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Executive Incentives and Capital Structure

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MASTER THESIS

for

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Purpose	Investigate to what extent executive incentives can explain capital structure.

Main contents:

1. Review and discussion of theoretical and empirical literature related to the relationship between executive incentives and capital structure.

2. Formulation of testable hypothesis, discussion of data, and analysis of data with the intention of gaining new insights regarding the relationship between executive incentives and capital structure.

3. Overall assessment of the implications of the empirical study.

Monica Rolfsen Deputy Head of Department	Einar Belsom Supervisor

Preface

This master's thesis is written as an ending work of our master degree program at the Norwegian University of Science and Technology (NTNU), Department of Industrial Economics and Technology Management, Trondheim.

We would like to thank Associate Professor Einar Belsom at Department of Industrial Economics and Technology Management at NTNU for counseling. We also thank The Transaction and Restructuring department at KPMG AS for help in the data collection process.

We alone are responsible for the contents and any errors.

May 2011, Trondheim

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Executive Incentives and Capital Structure

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ABSTRACT

Through a dynamic panel data analysis of a sample of Nordic firms we investigate how executives' stock and option incentives influence the choice of capital structure. In addition, we look at how equity ownership by a large external shareholder influences the incentives' effect on capital structure. Our results show that options have a negative effect on debt level, while stock holdings' influence is more diffuse. We also see that only options have both a statistical and economical significant impact on leverage, and therefore operate as a stronger incentive than stocks. No significant dependency is found between the size of the largest external shareholder and the incentives' effect on capital structure. Still, we see a weak trend indicating that the effect of equity based incentives is stronger when firms' largest shareholders are institutional.

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1. Introduction

Since the work of Berle and Means (1932), researchers have acknowledged the potential conflicts of interest between executives and shareholders. Capital structure can be used by shareholders in order to limit this agency problem, or executives might adjust capital structure according to their own preferences. Jensen & Meckling (1976) showed that debt financing, even in the absence of taxes, increases firm value due to reduced total agency costs. A diversified external shareholder will therefore choose a level of debt that minimizes these costs and thereby maximizes firm value. Nevertheless, Lang (1987) presented a theory illustrating that if executives lose all their interests in the firm at bankruptcy they may desire to use an amount of debt that is less than ideal from external shareholders' point of view. This will result in a reduced firm value. Hence, from an agency theory perspective, it is argued that the separation of ownership and control makes it impossible to secure that executives make optimal decisions for the external shareholders, without incurring any agency costs. It is expected that as fractional ownership falls, equity agency costs surge due to the residual loss caused by executives maximizing their own wealth, and not the external shareholders'. From a risk oriented perspective, executives are unable to diversify their human capital. To secure their own positions they will therefore seek to reduce firms' risk through under-leveraging. As the external shareholders bear these agency costs of equity, it is in their interest to minimize them.

Various incentives are used to align executive interests with those of shareholders. Equity compensation is the most widely used incentive to obtain this. The underlying intention of such compensation is to expose executives to firm risk and encourage them to make financial decisions in the interest of the external shareholders. However, regarding capital structure, the incentives' influential directions on leverage is somewhat diffuse. When allocating shares, the literature showcases two divergent results and explains these by focusing on two aspects: Executives' risk aversion, which emphasizes executives preference to choose lower risk compared to well diversified external shareholders, and the agency cost of debt, which also consider how changes in the costs of debt affect executives' financing preference.

Friend and Lang (1988) based their empirical analysis on the risk aversion argument. To test whether capital structure decisions are, at least in part, motivated by executive ownership they classified New York Stock Exchange firms into two equal groups, one above- and one below-median ownership. This gave them an opportunity to examine whether executives' ability and desire to reduce the level of debt are dependent on how much equity they possess. The coefficient of the ownership variable was larger in the sample with higher proportion of executive ownership, indicating that these executives have greater incentives to affect leverage. They also showed a negative relationship between executive ownership and debt level, and argued that this observation reflects the greater undiversified risk of debt to executives compared to diversified external shareholders. Firth (1995) agreed and emphasized that the greater fraction of ownership, the greater are executives' abilities to adopt strategies to accomplish their own objectives. However, Mehran (1992) stated that the influential direction on leverage is more complex and therefore rather unclear. On one hand, debt increases share price and therefore higher debt may become more attractive as executive ownership increases. Notwithstanding, at sufficiently high levels of ownership, executives are unlikely to hold a well-diversified portfolio and they would therefore prefer lower levels of debt. The result he found through his article coincides with his first argument,

which depicts a positive relationship. As this was conflicting evidence compared to earlier research, Mehran (1992) argued that different origins for the data collection could be the underlying cause.

Short et al. (2002) argued that previous research ignores the part of the agency theory which concerns agency cost of debt. Based on this argument he explains the positive relationship between stock compensation and the debt level. As executives' ownership give them incentives to decrease their disposition to risk, risk seeking behavior like engaging in asset substitution is likely to be reduced. Hence, the interests of executives are likely to become more aligned with those of the debt holders, lowering the agency cost of debt and therefore also the debt burden for the firm.

The effect of executive stock options on capital structure seems not to have received as much attention in academic research as executive equity stock holdings. Smitt and Watts (1982) argued that stock options may motivate executives to increase the firms' risk by for instance to take on more debt, since this further will increase the value of their options. Zhou (2001) agreed with this point of view, and stated that a substantial proportion of option compensation to executives can be associated with more extreme outcomes in stock prices compared to other equity compensation incentives. This is caused by the fact that executives might take higher risk than desirable because, when owning options, they are only exposed to upside risk. Thus, based on the risk aversion argument there is a positive relationship between options and debt level.

When looking at how executive equity compensation influences the choice of capital structure, it is interesting to also consider how large external shareholders can affect the decision. Friend and Lang (1988) explored this by dividing each of the two, above-mentioned groups into two new groups, one with large and one with small external shareholders, using a cutoff of 10% ownership. They did not find any clear tendencies. Still, they argued that external shareholders are likely to hold more diversified portfolios than owner-executives and would, therefore, be expected to prefer higher debt levels than those sought by executives. Also Firth (1995) and Mehran (1992) found this positive relationship, and argued that a large external shareholder constrains executives' discretion in setting capital structure. On the contrary, Short et al. (2002) argued that the presence of a large external shareholder may force executives to engage in asset substitution. Hence, increased risk changing behavior on the part of executives will increase the agency costs of debt, resulting in a negative relationship. Short (2002) also tested if the existence of a large external shareholder would change the incentives' effect on leverage. He defined two different dummy variables in the regression model, each multiplied with the percentage of equity owned by the executive. The first dummy equaled one if the major shareholder was large, and the second dummy equaled one if the major shareholder was small. After carrying through this regression, Short concluded that the presence of a large external shareholder negate the positive relationship between executive ownership and debt ratio.

