How Do Tax Rates Affect Executives' Decisions About Corporate Stock?

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Abstract

This paper uses data on executive compensation during the period 1992-2000 matched to information on federal and state marginal tax rates on different types of income to examine the impact of taxes on executives' decisions about corporate stock. The paper documents that lower capital gains taxes correspond with executives increasing their holding of corporate stock significantly. The paper then illustrates how interactions between ordinary income taxes, capital gains taxes and corporate income taxes interact in the executives' decisions of whether to exercise their stock options early. When capital gains taxes fall, as in 1997, executives have an incentive to exercise early and pay taxes on part of the gain at ordinary income rates now in order to get future appreciation of the stock taxed at the lower capital gains rates in the future. The estimates seem to strongly confirm the model, and to suggest that executives do have some inside information into the future prospects of the company as firms whose stock ends up growing faster are more likely to exercise early. Interestingly, the executives appear to place almost no weight on the corporate tax consequences of their exercise decisions as the corporate income tax rate facing their companies has no influence on their behavior.

Corporate executives are some of the United States' most public high income people. Partly this is due to the abiding interest in business but mainly to securities regulations that require the top five highest paid employees of public companies to disclose all of their compensation annually. The fact that their compensation is disclosed makes them an interesting place to study the impact of taxes. The magnitude of their income can sometimes make them important for aggregate tax policy.[1]

They are a particularly interesting place to look at the impact of taxation on stock holdings because, in addition to their high incomes, corporate executives tend to be quite un-diversified. In particular, much of the savings of a corporate executive is tied up with the fortunes of the company he or she manages. Principally, this is by design. The shareholders want to give managers high-powered incentives to perform well and corporate pay tends to include generous stock options, bonus and the like that attempt to do just that. Hall and Liebman (1998) show just how tied to performance most CEO pay is.

In this paper, I revisit the issue of CEO incentives by looking at the question of whether tax rates on capital gains income, ordinary income, and corporate income influence the corporate stock holding decisions of major executives. To do so, the paper uses information on the compensation and corporate performance for a panel of 5000 corporate executives. The results start by documenting that, controlling for everything else, capital gains taxes have a large and direct impact on the amount of corporate stock held by corporate executives. This is true in absolute amounts as well as computed as a share of mean annual pay or as a percent of the company stock. The magnitudes suggest

[1] See the discussion in Goolsbee (2000) about the role of corporate executives in the aggregate fluctuations in reported income surrounding the Clinton tax change of 1993.

that the capital gains tax cut of 1997, for example, lead to an increase in corporate stock holdings of more than 30 percent. It does not appear that these increases came from greater stock grants, from a change in the holdings of stock options or from an increase in options granted, making it likely that this is the due to executives choosing to hold more stock when the tax costs of doing so are lower.

The paper then examines a more particular influence of taxes on stock holdings, namely the interactions of personal, capital gains, and corporate taxation on the probability that an executive exercises stock options. The theory suggests that when capital gains taxation is low, an executive at a firm with high expected stock appreciation has an incentive to exercise stock options early (and pay taxes at ordinary income rates) in order to get future stock appreciation in the form of capital gains (which is relatively lightly taxed). Though the results are not totally robust, the findings are, on the whole, quite consistent with the view that executives have some information about the firm's future prospects and that they act as if they understand the tax consequences of their actions. Interestingly, though, they appear to put little weight on the implications their actions have on the tax position of their corporation, only on their own personal situations.

II Data on Executives and Taxes

To examine these issues, I turn to the EXECUCOMP data of Standard and Poor’s which compiles all of the executive compensation data from the proxy statements of firms in the S&P 500, the S&P Mid Cap 400 and the S&P Small Cap 600. In these data there is information on all forms of annual compensation such as salary, bonus, long-term incentive payouts, other perquisites, the Black-Scholes value of options granted, the amount of restricted stock granted and so on. The data in my sample cover the period of 1992 to 2000 though sometimes leads and lagged variables will force a smaller 1993-1999 sample.

In addition to the annual compensation they receive, executives must also disclose their corporate stock holdings, their stock option holdings and their exercise decisions on those stock options. It is these that I will primarily use for this study. I will also use the identity and location of the firms in the study to explore the impact of taxes that frequently not available in applied tax research such as the impact of corporate tax rates on individual behavior.

The principal drawback with using executive compensation data to study taxes is the fact that one knows nothing more about the executive's tax situation than what takes place within the firm. There is no information about earnings outside the company or of other portfolio holdings besides those within the company.

