$

and let  $d_1^{***} = c - w - i^{***}$ .

If  $1/a > \frac{1-t_d}{(1-a)(1-t_c)}$  then  $i^{***} > i^{**}$ ,  $d_1^{***} < d_1^{**} = c - w - i^{**}$ . We thus have  $\frac{\partial W}{\partial d_1} < 0$ ,  $\forall d_1 > c - w - i^{**}$  implying corner solution  $d_1 = c - w - i^{**}$ . If  $1/a < \frac{1-t_d}{(1-a)(1-t_c)}$  then  $i^{***} < i^{**}$ ,  $d_1^{***} > d_1^{**} = c - w - i^{**}$  and we thus have an interior optimum  $d_1 = c - w - i^{***}$ .

**Lemma 4.** *If  $1/a \geq \frac{1-t_d}{(1-a)(1-t_c)}$  then  $d_1 = c - w - i^{**}$ . If  $1/a < \frac{1-t_d}{(1-a)(1-t_c)}$  then  $d_1 = c - w - i^{***}$ .*

The intuition behind this result is following. The manager's contract shapes not only the manager's incentive but also those of entrepreneur. According to (5), the entrepreneur preference point for investments is  $i^{***}$ . This however cannot be implemented directly since the decision is taken by a self-interested manager. The manager prefers  $i^{**}$  if it has funds or he will invests as much as possible. If  $i^{***} > i^{**}$ , the entrepreneur cannot induce  $i^{***}$  and thus he will stick with  $i^{**}$ . Otherwise he will induce  $i^{***}$ .

Now consider optimal contract for the manager.

The entrepreneur's problem is to design the manager's contract and to choose  $d$  to maximize his expected payoff.

$$\max_{w,a} W \tag{8}$$

where

$$W = \begin{cases} (c - w - i^{**}(a))(1 - t_d) + (1 - a)r(i^{**})(1 - t_c), & \text{if } 1/a \geq \frac{1-t_d}{(1-a)(1-t_c)} \\ (c - w - i^{***}(a))(1 - t_d) + (1 - a)r(i^{***})(1 - t_c), & \text{if } 1/a < \frac{1-t_d}{(1-a)(1-t_c)} \end{cases} \tag{9}$$

subject to

$$\begin{aligned} w + ar(i^{**}) &\geq w_0, \text{ if } 1/a \geq \frac{1-t_d}{(1-a)(1-t_c)} \\ w + ar(i^{***}) &\geq w_0, \text{ if } 1/a < \frac{1-t_d}{(1-a)(1-t_c)} \end{aligned} \tag{10}$$

Note that in (9) the first-period dividend (by Lemma 4) is either  $c - w - i^{**}(a)$  or  $c - w - i^{***}(a)$ . From (9):

$$\frac{\partial W}{\partial a} = \begin{cases} -i_a^{**}(a)(1 - t_d) + (1 - a)r'(i^{**})i_a^{**}(a)(1 - t_c) - r(i^{**})(1 - t_c), & \text{if } 1/a \geq \frac{1-t_d}{(1-a)(1-t_c)} \\ -i_a^{***}(a)(1 - t_d) + (1 - a)r'(i^{***})i_a^{***}(a)(1 - t_c) - r(i^{***})(1 - t_c), & \text{if } 1/a < \frac{1-t_d}{(1-a)(1-t_c)} \end{cases}$$

Using (7):

$$\frac{\partial W}{\partial a} = \begin{cases} -i_a^{**}(a)(1-t_d) + (1-a)r'(i^{**})i_a^{**}(a)(1-t_c) - r(i^{**})(1-t_c), \\ \quad \text{if } 1/a \geq \frac{1-t_d}{(1-a)(1-t_c)} \\ -r(i^{***})(1-t_c), \text{ if } 1/a < \frac{1-t_d}{(1-a)(1-t_c)} \end{cases} \quad (11)$$

The only candidate for optimal  $a$  is  $a \leq \frac{1-t_c}{2-t_d-t_c}$  (this is equivalent to  $1/a \geq \frac{1-t_d}{(1-a)(1-t_c)}$ ). Proof by contradiction. Suppose that optimal  $a > \frac{1-t_c}{2-t_d-t_c}$ . Two cases are possible. If the manager's budget constraint is not binding, one can reduce  $a$  that improves the entrepreneur's earnings by (11). If it's binding then a reduction in  $a$  increases investment by Lemma 4 and (7) and taking into account the concavity of  $r(i)$ . This increases the total payoff of entrepreneur and manager. The entrepreneur will adjust  $w$  to satisfy the manager's budget constraint.