Our analysis of the link between executive equity based incentives and leverage differs from previous work both in geographic focus and in methodology. Previous literature has focused on the United States (US) and the United Kingdom (UK), while we look at the Nordic market. Our research also differs from former static studies by using panel data to conduct a dynamical analysis. Panel data accounts for individual heterogeneity, and reduce the chance for omitted variable bias. Hence, we believe using panel data makes our model more robust. To our knowledge, earlier research on the relationship between options and debt level has solely focused on the risk aversion argument. We therefore present a new theoretical

perspective for this relationship by also including the agency cost of debt as an influencing factor. When options are allocated, executives are willing to take on more risk by for instance to raise debt level, as this boosts the options' value. In this case the firm specific risk will increase, which again will influence creditors to demand a higher interest on debt. In addition we investigate how each firm's largest external shareholder influences the incentive variables' effect on debt level. This is done because we expect that they have the possibility and interest of interfering in capital structure decisions.

The remaining part of the paper is organized as follows: Section 2 discusses the methodology used and the collection of data. In section 3 we show the regression results and provide our interpretation of these. Section 4 presents robustness checks and potential sources of errors, before we conclude in Section 5.

2. Methodology and Data

In this section we first present our model for how executives' equity incentives influence the choice of capital structure. After that follows an explanation of data sources, before we define the regression variables used in our model.

2.1 Regression method

We conducted a dynamic analysis, using panel data in STATA. This dynamical approach allowed us to introduce a new dimension compared to earlier static research. Leverage (LEV) was defined to be the dependent variable and our proxy for capital structure. Further we specified eight independent variables, four control variables (CV) and four incentive variables (IV), see Table 1 below. The following regression model was used:

$$LEV = \beta_1 + \sum_{i=2}^{n} \beta_i CV_i + \sum_{j=n+1}^{m} \beta_j IV_j$$

A constructed proxy never captures the full effect of the real world causal relationship between equity compensation and leverage. We therefore chose to define two different proxies that capture slightly different aspects of each of the two incentives, shares and options. This resulted in two main regressions, one for each of the two combinations of the incentives' proxies (see Table 1). The motivation was to find stronger indicia for the relationship between incentives and capital structure, given that both regressions derived the same result.

Our dataset, made out of 29 companies, constitute of a random sample drawn from the total number of listed companies. The variation across entities was therefore assumed to be random and uncorrelated with the other independent variables, which meant that we could use a random effects model. The Hausman test also supported this decision. Each company was listed during the time period 2005-2009.

Further, we expected a time effect in our dataset. This is because when executives receive incentives, they will normally not be able to alter the capital structure immediately. Yet, since we only registered financial data from firms once a year at year-end, the time trend was not expected to be large. This is because parts of the delays will be captured in the firms' closing balance, if incentives were given early in that same year. To check if our intuition was right we did multiple test-regressions on our dataset where one, two and three lags on the incentive proxies were included. When using lags, it limits the number of years and thereby the number of observations included in the regression. By introducing one lag, values from 2005 were only included in the lagged values and not in the rest of the variables. With two lags, values from 2005 and 2006 were only included in the lagged values, and so on. Next we compared these lagged regressions with regressions done without lags on the same number of years, i.e. 2006 to 2009 for one lag, 2007 to 2009 for two lags etc. Doing this, we saw a time trend in our dataset, and thus, decided to introduce lags in our model to also incorporate the time effect that spans over multiple years[1]. To find the suitable number of lags we did regressions with one, two and three lags on the incentive variables. It turned out that using two lags on the OS and VO variables were sufficient.

To check for potential data dependency in our results, we further categorized our data into different subsamples and performed the same regression on these. To better see the combined incentives effect on leverage we regressed on a subsample which only included firms that allocate options (SUBO). The restriction on options was chosen because there are fewer firms in our dataset that allocate options than stocks. We also divided our dataset into two new subsamples, restricted by whether or not the largest external shareholder owned more (SUBEL) or less (SUBES) than 10 %[2]. The motivation for this classification was to see whether the existence of a large external shareholder contra a small external shareholder influenced the incentives' effect on leverage differently. We further created two new subsamples, based on whether or not the firms' largest shareholders were institutional (SUBEI) or private (SUBEP)[3]. Our aim was to determine if this categorization would change the incentives effect on leverage.

2.2 Data sources and variables used in the regression model

Data from 796 listed Nordic companies was collected from the Bloomberg and Amadeus databases for the period 2005-2009, and all variables in the model were calculated from reported year-end values. To ensure a fully balanced dataset, firms with low data availability were excluded, resulting in a final sample of 29 firms. Besides this, the final sample was selected randomly from listed Swedish, Norwegian, Danish and Finnish companies within one of the following four sectors[4]; industrials, consumer staples, information technology and materials. Companies from Iceland were excluded due to the country's extraordinary financial situation recent years. Where it was found necessary, annual reports were used as

[1] See Appendix C.1 for further details.
[2] This is the cutoff that Friend and Lang (1998) used in their paper to separate large major external shareholders from smaller.
[3] Institutional shareholders are defined to have investment stakes in more than two industries and are well diversified. Remaining shareholders are classified as private shareholders and are less diversified.
[4] Classified according to the GICS.

an additional source of information. After having completed the dataset we looked at the descriptive statistics and removed outliers[5].

To be able to assess the incentive variables' isolated effect on leverage, we included four control variables. Three of these variables are commonly used in the literature to account for other potential determinants of capital structure, see Titman and Wessels (1988), Altman (1968) and Baker and Wurgler (2002)[6]. In addition, a forth control variable accounting for the ownership of the largest external shareholder was included. Table 1 below gives an overview over the final variables we used in our regression model. For descriptive statistics see Table 2.