For each executive in the sample, I will match by state of the company and by year a marginal tax rate on wage income and a marginal tax rate on capital gains income using the highest marginal rates as computed by TAXSIM and reported in Feenberg (2001). In most states, income is taxed where earned so the location of the firm's headquarters is actually likely to provide a better measure of the marginal tax rate than is the executive's state of residence, at least for wage income. For capital gains income, this is not so clear. Given the lack of personal information, however, there is nothing else that could be done on this point. The TAXSIM calculations are done for someone with $250,000 of income. To avoid any complications of people who do not have high enough income to qualify for these highest rates (a fairly small fraction of these high income executives, of course), I will further restrict the sample to people with mean total compensation in the sample of at least $250,000 per year. Using higher cutoffs made little difference (mainly because almost everyone qualifies for the sample unless the cutoff is very high). I drop anyone working at firm with a fiscal year ending in a month other than December so that the firm reporting and the tax year will correspond.[2]

There is significant variation in tax rates across states and time in both wage and capital gains income. In addition, there were increases in federal marginal tax rates on wages early in the sample and a major cut in the tax rate on long-term capital gains in 1997. Because these firms are publicly traded, I can also match them to estimates of the marginal tax rates on corporate income computed by Graham (2000). The idea of the paper is to use that variation in taxes to see if tax rates matter for how much corporate stock executives choose to hold and whether they matter for executives' decision to exercise their options early.

Table 1 presents summary statistics for the variables used in the paper.

III Taxes and Corporate Stock Holdings

The first subject relates capital gains taxes to corporate stock ownership. Table 2 presents several variations of such regressions. The first column of the table explains the log of company stock value as a function of individual dummies, the log of corporate assets, employment, market value, cash flow, and sales as well as the total return to shareholders in the last year and the log of total annual compensation of the executive

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[2] Most of these sample restrictions follow Goolsbee (2000) and more detail on the EXECUOMP data and the advantages and drawbacks of the data for tax analysis can be found there.

and then the total federal plus state marginal tax rate on capital gains income and on wage income. All the standard errors in table 2 are corrected for the fact that there is only variation in the tax rate at the state level and, to be conservative, given the likely serial correlation of tax rates across time within state, are clustered by state rather than state-year. The results show a very significant and negative relationship between the rate on capital gains and the value of own company stock ownership and a positive relationship between ownership and the rate on ordinary income. Column 2 adds year dummies, thus identifying the impact of taxes using just the variation in rates arising from the cross-state differences in taxation. In both equations, the coefficient on capital gains is significant and of similar magnitude, though, perhaps unsurprisingly, the standard error is almost ten times bigger in the specification with year dummies.

The magnitude indicates that reducing capital gains taxes as in the data from 1996 to 1997 (average combined marginal rate of .32 to an average combined marginal rate of .25) would correspond to an increase in the value of corporate holding for the executive of around 35 to 40 percent. For the average executive whose holdings are worth some $22 million, this is an increase of about $8-9 million dollars. For an executive with the median holdings (about $1.1 million) this is more like an increase of $400,000.

To deal with the possibilities that this measure is reflecting changes in value rather than active changes in the savings decision of the executive, columns 3 and 4 do the same regressions but seek to explain the share of the overall equity of the firm that is owned by the executive. Given the large size of these companies, of course, the mean of this variable is small (0.58 percent). Regardless, using the full tax variation as in 3 or just the variation across states, as in 4, shows that there is still the negative impact of capital gains taxation on corporate stock holdings.

The magnitude using only the state level variation says that the 1997 tax change induced an increase of 39 basis points in the executive's share of corporate equity. The specification using the full variation is a bit smaller, yielding an increase in holdings of 14 basis points from the 1997 tax change. Given the average market value of the firms in the sample of $8.8 billion, this amounts to an increase in corporate holdings of between $12 and $34 million. For the median firm value of I found similar negative effects of capital gains taxes using other measures of corporate stock holdings such as the value of corporate stock relative to mean income for the executive in the sample as well as the log number of shares (i.e., not including any information about price), though I have not reported these in the table.

