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ROE as a performance measure in performance-vested stock option contracts in China

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Abstract

In this paper, we hand-collect the performance measures adopted in performance-vested stock option plans in China. We find that return on equity (ROE) is a widely used performance measure. Different from most of the other performance measures, ROE is affected by the number of shares outstanding. When executive compensation contracts are explicitly tied to ROE performance, in order to avoid the reduction in reported ROE through the issuance of additional common shares (i.e., ROE dilution), managers have an incentive to influence ROE performance through financing decisions. We find that managers are more likely to avoid ROE dilution related to debt-versus-equity choice when their performance-vested stock option plans are explicitly tied to ROE performance and when firms have a high level of access to bank loans. However, there is no such link for firms with a low level of access to bank loans. Our study shows that the association between executive compensation design and corporate financing decisions depends on the accessibility of bank loans, demonstrating the importance of institutional factors in China. The results hold after controlling for potential endogeneity in executive compensation and corporate financing decisions. Our study contributes to both the executive compensation and corporate finance literature.

Keywords: Executive compensation, Performance-vested stock option plans, Performance measures, Debt financing, Equity financing

Introduction

Agency theory suggests that executive compensation

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contracts are designed to align the interests of shareholders to those of managers. Executive compensation has attracted a great deal of attention among both academics and practitioners. Equity-based compensation is the single largest component of executive compensation in the U.S. and was adopted in China starting from 2006. Different from traditional stock options, stock option plans in China are required to be performance based (performance-vested stock options). Performance-vested stock options condition stock option vesting on explicit performance measures.

Companies adopt a variety of financial performance measures in executive compensation plans. Prior literature shows that performance measure choice affects managerial decisions (e.g., Marquardt and Wiedman, 2005; Young and Yang, 2011; Huang et al., 2014). Performance measures adopted in executive compensation contracts are important in communicating corporate objectives to managers and evaluating managerial performance. Due to data limitations, prior studies in executive compensation have generally investigated aggregate performance measure classifications, such as net income and stock returns, rather than specific performance measures (Ittner and Larcker, 2002). However, Ittner and Larcker (2002) assert that the aggregate performance measure classifications, such as accounting vs. market performance measures, commonly used in compensation research provide somewhat misleading inferences regarding performance measure choices since factors influencing the use of specific measures vary.

Earnings per share (EPS) is the most commonly used accounting performance measure in executive compensation contracts in many countries such as the U.S. and U.K. Recently, using hand-collected data, researchers have begun to focus on the use of EPS as a performance measure. An EPS performance metric is different from other performance measures such as net income and operating income. Specifically, when executive compensation contracts are explicitly linked to EPS, managers have an incentive to also influence the denominator, the number of shares outstanding, used in EPS calculations (Young and Yang, 2011; Huang et al., 2014). For example, Huang et al. (2014) find that managers tend to choose debt financing over equity financing in order to avoid EPS dilution when executive compensation contracts are explicitly tied to EPS. EPS dilution refers to the reduction in reported EPS numbers due to the issuance of additional common shares.

In this paper, we hand-collect the performance measures used in performance-vested stock option plans in China. We find that net income is the most commonly used performance measure in performance-vested stock option plans, with 96% of firms in our sample using it as a performance measure. Return on equity (ROE) is the second most frequently used performance measure, with 84% of firms explicitly mentioning its use.

Again, different from other performance measures, such as revenues, net income, pre-tax income or operating income, return on equity (ROE) is a ratio of net income over shareholder equity, which is very similar to the EPS ratio. In this paper, we investigate the association between ROE dilution, ROE-contingent performance-vested stock option plans and corporate financing decisions. Similar to EPS dilution, ROE dilution is the reduction in reported ROE due to the issuance of additional common shares.

Different from developed countries, the accessibility to external debt financing is quite limited in China (Wu and Yue, 2009). Firms mainly rely on bank loans for debt financing as the public bond market is very small (Wu and Yue, 2009). Allen et al. (2005) document that corporate bonds account for less than 1% of GDP in China. However, the accessibility of bank loans varies significantly across firms. Banks often selectively provide loans to firms, with which they have good connections or which can provide financial guarantees (Wu and Yue, 2009). The accessibility of bank loans limit firms' ability to choose debt financing. Therefore, we expect that managers are more likely to avoid ROE dilution related to debt-versus-equity choice when their performance-vested stock option plans are explicitly tied to ROE and when firms have a high level of access to bank loans.