In previous literature, both book and market values have been used to determine leverage ratios. Book values can be manipulated by accounting techniques that differs between firms, making them less comparable in cross-sectional analyses. But, since we in our analysis considered panel data, accounting differences between firms became less crucial. Marsh (1982) also argued that book values are preferable because these are the numbers executives tend to focus on when making capital structure decisions. We therefore used book values when calculating our dependent variable. Also, in the literature, both long-term debt and total debt are used to determine leverage ratios. We expected that newly obtained executive incentives in most cases will have a delayed effect on leverage. Therefore, we saw long-term debt as a more appropriate variable to capture how present incentives affect firms' long-term capital structure.

Our main motive in the choice of incentive proxies was to find variables that in the best possible way would reflect how stocks and options given to executives affect leverage. The defined variables are SS (Stock Sensitivity) and VSTO (Value Stock) for the stock incentive, and OS (Option Sensitivity) and VO (Value Option) for the option incentive.

The motivation behind our risk proxies, SS and OS, was our conviction that executives' willingness to change personal risk exposure will affect their posture to leverage. Executives are exposed to firm specific risk when they are holding equity based compensation, since their wealth will be dependent on firm performance. When leverage increases, the asset and stock return volatility will also increase, meaning that SS and OS indirectly reflect how sensitive executives' stock and option values are to changes in firms' leverage. By measuring changes in executives' stock and option values due to changes in firm specific risk, we capture an important aspect of the motivation incentives give executives to affect leverage.

We defined the VSTO and VO proxies based on our opinion that the value of stocks and options incentives also affects executives' motivation to change leverage. However, we realize that the actual motivation perceived of the executives that obtain these incentives is dependent of the value relative to their total monetary compensation. We therefore used the rate of executives' stock and option wealth to total yearly monetary compensation to describe executives' incentives to change leverage.

Previous research frequently uses the percentage of executives' ownership as a proxy for the stock incentive. This proxy can also give an indication of executives' ability to change leverage, as a higher percentage of ownership gives more voting rights. When including this

[5] To discover outliers we plotted each year separately and removed firms that stood out in three or more years.
[6] We tried several control variables that are common in the capital structure theory, and also different proxies for the same control variables. These three were retained because they were the most significant ones.

proxy (MANFRAC) in our regressions, it turned out to be insignificant and it was therefore dropped in further analysis.

	Abbreviation	Proxy for	Definition
Dependent variable	LEV	Leverage	Long-term debt/Book value of total asset
Control variables	LNSALES	Size	LN(Sales)
	EOA	Profitability	EBIT/Book value of total asset
	GROWRD	Growth opportunity	R&D/Total sales
	EXT	External shareholder	% ownership of the largest shareholder
Incentive variables	SS[1]	Stock incentive	SS=(e^{-yT}*N'(d1)*S*√T)*Executive ownership fraction
	OS[1]	Option incentive	OS=(e^{-yT}*N'(d1)*S*√T)*# Executive options
	VSTO[2]	Stock incentive	Value executive stocks/yearly monetary compensation
	VO[2]	Option incentive	Value executive options/yearly monetary compensation

Table 1: Two separate regressions were conducted: In regression 1, the proxies SS and OS were together with the control variables regressed on LEV. In regression 2, SS and OS were substituted by VSTO and VO. All variables are fractions, except LNSALES, SS and OS. SS and OS have units in Million NOK per percentage volatility change.

3. Empirical analysis

In this section we first present the characteristics of our dataset followed by a review of our regression results. These results are then discussed and interpreted.

3.1 Descriptive Statistics

Summary statistics relating to the variables used in the analysis are shown in Table 2. Inspection of the table shows that the mean leverage in our sample is 16.4% and therefore relatively low compared to datasets in previous literature. The standard deviation of leverage is 18.2%.

The mean of the SS proxy shows that the sensitivity of total stock value to asset volatility is 28.5 million NOK per percentage asset volatility change, with a standard deviation of 93.9. The comparable stock proxy, the fraction of executives' stocks value to total, yearly monetary compensation (VSTO), has a mean of 6.5 and a standard deviation of 23.6. We are looking at the wealth effect of executives' stocks, accumulated over many

years, to the total monetary compensation received each year. The ratio can therefore exceed 1.

Regarding the option proxies, the sensitivity of total option value to stock volatility (OS) has a mean of 7.9 million NOK per percentage stock volatility change, while the standard deviation is 24.4. The fraction of executives' total option value to total, yearly monetary compensation (VO), gives a mean of 1.1 and a standard deviation of 3.1.

The dummy variable (INSTPRIV) indicates if the largest external shareholder is institutional (1) or private (0). We see that the mean is 68.3%, which means that the overweight is institutional shareholders. We also see that the mean equity fraction held by managers (MANFRAC) is 3.4%, which indicates that executives in Nordic countries have low equity interests in their own firms. The largest external shareholders (EXT) hold on average 24.6 % of the firms, which qualifies as a large proportion compared to dataset in earlier literature.

From Table 2 we see that all incentive variables, except VO, have a large range, which can result in small coefficients when regressing. Still, these small coefficients can have an essential influence on leverage and we will therefore analyze them further.

When considering that our dataset consists exclusively of Nordic listed firms of a certain age and credibility, the chances of financial distress are minimal. For that reason we further assume that executives, when facing the tender of lower (higher) cost of debt, will choose to adjust the firms debt level up (down).

Variable	Mean	Std Dev	Min	Max	Obs
Debt ratio					
LEV	0.164	0.182	0.000	0.918	145
Control variables					
LNSALES	8.578	1.842	4.188	12.181	145
EOA	0.141	0.315	-0.237	1.796	145
GROWRD	0.070	0.117	0.000	0.895	145
EXT	0.246	0.156	0.032	0.930	145
Incentive variables					
SS	28.536	93.903	0.000	808.991	145
OS	7.876	24.417	0.000	247.845	145
VSTO	6.481	23.619	0.000	235.178	145
VO	1.082	3.097	0.000	23.630	145
Other variables					
MANFRAC	0.034	0.079	0.000	0.395	145
INSTPRIV	0.683	0.467	0.000	1.000	145

Table 2: Descriptive statistics of the variables used in our regressions. *Other Variables* are not included in the model, but used in supplementary regressions. MANFRAC shows the fraction of how much shares executives possess, while the dummy variable INSTPRIV reviles whether external shareholders are institutional (=1) or private (=0). INSTPRIV is used to separate the whole sample into two subsamples.