These regressions controlled for the overall compensation of the executive so the change in corporate holdings is unlikely to be explained by a major increase in the amount of compensation given to the executive but table 3 examines evidence on the point directly by looking at grants of restricted stock, grants of stock options and changes to the number of unexercised options or their value. Each of these regressions is a fixed effect logit which allows for an individual effect in the context of a 0,1 variable, though the results were very similar using a simple linear probability model with linear fixed effects. Columns 1 looks at the probability of a grant of restricted stock. This is not related to the capital gains rate. Column 2 looks at the probability of receiving a stock option grant. Again taxes are not important. Next, though, columns 3 and 4 look at the number of unexercised options owned by the executive and the value of unexercised options owned by the executive to see if part of the increase in stock ownership might be resulting from large exercises of stock options and subsequent purchasing of shares. The results show that reducing capital gains taxes does increase the chance that the executive has fewer unexercised but exercisable stock options, consistent with the view that part of the increase in stock ownership arises from executives exercising stock options to buy more shares when capital gains rates are lower (more on the point in the following section). The mean change in the number of options for people that reduce, however is only 83,000 with a reduction in value of $1.2 million so this can explain only a small part of the mean increase in stock ownership. The median reduction among reducers is about 19,000 and the median reduction in value is $85,000 so again this is only a small part of the median change in ownership.

IV Relative Taxes and the Decision to Exercise Stock Options Early

Given the general correlation between taxes and stock ownership, I also consider issues associated with short term changes to tax policy, namely the interactions among different types of taxes in influencing decisions about when to exercise stock options. Whereas in the case of a traditional option, an owner never has an incentive to exercise early, in the case of employee stock options this is not true, as documented in the work of Huddart (1998) and Hall and Murphy (2000). Most of the reasons for early exercise have to do with risk aversion and liquidity but tax changes can also influence the decision. Since the difference between the stock price and the strike price of the option is treated as ordinary income for the individual at the time of exercise (and deductible for the firm as a labor expense), it is well understood and well documented that anticipated changes to the personal income tax rate can lead option holders to exercise their options early to avoid tax increases, as many did in the period in 1992 before the Clinton administration raised taxes in 1993.

Less well documented is the possibility that changes to capital gains tax rates relative to wage rates can lead to early exercise. The idea is that in a period like 1997 when capital gains rates fell substantially below personal rates, depending on how rapidly the stock could be expected to appreciate, it might make sense to exercise a stock option early, pay the full individual income tax in order to buy the shares and get the future appreciation treated as capital gains income rather than yet more wage income as in the case of appreciation of the stock option. Huddart (2000) raises this issue theoretically and Goolsbee (2000) presents suggestive evidence for high-tech companies that was consistent with the idea. Here, I explore the notion is more detail.

I start with the model of Huddart but expanded to take account of corporate taxation. If the price of the option is X and the price of the stock in period one is S1 and the uncertain payoff in period 2 is S2, and the interest rate is r. An executive facing a reduction in the capital gains tax will want to exercise options early, incurring an immediate tax at ordinary income rates on the gain so far but getting the future gain taxed at the lower capital gains rate, when

$$\tilde{S}_2-(\tilde{S}_2-S_1)t_g-\left[X+(S_1-X)t_p-(S_1-X)t_c\right](1+r)>(\tilde{S}_2-X)(1-t_p+t_c) \qquad (1)$$

The term with the interest rate on the left side of the inequality arises because when the executive exercises the option and buys the shares, he or she must pay taxes and buy the shares so they must borrow the money. Importantly, the firm gets to deduct the difference between the stock price and the strike price in whatever period the executive exercises so they at least have an incentive to influence when the executive does this. Equation (1) just says that the ultimate gain minus the capital gains tax plus the costs incurred by exercising early need to be bigger than the gain minus tax costs of holding on to the options until next period if they are to exercise early. Rewriting,

$$(\hat{S}_2 - S_1)(t_p - t_g - t_c) > r\left[X + (S_1 - X)(t_p - t_c)\right] \tag{2}$$

and dividing through by S1 yields a condition based on the expected return on the stock Rhat.

$$(\hat{R})(t_p - t_g - t_c) > r\left[(t_p - t_c) + \left(\frac{X}{S_1}\right)(1 - t_p - t_c)\right] \tag{3}$$

Breaking this equation out, yields specific predictions of how various taxes should influence the probability of adoption.

$$(\hat{R} - r)t_p - \hat{R}t_g - (\hat{R} - r)t_c - r(1 - t_p)\left(\frac{X}{S_1}\right) + r\left(\frac{X}{S_1}\right)t_c > 0 \tag{4}$$