Following Wu and Yue (2009), we use the percentage of non-tradable shares to measure the accessibility of bank loans. Using a sample of publicly traded firms disclosing performance measures in performance-vested stock option plans from 2006 to 2014, we find that managers are likely to choose debt over equity financing in order to avoid ROE dilution when their compensation contracts are based on ROE performance and when firms have a high level of access to bank loans. However, we find no such link when firms' ability to access bank loans is restricted. The results hold when we use two-stage procedures to address potential endogeneity issues in executive compensation and corporate financing decisions.

Our paper makes several contributions to the existing literature. First, our paper contributes to executive compensation literature. Our study adds to the emerging literature on the choice of performance measures and its impact on managerial decisions (e.g., Marquardt and Wiedman, 2005; Young and Yang, 2011; Shalev et al., 2013; Huang et al., 2014). In particular, we document that the use of ROE as a performance measure affects corporate financing decisions for firms with a high level of access to bank loans. Second, we provide empirical evidence that performance measure choice in executive compensation contracts impacts debt financing decisions, thus contributing to the corporate finance literature.

In addition, our study is relevant to regulators, policy makers, and investors. The findings of our paper suggest that performance measures are important in the managerial decision-making process. The transparency of executive

compensation disclosure matters. Therefore, regulators and policy makers should promote transparency in executive compensation. In addition, improved disclosure can help investors to make informed investment decisions.

Last, different from the findings of U.S. studies (Young and Yang, 2011; Huang et al., 2014), our results suggest that the association between financial reporting, executive compensation and corporate financing decisions depends on the accessibility of bank loans. Therefore, our paper suggests that institutional factors are important in shaping the association between financial reporting incentives and corporate financing decisions.

The remainder of this paper is structured as follows. "Literature review and hypothesis development" section reviews related literature and develops hypotheses. "Sample and data" section describes the sample and data. "Empirical analyses" section provides our empirical analyses. We conclude in "Conclusion" section.

Literature review and hypothesis development

The use of stock option plans and performance measure choice in executive compensation contracts are two important issues in accounting and economics literature (Gerakos et al., 2007). Traditional stock options are vested conditional on the passage of time. Different from the traditional form, performance-vested stock options condition vesting not only on elapsed time, but also on specific performance measures, such as accounting and market measures. Stock option plans in China are required to be performance based (performance-vested stock options).

Proponents of performance-vested stock options assert that these options can better align the interests of managers with shareholders since executives are compensated when "they achieve superior performance and not when performance merely mirrors competitors or follows market trends." (Gerakos et al., 2007). Regarding the value and incentive effects of performance-vested stock options, a theoretical work by Johnson and Tian (2000) finds that performance-vested options provide stronger incentives than traditional options. Similarly, Kuang and Qin (2009) document empirical evidence that the use of performance-vested stock options is associated with higher pay-for-performance sensitivity, therefore providing a better interest alignment than traditional options. In addition, the theoretical model of Arya and Mittendof (2005) suggests that performance-based options can gauge managerial talent.

Furthermore, previous research also investigates the impact of performance-vested stock options on managerial decisions. For example, Kuang (2008) examines the impact of performance-vested stock options on the likelihood of earnings management, and finds that managers are more likely to engage in earnings management when they hold a larger amount of

performance-vested stock options.

Recently, studies have begun to focus on the use of specific performance measures, and their impact on managerial decisions. Performance measures adopted in executive compensation contracts are important in communicating corporate objectives and influencing managerial decisions (e.g., Marquardt and Wiedman, 2005; Young and Yang, 2011; Huang et al., 2014). For example, previous research documents that, when managerial compensation contracts are explicitly tied to EPS, managers have an incentive to influence the denominator, the number of shares outstanding used in EPS calculations through share repurchases (e.g., Young and Yang, 2011), contingently convertible debt issuances (Marquardt and Wiedman, 2005), and corporate financing decisions (Huang et al., 2014) in order to avoid EPS dilution. EPS dilution refers to the reduction in reported EPS numbers due to the issuance of additional common shares.

In this paper, we extend this line of research by examining the use of return on equity (ROE) as a performance measure in performance-vested stock options, and its impact on corporate financing decisions. In corporate finance, there are various theories with regard to debt-equity choice. First, the pecking order theory of Myers and Majluf (1984) suggests that companies prefer internal financing over external financing, and debt is preferred over equity when external funds are used. In contrast, trade-off theory is based on the concept of target capital structure, by which firms balance the costs and benefits of debt-equity choice. Prior research suggests that executive compensation decisions can also affect corporate financing choices (Huang et al., 2014).