3.2 Results

The coefficients in Table 3 below reveal that most of the stock and option incentives do have a statistical significant impact on leverage. If we compare the absolute size of the incentive coefficients directly with the control variables coefficients, the impact may appear small. Nevertheless, without considering the impact in a larger context we cannot make any conclusions about this. Introducing lags generally improve our results and we will therefore only present the lagged models and do our analyses on these, unless specified differently in the text.

Looking at the whole sample, SS is positively related to leverage, but not highly significant. VSTO, on the other hand, acts completely different from SS, being significant and negatively related to leverage. OS and VO are both significant and negatively related to leverage. The option coefficients in each of the two proxy combinations are about ten times higher than the stock coefficients. VO's impact on leverage is about 10 times larger than the impact caused by OS. EXT's coefficient is positive in this regression, but not significant.

	Whole dataset	**SUBO**	**Whole dataset**	**SUBO**
LEV	**COEF.**	**COEF.**	**COEF.**	**COEF.**
LNSALES	-0.0025	-0.0066	-0.0033	-0.0034
	(0.878)	(0.722)	(0.840)	(0.849)
EOA	0.3845	-0.1838	0.3938	-0.2235
	(0.000)	(0.365)	(0.000)	(0.294)
GROWRD	0.1336	-0.2122	0.1563	-0.3045
	(0.386)	(0.599)	(0.306)	(0.432)
EXT	0.1327	-0.3394	0.0907	-0.2700
	(0.321)	(0.106)	(0.495)	(0.210)
SS[1]	1.65E-04	2.3E-04		
	(0.133)	(0.019)		
OS[1]	-0.0010	-0.0010		
	(0.008)	(0.002)		
VSTO[2]			-0.0017	-0.0003
			(0.063)	(0.895)
VO[2]			-0.0348	-0.0263
			(0.001)	(0.014)

Table 3: Results from regressions done on the whole sample and on the subset where only firms that give option incentives to executives are included (SUBO). Coefficients, with accompanying p-values in brackets, are provided for the different regressions.

In the regression done on the subsample where only firms that allocate options are included (SUBO), SS's coefficient increases, OS's remains the same and both VSTO's and VO's decrease compared to the regression done on the whole sample. SS and OS obtain a clearly better p-value in SUBO, while VSTO becomes insignificant and VO less significant. EXT becomes negative, but is not highly significant.

When dividing the sample into two subsamples, one with large external shareholders (SUBEL) and one with small external shareholders (SUBES), we are not able to use lags in STATA due to a limited number of observations in the latter subsample. When regressing on these two subsamples the incentives' p-values generally become high (see Table 4). We can therefore not say anything about how the existence of a large external shareholder influences the incentives' effect on leverage. Still, EXT becomes significant and strongly negative when major external shareholders are small, and close to significant and positive when the opposite is true.

When we regress on a subsample which includes only private external shareholders (SUBEP), we observe no significant relationship between the incentive variables and leverage (Table 4). Regressing on the opposite subset where only institutional external shareholders (SUBEI) are included, all incentive variables, except VO, obtain higher coefficients and get more significant compared to the whole sample.

The control variables are not the focus in this paper, but it is still necessary to notify the direction in which they affect leverage and whether or not this is consistent across the different samples. LNSALES is both positive and negative, but it is only significant in SUBES, where it has a negative influence. EOA is positive in all samples where it is significant. GROWRD is only significant in SUBES, where it is negative.

	SUBES	**SUBEL**	**SUBES**	**SUBEL**	**SUBEP**	**SUBEI**	**SUBEP**	**SUBEI**
LEV	**COEF.**	**COEF.**	**COEF.**	**COEF.**	**COEF.**	**COEF.**	**COEF.**	**COEF.**
LNSALES	-0.0301	0.0068	-0.0263	0.0042	0.0146	-0.0143	0.0369	-0.0085
	(0.032)	(0.713)	(0.090)	(0.820)	(0.797)	(0.464)	(0.348)	(0.655)
EOA	0.1008	0.1410	0.1837	0.1435	0.2809	0.4605	0.1381	0.4560
	(0.819)	(0.024)	(0.719)	(0.022)	(0.146)	(0.000)	(0.335)	(0.000)
GROWRD	-1.9149	0.1189	-1.6856	0.1071	-0.2032	0.1367	0.2509	0.1587
	(0.000)	(0.506)	(0.000)	(0.550)	(0.633)	(0.475)	(0.567)	(0.404)
EXT	-4.8356	0.1799	-5.4252	0.1789	0.0597	0.0692	0.3904	0.0585
	(0.001)	(0.199)	(0.000)	(0.207)	(0.885)	(0.680)	(0.235)	(0.723)
SS^1	1.58E-03	0.0002			-4.60E-06	0.0002		
	(0.353)	(0.210)			(0.987)	(0.073)		
OS^1	0.0013	-0.0006			0.0012	-0.0010		
	(0.549)	(0.127)			(0.851)	(0.007)		
$VSTO^2$			-0.0032	-0.0005			0.0016	-0.0021
			(0.380)	(0.331)			(0.514)	(0.037)
VO^2			-0.0005	-0.0055			-0.0214	-0.0339
			(0.905)	(0.304)			(0.802)	(0.002)

Table 4: Results from regressions done on the following subsets: Firms with largest external shareholder's ownership below 10% (SUBES), firms with largest external shareholder's ownership abow 10% (SUBEL), firms where largest external shareholder is private (SUBEP),firms where the largest external shareholder is institutional (SUBEI). Coefficients, with accompanying p-values in brackets, are provided for the different regressions.

3.3 Discussion and interpretation of results

In this section we present an interpretation of each of the two incentives' effect on leverage. Further, we look at the external shareholders impact on the incentives. We also provide a comparison of the incentives, as well as a comparison of our results to previous research.

3.3.1 Stock incentives' effect on leverage

The two stock proxies, SS and VSTO, are showing contradicting results, which makes it difficult to draw any clear conclusion about how the stock incentive influences leverage over time. This result is inconsistent with our assumption in Section 3.1, concerning that executives will choose to adjust firms' debt level up when facing the tender of a lower cost of debt. The coefficient on SS in Table 3 is positive and, even though it is not statistically significant at a 10% confidence level, it can be argued that it has a small significant influence on leverage. VSTO, on the other hand, has a negative and significant coefficient. Due to these contradictory results, we do not analyze the quantitative effect of stock incentives on leverage any further. However, we want to make some reflections around the different influential directions.