Empirically, it will also matter whether executives have firm specific information on returns or whether they all expect some common Rhat on equities (as with a random walk process, for example. The specification I will estimate, again using the fixed effect logit to allow for individual effects in the dichotomous variable setting will be

$$\Pr\{Exercise_{it} = 1\} =$$
$$f(\alpha_i + \beta_1\hat{R}(t_{pt} - t_{gt+1}) + \beta_2\hat{R}(t_{ct}) + \beta_3 t_{pt} + \beta_4 t_{gt+1} + \beta_5 t_{ct} + \beta_6 r(1 - t_{pt})\left(\frac{X}{S_1}\right) + \beta_7 r\left(\frac{X}{S_1}\right)t_{ct} + Z'\Gamma) + \varepsilon_{it}$$

The important tests of the model are as follows. First, B1, B3, and B7 should be positive and B2, B4, B5 and B6 should be positive. If there is no inside information, B1 and B2 will be zero and the coefficient on B3 and B5 should be positive. A test of whether the individual cares about corporate tax rates will be whether B1=B2 and B3=B5. Intuitively, this is testing whether the executive puts the same weight on gains to the firm as on gains to themselves.

I will use an interest rate of .07 and will compute the ratio of the option price to the current price using the five year return on the stock. In the other variables, Z, I will include any information that might influence corporate prospects that could influence exercise behavior. These will include sales, employees, cash flow, market value, the individual's total compensation, and the stock return in the past year.

I present these results in table 4. The first column assumes there is no inside information and leaves out corporate taxation. The tax coefficients all have the correct sign and are significant. Lower future capital gains taxes raise the probability of exercising the option early as to higher personal income taxes. The interaction term with the amount of appreciation on the options is negative so when the strike price is very low, higher personal taxes have a smaller effect on the probability of exercise. FILL IN MAGNITUDES.

Adding the actual future return of the stock in column 2 shows that there is some evidence that executives have inside information in that the tax effects are larger for companies where future gains are going to be the largest.

Columns 3 and 4 then add corporate income taxes to the equation. The impact of personal taxes and next year's capital gains taxes retain their predicted signs and are significant. There is very little evidence, however, that the executives care at all about the implications of their exercising decisions on the tax position of the firms. None of the corporate tax terms is significant and all of the point estimates are much smaller than their personal tax counterparts, indicating individuals put much less weight on those costs. This is interesting because it does not support the conventional view that firms and individuals work together to take actions that are jointly efficient (see Scholes and Wolfson, 1992).

V. Conclusion

Variable	Mean	Std. Deviation
Ln (Stock Holdings)	6.97	2.18
Share of company owned (in percent)	0.70	3.37
Receive Restricted Stock (this yr)	.24	.43
Receive Options (this yr)	.75	.43
# Unexercised Options Fell (this year)	.15	.36
Value of Unexercised Options Fell (this year)	.30	.46
Exercised Options (this year)	.37	.48
Ln(assets)	8.01	1.77
Ln(Sales)	7.56	1.48
Ln(Employees)	2.12	1.49
Ln(Market Value)	7.61	1.62
Ln(Cash Flow)	5.84	1.60
Return	.17	.57
Future Return (next 2 years)	.31	.73
Ln(Total Compensation)	6.72	1.06
Combined state+federal t_p	.41	.03
Combined state+federal t_{cg}	.29	.04
Firm level t_c	.25	.14

Table 2: Corporate Stock Ownership and Capital Gains Taxes

	(1) Ln(Stock)	(2) Ln(Stock)	(3) % Firm	(4) % Firm
t_{cg}	-5.155	-5.993	-1.961	-5.631
	(0.353)**	(3.040)*	(0.793)*	(3.009)
t_p	2.654	6.347	-1.325	23.232
	(0.584)**	(7.576)	(1.025)	(12.964)
ln(Assets)	-0.018	-0.215	-0.015	-0.057
	(0.094)	(0.095)*	(0.239)	(0.225)
$Return_t$	22.411	0.203	6.464	4.272
	(11.212)*	(13.632)	(14.572)	(15.163)
ln(employees)	-0.364	-0.184	-0.283	-0.271
	(0.084)**	(0.097)	(0.263)	(0.251)
ln(sales)	0.805	0.867	-0.235	-0.213
	(0.036)**	(0.037)**	(0.095)*	(0.097)*
ln(Cash Flow)	0.030	0.022	0.089	0.090
	(0.046)	(0.043)	(0.081)	(0.081)
ln(Market Value)	0.000	0.000	0.002	0.002
	(0.001)	(0.001)	(0.001)*	(0.001)*
ln(Total comp)	0.221	0.147	0.089	0.077
	(0.034)**	(0.029)**	(0.025)**	(0.025)**
Constant	-1.135	0.601	2.771	-6.100
	(0.613)	(2.903)	(0.632)**	(5.693)
Year Dummies	No	Yes	No	Yes
Indiv. Dummies	Yes	Yes	Yes	Yes
Observations	17808	17808	18337	18337
R-squared	0.93	0.93	0.93	0.93