ROE is widely used as a performance measure in performance-vested stock option plans in China. We find that it is the second most frequently used performance measure, with 83.80% of firms explicitly adopting ROE as a performance measure. ROE is a ratio of net income over shareholders' equity. Both ROE and the EPS ratio are affected by the number of shares outstanding. Similar to the EPS ratio, when executive compensation contracts are tied to ROE performance, in order to avoid the reduction in reported ROE through the issuance of additional common shares (ROE dilution), managers have an incentive to influence their compensation not only through the operating and reporting decisions that affect the numerator, net income, but also through financing decisions that influence the number of shares outstanding (Huang et al., 2014).[1]

However, we expect the case in China to be different from the ones documented in US studies (e.g., Huang et al., 2014). Specifically, we expect that the association between ROE dilution, ROE-contingent performance-vested stock option plans and corporate financing decisions depends on the accessibility of bank loans.

Different from developed countries, the public bond market in China is very small (Wu and Yue, 2009). Allen et al. (2005) document that corporate bonds account for less than 1% of GDP in China. Firms mainly rely on bank loans for debt financing. However, the accessibility of bank loans varies significantly across firms. Banks often selectively provide loans to firms (Wu and Yue, 2009). The accessibility of bank loans affects corporate financing decisions, limiting firms' ability to choose debt financing. Therefore, we expect that managers are more likely to avoid ROE dilution related to debt-versus-equity choice when their performance-vested stock option plans are explicitly tied to ROE and when firms have a high level of access to bank loans. The above arguments lead to our hypothesis:

H1. Managers are more likely to avoid ROE dilution related to debt-versus-equity choice when their performance-vested stock option plans are explicitly tied to ROE performance and when firms have a high level of access to bank loans.

Sample and data

Our initial sample includes listed companies that explicitly disclosed performance measures in their performance-vested stock option contracts from 2006 to 2014. Our sample starts in 2006 because Chinese listed companies started adopting stock option plans in 2006. We hand-collect performance measure data from the Wind financial database.[2] Our initial sample includes 1,147 firm-year observations with available performance measure data. We exclude firms in financial industries as their financial reporting and capital structure are likely to be different from those of other firms. We obtain financial data and corporate governance data from the Chinese Securities Market and Accounting Research (CSMAR). We require non-missing data on all the variables used to estimate the regression models, and there are 181 firm-year observations with missing financial and corporate governance data.

Following prior literature (Su and Zeng, 2011; Huang et al. 2014), we define firms using debt (equity) financing if new debt (new equity issuance) exceeds 5% of total assets. Following prior research (Hovakimian et al. 2001; Huang et al. 2014), we have removed dual issuers (that is, firms that issued both debt and equity in the same year) and non-issuers (that is, firms that issued neither debt nor equity) from our sample. 51 dual issuers and 601 non-issuers are removed from our sample. This methodology restricts our sample to 314 firm-year observations, including 47 SOEs and 267 non-SOEs.

Empirical analyses

ROE as a performance measure

Table 1 presents descriptive data on performance measures used in performance-vested stock option plans. According to Panel A, net income is the most commonly adopted performance measure, with 301 of the 314 (95.90%) firms using it. ROE is the second most frequently used, with 263 of the 314 (83.80%) companies reporting its use, followed by sales revenue measures (13.40%), and market performance measures (share price and stock return) (0.96%). Consistent with Xiao et al. (2013), we find that very few firms (3 out of the 314) use market performance measures in their stock option plan while most firms use accounting measures. In addition, firms typically use more than one performance measure—the mean (median) number of measures reported is 1.94 (2.00).

In Panel B of Table 1, we split our sample into firms that report the use of ROE as a performance measure and those that do not and compare the frequency of the remaining performance measures across the two groups. We find that firms that use ROE as a performance measure in their performance-vested stock option contracts are significantly less likely to include sales revenue than other firms.

Table 1 Performance measures used in performance-vested option plans

			Number	Percent
Panel A: Frequency of firms using each performance measure (*n*=314)				
ROE			263	83.80
Net income			301	95.86
Sales revenue			42	13.38
Share price/shareholder return			3	0.96
	Mean	Q1	Median	Q3
Number of measures used	1.94	2.00	2.00	2.00
		ROE used (*n*=263)	ROE not used (*n*=51)	*p* value
Panel B: χ^2 tests of differences of reported performance measures, conditional on the use of ROE (n=314)				
Net income		96.20%	94.12%	0.50
Sales revenue		6.84%	47.06%	<0.01
Share price/shareholder return		1.14%	0.00%	0.45

This table presents descriptive statistics on performance measures used in performance-vested stock option plans. *P* values are based on two-tailed tests