We can explain the divergent results from an agency theory perspective. According to this theory, shareholders' first consideration when giving stock incentives is to align executives' interests with their own, as this will reduce the agency cost of equity. At the same time, debt holders are of the opinion that executives' stock ownership will make them less willing to take on risk, and that their interests, therefore, are likely to become more aligned with the debt holders. Thus, the agency cost of debt will probably also be reduced. Arguing that stock incentives result in both lower costs of equity and debt, the exact influential direction on leverage is somewhat diffuse, as seen in our results as well as previous research: SS's result supports the evidence of Friend and Lang (1988) and Firth (1995), while VSTO's result supports Mehran (1992) and Short et al. (2002).

An interesting observation is that the total value of shares to total monetary compensation ratio (VSTO), becomes insignificant when regressing on a sample which only includes firms that allocates options (SUBO). In general, when one regress on a smaller sample, it is expected that the p-value will somewhat increase even though the true relationship between the dependent and independent variables remains the same. However, the p-value of VSTO is about 2.5 times higher in SUBO, a result that is above what we would expect from simply a change in sample size. Therefore, our opinion is that the option incentive exceeds the incentive created by the value of stocks, indicating that options are a stronger incentive.

The sensitivity of total stock value to asset return volatility (SS) on the other hand, becomes highly significant in SUBO. This can be explained by looking at the company risk, as well as the fact that options are assumed to be a stronger incentive than stocks. When options are present, this will affect executives' company risk preference positively, which again will affect the value of SS through changed asset return volatility. The direct dependency between SS and asset volatility might therefore explain why SS, as opposed to VSTO, becomes more significant in SUBO.

3.3.2 Option incentives effect on leverage

From Table 3 we see that both of our option incentive proxies, OS and VO, have statistical significant and negative coefficients, which implies that option incentives have a negative effect on leverage over time. This coincides with our assumption presented in Section 3.1 regarding that executives will adjust the firms' debt level down when facing the tender of a higher cost of debt. Since VO has a larger and more significant coefficient, we also see that VO captures more of this effect than OS. This result is consistent through all regressions done, both on the whole sample and on subsamples.

The coefficient on the sensitivity of total option value to stock return volatility variable (OS) of -0.001, indicates that an increase of 1 % in average OS equals a decline of 0.05% of the average leverage ratio. Thus we conclude that OS have a limited economic impact on leverage. The coefficient of the total value of options to total monetary compensation ratio (VO) of -0.0348, indicates that an increase in the average VO ratio by 1% equals a decrease of 0.23% in average leverage. This qualifies to being called an economically significant dependency.

Our results are inconsistent to those found by Smitt and Watts (1982) and Zhou (2001). They both find a positive relationship between options and leverage. To explain this contradiction we take agency theory into consideration. Shareholders give options to align the executives' interests with their own, and thereby reduce the cost of equity. When receiving options executives obtain an incentive to increase firm risk as this will boost the value of their options. One way to achieve this is to increase leverage. In response to the allocated options, creditors will at the same time anticipate executives' higher risk preference, and therefore increase the interest rates on debt. This works as an incentive to decrease leverage. Options have therefore two opposite effects on leverage. When we in our results observe a negative relationship between option incentives and leverage, we conclude that the reduction of total agency costs matter more than the possible gains from higher option values.

The difference in economic significance of the option proxies can be explained by the fact that each of the two proxies captures different aspects of the option incentives' influence on leverage. Seeing that VO has higher p-values, we conclude that this is the superior proxy. By being a better suiting proxy, VO captures the option incentives effect better than OS, which might also explain why VO has a larger coefficient. Another reason for why VO seems like a better proxy might be due to calculation simplifications of OS. These can lead to underestimation of the risk incentive associated with OS. The exercise prices used to calculate the options' incentive effects are supposed to be the average exercise prices for all the options executives possess. Yet, where this information was unavailable, we used the average exercise prices reported for options exercised in the current period, meaning options in the money. This leads to underestimated exercise prices and hence overestimated option values. In consequence, we then underestimate the risk incentives executive possess when their options are assumed to be more into the money than they really are.

3.3.3 A comparison between stocks' and options' effect on leverage

We see a general trend that options act as a stronger incentive to change leverage than stocks. By separately comparing the absolute value of the coefficients of SS with OS and VSTO with VO, the options' coefficients are about 10 times higher and more significant. Also compared to the control variables, options are economical significant.

That options act as a stronger incentive than stocks can be explained by the agency theory. According to this theory, equity clearly becomes the cheaper choice of new financing when executives are holding options, as the agency cost of equity goes down while the agency cost of debt goes up. For stocks the choice is less clear since both agency cost of equity and debt decrease, and it can therefore be expected that other factors will have a higher influence on stock incentives' effect on leverage. This is seen in our results since stocks' influence on leverage is more dependent on what sample we have regressed on, see Table 3.

We classify options as an economical significant incentive. To evaluate if options' effect remains economical significant relative to other influential factors, we compare VO's coefficient to the earning over asset (EOA) coefficient. This is because EOA has the largest coefficient and is the only significant control variable in the whole sample. As the OS proxy is assessed to be economically insignificant, it is excluded in this comparison. EOA's coefficient is about 10 times higher than VO's (see Table 3), indicating that option incentives' impact on leverage is relatively small compared to other factors. However, when analyzing VO's and EOA's average impact on leverage we actually see that options have a significant economic influence. If we increase the average EOA fraction by 1% this corresponds to an increase of 0.3% in average leverage compared to VO's change of 0.2% (see section 3.3.2). Therefore, the VO's and EOA's effect on leverage is similar in absolute terms.

When comparing our overall results of stocks' and options' to those of earlier research, we notice that our observations coincide more with those of Short et al. (2002) than the other papers on the area. Since Short et al. (2002) is the only paper discussing a non-American dataset, namely the UK, this indicates that the tendencies we found in the Nordic market are more similar to tendencies observed in the UK. Considering that the UK is a closer market, and a capital commercial trade partner to the Nordic market, it is natural that there are stronger mutual influences between the two markets.