Thus only the case  $a \leq \frac{1-t_c}{2-t_d-t_c}$  can be a candidate for optimal  $a$  (by continuity). We have (see, for instance, Varian (2001), ch.27):

$$\text{sign} \frac{\partial a}{\partial t_d} = \text{sign} \frac{\partial^2 W}{\partial a \partial t_d} = \text{sign}\{i_a^{**}(a)\}$$

The latter is positive by (6). Indeed, by differentiating both parts of (6) in  $a$  we get

$$r''(i | i = i^{**})i_a^{**}(a) = -1/a^2$$

The concavity of  $r(i)$  implies that  $i^{**}(a)$  is increasing. This inturn implies that  $\frac{\partial a}{\partial t_d} > 0$ . Since an increase in  $t_d$  increases  $a$ , this leads to higher  $i^{**}$  and higher amount of investment by Lemma 4. This leads to the following proposition.

**Proposition 1.** *An increase in  $t_d$  is socially efficient.*

### 3 Conclusion.

This note has analyzed optimal dividend policy and investment decision in a model where a firm's manager is subject to moral hazard and has ability to invest in socially inefficient projects. It is shown that equilibrium level of investment is below socially optimally since the entrepreneur distributes too much dividends to reduce the manager's entrenchment problem. By increasing the dividend tax rate over capital gain tax rate, social planner



can improve the equilibrium level of investment by giving more incentive to entrepreneur to retain funds inside the firm.

## Appendix

*Proof of Lemma 1.* Two cases are possible. Case 1:  $V_2 - d_2 > V_1$ . Then

$$\frac{\partial W_2}{\partial d_2} = t_c - t_d$$

If  $t_c > t_d$  then  $d_2 = V_2 - V_1$ . Otherwise  $d_2 = 0$ . High dividends will be paid if dividend tax rate is smaller than capital tax rate and no dividends will be paid otherwise. Case 2.  $V_2 - d_2 < V_1$ . Then

$$\frac{\partial W_2}{\partial d_2} = -t_d$$

Then  $d_2 = \max\{0, V_2 - V_1\}$ . Finally we have. If  $V_2 > V_1$ , and  $t_c > t_d$ ,  $d_2 = V_2 - V_1$ . If  $t_c < t_d$ , then compare  $d_2 = 0$  and  $d_2 = V_2 - V_1$ . In the first case  $W_2 = V_2 - (V_2 - V_1)t_c$ . In the second case  $W_2 = (V_2 - V_1)(1 - t_d) + V_1$ . First case is better for the entrepreneur. Finally, if  $V_2 < V_1$ ,  $d_2 = 0$ . *End proof.*

*Proof of Lemma 3.* First suppose that the entrepreneur does not sell shares. Then by Lemma 1 (given that  $V_1 = 0$ ), if  $t_c > t_d$  the entrepreneur's earnings are  $W_2 = (1 - a)r(i)(1 - t_d)$ . Otherwise it is  $(1 - a)r(i)(1 - t_c)$ , where  $i$  is determined by Lemma 2.

Now suppose that the entrepreneur sells shares at the end of year 1. What is the value of the firm then?

Recall that  $V_1$  is the value of the firm in this case. We have  $V_2 = (1 - a)r(i)$ , where  $i$  is determined by Lemma 2. Suppose  $V_1 \leq V_2$ . If  $t_c > t_d$ , then by Lemma 1  $d_2 = V_2 - V_1$  and the new shareholders' payoff (buying shares from the entrepreneur) is  $W_n = V_1 + (V_2 - V_1)(1 - t_d)$ . This should be equal to  $V_1$ . Thus we have  $V_1 = V_2 = (1 - a)r(i)$ . If  $t_c < t_d$  then  $d_2 = 0$  and  $W_n = V_2 - (V_2 - V_1)t_c$ . Thus  $V_1 = V_2 - (V_2 - V_1)t_c$  or  $V_1 = \frac{V_2(1 - t_c)}{1 - t_c} = V_2$ . Now suppose that  $V_1 > V_2$ . This situation is impossible because no one will be willing to buy the shares of the firm at the end of year 1. To summarize: at the end of year 1 the firm's value is  $(1 - a)r(i)$ , where  $i = c - d_1 - w - b$ .

If the entrepreneur sells shares at the end of year 1 he gets  $(1 - a)r(i)(1 - t_c)$ . *End proof.*

## References

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