The sample is 1992-2000. Robust standard errors in parentheses.
* significant at 5%; ** significant at 1%

Table 3: Capital Gains Taxes and Other Equity Compensation

	(1) Restricted Stock Granted	(2) Options Granted	(3) Reduction in unex. options (Number)	(4) Reduction in unex. options (Value)
t_{cg}	-0.303	10.430	-11.547	-6.336
	(1.166)	(1.497)**	(3.421)**	(3.244)
t_p	-2.302	-9.931	-32.156	-13.761
	(2.043)	(2.362)**	(18.990)	(17.832)
ln(Assets)	-0.216	-0.022	0.092	0.109
	(0.173)	(0.228)	(0.192)	(0.198)
ln(sales)	0.256	-0.557	-0.053	-0.902
	(0.208)	(0.252)*	(0.235)	(0.233)**
ln(employees)	-0.153	0.730	-0.095	-0.038
	(0.167)	(0.204)**	(0.193)	(0.189)
ln(Market Value)	-0.132	-0.586	0.264	0.928
	(0.089)	(0.125)**	(0.103)*	(0.104)**
ln(Cash Flow)	0.193	-0.454	-0.008	0.156
	(0.112)	(0.122)**	(0.123)	(0.121)
$Return_t$	0.102	0.045	0.234	-6.022
	(0.173)	(0.103)	(0.102)**	(0.283)**
ln(Total comp)	0.158	4.876	-0.237	-0.009
	(0.054)**	(0.140)**	(0.064)**	(0.066)
Individual Effects	Yes	Yes	Yes	Yes
Observations	7154	9055	6731	10186
Individuals	1348	1726	1291	2057

Each of these regressions is a fixed effect logit on the probability of the dependent variable listed at the top of the column. The sample is 1992-2000. Standard errors in parentheses. * significant at 5%; ** significant at 1%

Table 4: Tax Rates and the Decision to Exercise Early

	(1)	(2)	(3)	(4)
	exercise	exercise	exercise	exercise
t_p	19.772	17.649	19.966	15.284
	(5.902)**	(7.187)*	(6.856)**	(8.250)
t_{cg}	-3.089	-2.628	-1.728	-2.026
	(1.116)**	(1.367)	(1.298)	(1.578)
t_c			0.015	-0.088
			(0.545)	(0.656)
$r(1-t_p)(X/S_1)$	-13.449	-15.633	-11.921	-16.933
	(3.356)**	(4.098)**	(4.823)*	(5.852)**
$r(t_c)(X/S_1)$			-0.261	2.646
			(9.725)	(11.868)
$(t_p - t_{cg})(\text{Return}_{t+1})$		1.242		1.991
		(0.447)**		(0.693)**
$(t_c)(\text{Return}_{t+1})$				-0.578
				(0.342)
ln(Assets)	-0.380	-0.378	-0.339	-0.242
	(0.181)*	(0.221)	(0.221)	(0.264)
Return_t	0.181	0.237	0.192	0.224
	(0.161)	(0.115)*	(0.149)	(0.103)*
ln(employees)	-0.751	-0.784	-0.838	-0.794
	(0.192)**	(0.235)**	(0.240)**	(0.288)**
ln(sales)	0.123	0.122	0.170	0.096
	(0.235)	(0.294)	(0.284)	(0.354)
ln(Cash Flow)	0.254	0.167	0.323	0.274
	(0.124)*	(0.152)	(0.148)*	(0.176)
ln(Market Value)	1.020	1.012	1.008	0.903
	(0.133)**	(0.171)**	(0.156)**	(0.201)**
ln(Total comp)	-0.026	0.079	-0.073	-0.044
	(0.059)	(0.075)	(0.070)	(0.088)
Indiv. Fixed Effects	Yes	Yes	Yes	Yes
Observations	8273	5766	6278	4416
# of Individuals	1723	1203	1360	954

Each of the regressions is a fixed effect logit of the decision of an executive to exercise stock options in a given year. The sample here is 1993-1999. Standard errors in parentheses.
* significant at 5%; ** significant at 1%