3.3.4 Large external shareholders' impact

We cannot draw any conclusion regarding how the size of an external shareholder, EXT, alters the incentives' effect on leverage. However, we see a trend indicating that when the largest shareholders are institutional, executives' incentives obtain a higher effect on leverage. We also observe that the presence of a large external shareholder seems to affect leverage negatively.

To evaluate how the size of a large external shareholder influences the incentives' effect on leverage, we do regressions on samples restricted by whether or not the largest external shareholder holds more (SUBEL) or less (SUBES) than 10 %. Short et al. (2002) did a similar analysis and observed that when the firms' largest external shareholder holds a high fraction, the incentives' effect on debt level is reduced. As the equity incentive variables turned out to be insignificant in both of our samples, we cannot draw any conclusions about this (see Table 4).

To find out how different types of shareholders influence the incentives' effect on leverage; we divide our sample into two groups, one with private, non-diversified shareholders (SUBEP) and one with institutional, well diversified shareholders (SUBEI). Since the average value of EXT in our sample is high, 24.6 % (see Table 2), both institutional and private shareholders hold a high fraction of the company, and hence should possess strong interests in the firms' leverage policy. However, according to our definition regarding type of shareholder, institutional shareholders have more diversified investment portfolios than private shareholders do. It is therefore likely that the latter are more active in changing firms' leverage policy, as they to a higher degree are dependent on the performance of each single firm. Therefore, we expect the equity incentives to be less efficient and EXT to be more efficient when regressing on the subset where only private shareholders are included (SUBEP). But, when doing this regression we get both insignificant coefficients on the incentive proxies and the EXT variable. We can therefore not draw any conclusion on this matter. This inconclusiveness might be due to the limited size of our sample, which makes it difficult to see any clear trends. When regressing on the subset including only institutional shareholders (SUBEI), we expect the incentives to be more efficient since the external shareholders will interfere less in firms financing policy. Therefore, we also expect EXT to be less efficient. In our results from regressing on SUBEI all incentive proxies, except VO, obtain higher coefficients and become increasingly statistically significant. It is though important to notice that the contradicting changes in VO's coefficient, with respect to size and p-value, are minimal. EXT gets clearly less influential and remains insignificant. For this reason, the incentives seem to have a stronger effect in SUBEI compared to the whole sample.

Even though EXT seems to affect leverage negatively, we still see that EXT has different influential directions on leverage across the samples, as shown in Tables 3 and 4. Here, the negative coefficients are generally higher and much more significant. Our observation supports Short et al. (2002), while Firth (1995) and Mehran (1992) observe a positive relationship between the existence of a large external shareholder and the debt ratio.

When regressing on the subsample where only external shareholders holding more than 10 % of firms' stocks are included (SUBEL), EXT is positive and close to significant. In the opposite subsample (SUBES) it becomes strongly negative and clearly significant. If one of the subsamples consists of a higher proportion of diversified shareholders, this could have been an explanation for these contradicting influences. But, when regressing on a sample that only includes institutional shareholders (SUBEI), compared to one that only include private shareholders (SUBEP), we see that EXT's coefficient becomes positive and non-significant in both. Our suggested explanation does therefore not hold, and we find it difficult to give a reason for why the size of the largest external shareholders determines which direction these shareholders affect leverage.

4 Robustness checks and potential sources of errors

Throughout our analysis we have conducted tests to increase the robustness of our results and to locate errors. Below follows explanations of these tests, and a list of possible remaining errors.

4.1 Bootstrapping

To check the accuracy of our sample estimates we conducted a robustness check, using bootstrapping. This technique allowed us to estimate the properties of our variables, with respect to the influential direction and order of magnitude (coefficient size). We defined coefficient values within the same decimal to have an equivalent order of magnitude. Bootstrapping was done by randomly selecting 15 firms, five times, from the whole sample, resulting in five different subsamples. The regression on each of the five subsamples was then compared to the regression on the whole sample to see if the results were consistent.

In our regression, LNSALES has a negative and insignificant coefficient. When bootstrapping, the influential direction of LNSALES varied and none of the coefficients had the same order of magnitude as our model. We could therefore not draw any conclusions for this variable, but it did not weaken our model since the variable was insignificant in the first place. Both EOA and GROWRD have a positive coefficient, significant and insignificant respectively. This same result was found in all five subsamples when bootstrapping, making a stronger argument for the accuracy of our estimated coefficients for these variables.

SS has a positive and fairly significant coefficient in the whole sample, which is also found when bootstrapping on all five subsamples. This strengthens our result for this coefficient. VSTO has a negative and significant coefficient in the whole sample. The results from bootstrapping gave the same influential direction. One coefficient was also significant and had the same order of magnitude. Besides this, all the other subsamples gave different order of magnitudes, but the coefficients were all insignificant. It is therefore difficult to draw a definite conclusion for this variable, but we see a clear negative trend. Both OS and VO have a negative and significant coefficient when bootstrapping, which is the same result as we found in the whole sample. In general, bootstrapping gave us basically the same result as our model and we thereby conclude that our model is reasonably robust.

4.2 Internal validity

When doing a regression one will never manage to capture a completely perfect picture. So even though we throughout our work have strived to minimize the chances of biases, there are still some possible sources of errors in our dataset that is worth to keep in mind when analyzing the results.

Panel data is given as a solution to omitted variable bias when the omitted variables are constant over time within a given company. We believe that we have been able to capture all the variables that will have an influence on leverage over time, but we realize that there is always a possibility of missing out of a factor that can create bias if omitted in the regression model.

Another reason for errors can be that we have chosen a linear approach. We assume that an increase in the incentives given to executives will give in an analogous motivation of changing leverage, resulting in a linearly relationship. We therefore see this as the most suitable functional form, but there is always a chance that a non-linear polynomial or exponential model would be more appropriate to use. If that is the case, we will, by using a linear model, get somewhat biased results.

Omitted interaction terms could be another possible source of error. We did, however, try to include interaction terms in our model, but this resulted in a less informative model. The interaction terms overlapped with the already defined variables and did not give anything extra to our analysis. We therefore found it best not to include them in our model.

Some variables bias will be found in our results. One reason for this is the different reporting procedures among Nordic firms. Due to these differences we had to make some simplifications and approximations to be able to complete our dataset[7]. Another reason is that we only corrected for the differences in currencies once, at the end of each year, but we assume the effect of this to be negligible.

To see if there was simultaneous causality between leverage and our independent variables, we looked at the correlation between the error term and the independent variables. This showed us that the correlation was too low to have a significant impact on our results. Nevertheless, it might, to some degree, be a two-way interaction between the incentives variables and leverage.

Another possible source of errors is outliers in our dataset. After completing the data collection we plotted each year separately and removed firms that stood out in three or more years. Since our dataset was already fairly limited, we decided not to remove firms that had only one or two years with substantially differing observations. If our dataset were bigger we would probably also have removed these firms, and the decision might cause some bias in our results.

As a last remark, we see that three out of four control variables are insignificant. This could be a sign that they fail to remain constant, but we believe that even though they are insignificant they could still capture an effect that improve our model. We therefore decided to include them in the regressions. This can create some bias, but we assumed it to be small.

5. Conclusion and further work

We have empirically investigated to what extent executive incentives can explain capital structure in Nordic firms. To answer this we have considered two incentives given to executives, stocks and options. In addition, we have seen how equity ownership by a large external shareholder influences the incentives effect on capital structure. Our results show that executive options have a statistical and economical negative effect on the long term debt level, while stock holdings' influence is more diffuse. We also found that for executives in Nordic firms, options give a stronger incentive to change leverage than stocks do. No significant dependency was found between the size of large external shareholders and the executive incentives' effect on capital structure. Still, we saw a weak trend indicating that the effect of equity based incentives is stronger when the largest shareholders are institutional. Compared with earlier research within the area, our results from investigating Nordic firms coincide more with those found in the UK than those in the US.

To get stronger indicia on how stock and option incentives affect leverage in the Nordic region, regressions can be done on a more comprehensive dataset.

Another value-adding aspect would be to include the executives' own time horizon regarding when to sell their equity or when to turn in their notice of dismissal. Especially, it would be interesting to evaluate if executives choose a higher leverage in firms when either

[7] See Appendix B for details.

of these time horizons are short. If this is the case it could indicate that equity incentives can make executives act opportunistic. Executives might be willing to take larger risks right before they plan to sell their equity, hoping to increase the short-term stock prices and thereby gaining more wealth. If the executives also are about to leave the company, they might take this larger risk even though they anticipate a reduced long-term firm performance, as this will not affect them.

It would also have been interesting to look at how the financial crisis impacts the incentives' effect on leverage. We did try to do some test that would reviled such influences, but did not get any significant results. We believe that in the future, with a prolonged dataset, such trends will probably be easier to discover.

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APPENDIX A: Calculation of incentive variables

SS: Proxy for how sensitive the market value of equity held by executives is to change in the volatility of firm value

$$\boldsymbol{SS = \nu * ExecutivesOwnershipFraction}$$

where

$$\nu = e^{-yT} * N'(d1) * S * \sqrt{T} \quad \text{and} \quad d1 = \frac{\ln\left(\frac{S}{K}\right) + \left(r - y + \frac{1}{2}\sigma^2\right) * T}{\sigma * \sqrt{T}}$$

ν	Sensitivity of compensation to asset return volatility (Vega)
S	The market value of the firm, determined as the market value of equity plus the book value of total liabilities at year end. Using book values as proxies for market value of liabilities is common practice in the literature.
K	Book value of total liabilities at year end
N'	Probability density function for the normal distribution
T	The liability's time to maturity
y	Dividend yield
r	The riskless rate (Treasury bond rate with a time to maturity equal to 10 | years)
σ_{asset}^2	The variance in firm value

σ_{asset} is found from σ_{equity} by assuming $\sigma_{liability}=0$[8] in the equation beneath. σ_{equity} is found each year by calculating the variance between each day's stock payoff.

$$\sigma_{asset} = \frac{\text{Equity}}{(\text{Equity} + \text{Liabilities})} * \sigma_{equity} + \frac{Liabilities}{(Equity + Liabilities)} * \sigma_{liability}$$[9]

OS: Proxy for how sensitive executives' option value is to change in the volatility of stock value.

$$\boldsymbol{OS = \nu * \#options}$$

where

[8] Considering that our sample consists of well established, stock exchanged listed firms with a low average debt ratio; small liability volatility close to zero is a reasonable assumption.

[9] We use market values, and assume that the market value of liabilities equals the book value of liabilities.

$$\nu = e^{-yT} * N'(d1) * S * \sqrt{T} \quad \text{and} \quad d1 = \frac{\ln\left(\frac{S}{K}\right) + \left(r - y + \frac{1}{2}\sigma^2\right) * T}{\sigma * \sqrt{T}}$$

ν	The sensitivity of compensation to stock return volatility (Vega)
S	Current price of the stock
K	Strike price of the option
N'	Probability density function for the normal distribution
T	Time to maturity
r	The continuously compounded risk-free interest rate
y	Dividend yield
$\sigma_{equity}{}^2$	The variance of the stock (Found each year by calculating the variance between each day's stock payoffs)

VSTO: Proxy defined by the ratio of stock incentives compensation to total monetary compensation.

$$\boldsymbol{VSTO} = \frac{\textbf{Total value executive stocks}}{\textbf{Total yearly monetary executive compensation}}$$

VO: Proxy defined by the ratio of option incentives compensation to total monetary compensation.

$$\boldsymbol{VO} = \frac{\textbf{Total value of executive options}}{\textbf{Total yearly monetary executive compensation}}$$

APPENDIX B: Assumptions and simplifications in the dataset.

When collecting information for the dataset several assumptions and simplifications had to be made. We found data in both Amadeus and Bloomberg and these numbers were not always identical. When this was the case, numbers from Amadeus was used.

Due to different reporting methods in the annual reports, concerning financial information, we had to make the following assumptions:

- Non-current liabilities are liabilities not due to be paid within the next year. Therefore, when long-term debt was not clearly expressed, non-current liability was used as an approximation.
- Revenue is income that a company receives from its normal business activities, usually from sale of goods and services to customers. Since a large proportion of sales often constitute the same part, we have used revenue as an approximation for sales when numbers for sales were missing.
- There were some of the companies that reported unequal financial statement numbers for the same year in two different annual reports. When this occurred the latest accounting numbers where used.

In this paper only executives' incentives, and not the total incentives given in a company, were included. Since some companies only reported total incentives given, some simplifications were made:

- If the exercise price and maturity date where not explicitly given for the executives incentives, we used the information appurtenant to the total number of options allocated in the firm as an approximation.
- Where the exercise price was only given for the options exercised in the current period, we used this price to indicate the exercise price for all outstanding options.

APPENDIX C: Other regression results

Table 5-7 below show that lags on the OS and VO variables are insignificant. Even though they are insignificant they could still capture an effect that improves our model. As shown in Table 5 we have a small time trend in our dataset, and we therefore believe that lags will create value for our analysis and decided to include them in the regressions.

C.1 Two regressions to establish the existence of a time trend

	Whole dataset	**Years 2007-2009**	**Whole dataset**	**Years 2007-2009**
LEV	**COEF.**	**COEF.**	**COEF.**	**COEF.**
LNSALES	-0.0025	-0.0020	-0.0033	0. 0042
	(0.878)	(0.902)	(0.840)	(0.793)
EOA	0.3845	0.3797	0.3938	0. 3933
	(0.000)	(0.000)	(0.000)	(0.000)
GROWRD	0.1336	0. 1347	0.1563	0. 1391
	(0.386)	(0.374)	(0.306)	(0.346)
EXT	0.1327	0. 1304	0.0907	0. 1047
	(0.321)	(0.321)	(0.495)	(0.416)
SS[1]	1.65E-04	1.68E-04		
	(0.133)	(0.122)		
OS[1]	-0.0010	-0.0011		
	(0.008)	(0.003)		
VSTO[2]			-0.0017	-0. 0018
			(0.063)	(0.043)
VO[2]			-0.0348	-0. 0344
			(0.001)	(0.001)
Lags OS[1]				
L1	0.0002			
	(0.659)			
L2	0.0002			
	(0.898)			
Lags VO[2]				
L1			0.0021	
			(0.663)	
L2			-0.0021	
			(0.553)	

Table 5: Regression with lags done on the whole sample, compared to the regression done only on years 2007-2009. This was done to registrate time effect in our dataset.

C.2 Table 3 with lags

	Whole dataset	**SUBO**	**Whole dataset**	**SUBO**
LEV	**COEF.**	**COEF.**	**COEF.**	**COEF.**
LNSALES	-0.0025	-0.0066	-0.0033	-0.0034
	(0.878)	(0.722)	(0.840)	(0.849)
EOA	0.3845	-0.1838	0.3938	-0.2235
	(0.000)	(0.365)	(0.000)	(0.294)
GROWRD	0.1336	-0.2122	0.1563	-0.3045
	(0.386)	(0.599)	(0.306)	(0.432)
EXT	0.1327	-0.3394	0.0907	-0.2700
	(0.321)	(0.106)	(0.495)	(0.210)
SS[1]	1.65E-04	2.3E-04		
	(0.133)	(0.019)		
OS[1]	-0.0010	-0.0010		
	(0.008)	(0.002)		
VSTO[2]			-0.0017	-0.0003
			(0.063)	(0.895)
VO[2]			-0.0348	-0.0263
			(0.001)	(0.014)
Lags OS[1]				
L1	0.0002	-4.9E-05		
	(0.659)	(0.878)		
L2	0.0002	-0.0005		
	(0.898)	(0.674)		
Lags VO[2]				
L1			0.0021	0.0046
			(0.663)	(0.394)
L2			-0.0021	-0.0007
			(0.553)	(0.870)

Table 6: Same regressions as in Table 3, but lags are included. Coefficients, with accompanying p-values in brackets, are provided for the different regressions.

C.3 Table 4 with lags

	SUBES	**SUBEL**	**SUBES**	**SUBEL**	**SUBEP**	**SUBEI**	**SUBEP**	**SUBEI**
LEV	**COEF.**	**COEF.**	**COEF.**	**COEF.**	**COEF.**	**COEF.**	**COEF.**	**COEF.**
LNSALES	-0.0301	0.0068	-0.0263	0.0042	0.0146	-0.0143	0.0369	-0.0085
	(0.032)	(0.713)	(0.090)	(0.820)	(0.797)	(0.464)	(0.348)	(0.655)
EOA	0.1008	0.1410	0.1837	0.1435	0.2809	0.4605	0.1381	0.4560
	(0.819)	(0.024)	(0.719)	(0.022)	(0.146)	(0.000)	(0.335)	(0.000)
GROWRD	-1.9149	0.1189	-1.6856	0.1071	-0.2032	0.1367	0.2509	0.1587
	(0.000)	(0.506)	(0.000)	(0.550)	(0.633)	(0.475)	(0.567)	(0.404)
EXT	-4.8356	0.1799	-5.4252	0.1789	0.0597	0.0692	0.3904	0.0585
	(0.001)	(0.199)	(0.000)	(0.207)	(0.885)	(0.680)	(0.235)	(0.723)
SS[1]	1.58E-03	0.0002			-4.60E-06	0.0002		
	(0.353)	(0.210)			(0.987)	(0.073)		
OS[1]	0.0013	-0.0006			0.0012	-0.0010		
	(0.549)	(0.127)			(0.851)	(0.007)		
VSTO[2]			-0.0032	-0.0005			0.0016	-0.0021
			(0.380)	(0.331)			(0.514)	(0.037)
VO[2]			-0.0005	-0.0055			-0.0214	-0.0339
			(0.905)	(0.304)			(0.802)	(0.002)
Lags OS[1]								
L1					0.0045	0.0001		
					(0.256)	(0.728)		
L2					0.0006	0.0004		
					(0.869)	(0.834)		
Lags VO[2]								
L1							0.0789	0.0017
							(0.315)	(0.736)
L2							-0.0625	-0.0013
							(0.288)	(0.720)

Table 7: Same regressions as in Table 4, but lags are included. Coefficients, with accompanying p- values in brackets, are provided for the different regressions.

C.4 Regression including equity owned by executive

	Whole dataset	**SUBO**
LEV	**COEF.**	**COEF.**
LNSALES	0.0109	-0.0003
	(0.485)	(0.976)
EOA	0.1304	-0.274
	(0.024)	(0.045)
GROWRD	0.1358	-0.296
	(0.373)	(0.109)
EXT	0.1896	-0.196
	(0.114)	(0.135)
MANFRAC	0.023	-0.276
	(0.938)	(0.320)

Table 8: Results when including fractions hold by executive in the regression. Coefficients, with accompanying p-values in brackets, are provided for the different regressions.