ROE dilution and debt-equity choice

Main tests

To formally test our hypothesis, we estimate the following probit model:

$$\begin{aligned} P\,(DEBTFINANCING_{i,t}) = {} & \beta_0 + \beta_1\, DILUTION_{i,t} + \beta_2 ROE_{i,t} + \beta_3 ROE_{i,t} \\ & \times DILUTION_{i,t} + \beta_4 DEVIATION_{i,t} + \beta_5\, MB_{i,t} + \beta_6 RET_{i,t} + \beta_7 ROA_{i,t} \\ & + \beta_8 ISSUESIZE_{i,t} + \beta_9 POTSHR_{i,t} + \beta_{10} FCF_{i,t} + \beta_{11} SOE_{i,t} + YEAR \\ & + INDUSTRY + \varepsilon \end{aligned} \quad (1)$$

In model (1), *DEBTFINANCING* is an indicator variable that equals one when firms choose debt financing and zero when net equity is issued. Again, following the prior literature (Su and Zeng, 2011; Huang et al. 2014), we define firms using debt financing if new debt exceeds 5% of total assets. *DILUTION* is a dummy variable that equals one when an equity issue will dilute ROE. Specifically, it equals one when ROE $> \frac{r_d}{1+r_d}$, where ROE is the firm's reported ROE; r_d is the after-tax interest rate which equals the cost of debt multiplied by one minus the corporate tax rate, and zero otherwise (See "Appendix" for more a detailed derivation). Consistent with Li and Liu (2009), we measure cost of debt using interest expenses divided by total debt.[3] Following Porcano (1986) and Wu (2009), we use effective tax rate (ETR) (income tax expenses divided by pretax income) to measure corporate tax rate.

ROE is an indicator variable that equals one when ROE is explicitly mentioned as a performance measure in performance-vested option plans, and zero otherwise. Our key variable of interest is the interaction term between *ROE* and *DILUTION*. We predict that the coefficient on the interaction term to be positive and significant for firms with a high level of access to bank loans, suggesting that managers are more likely to avoid ROE dilution related to debt-versus-equity choice when their performance-vested stock option plans are explicitly tied to ROE performance and when firms have a high level of access to bank loans.

To define the accessibility of bank loans, we use the percentage of non-tradable shares (*NONTR*) (Wu and Yue, 2009). China listed firms often issue both tradable and non-tradable shares. Firms having a large percentage of non-tradable shares are either held by the government or other large firms, providing support for bank loans (Wu and Yue, 2009). On the other hand, firms with a small percentage of non-tradable shares are held by individuals or financial institutions, which provide very limited support in getting bank loans (Wu and Yue, 2009). Therefore, we divide our sample into two groups: one with the percentage of non-tradable shares larger than the sample median and the other one with the percentage smaller than the sample median.[4] Again, we expect a positive and significant association between *DEBTFINANCING* and *ROE * DILUTION* for the upper median group but an insignificant one for the other group.

Following prior research (Su and Zeng, 2011; Huang et al. 2014), we also include a firm's deviation from its industry leverage (*DEVIATION*), market-to-book ratio (*MB*), stock returns (*RET*), profitability (*ROA*), the sum of the debt and equity financing (*ISSUESIZE*), the percentage of shares held by the largest

shareholder (*POTSHR*), free cash flow (*FCF*), and a state-owned enterprises dummy variable (*SOE*) as control variables.

In order to control industry leverage, *DEVIATION* is included, defined as the difference between a firm's observed leverage ratio and its industry median leverage ratio (Jiang et al., 2008). To control for the market timing effect, we include market-to-book ratio (*MB*) and stock returns (*RET*). *MB* is defined as (total assets − book value of equity + market value of equity) over total assets. *RET* is defined as the dividend-adjusted raw return over the previous two years (Huang et al., 2014). *ROA* is used to control for past profitability, and it is defined as net income over total assets. *ISSUESIZE* is defined as the sum of debt and equity financing over total assets. *POTSHR* is the percentage of shares held by the largest shareholder over total shares outstanding. Free cash flow (*FCF*) is measured by operating cash flows minus capital expenditures, over total assets. In addition, year and industry dummies are included in model (1).

Table 2 presents descriptive statistics of key variables. The mean (median) of *DEBTFINANCING* is 0.81 (1.00), and the mean (median) of *DILUTION* is 0.90 (1.00). In addition, we find that the percentage of non-tradable shares (*NONTR*) varies widely across our sample: the standard deviation of *NONTR* is 0.24.

We present our main results in Table 3. We find that the estimated coefficients on the interaction term between *ROE* and *DILUTION* is insignificant for the whole sample. However, for firms with a high level of access to bank loans, the interaction term has a positive and significant coefficient of 3.89 ($p < 0.01$). This finding is consistent with our hypothesis, suggesting that managers are more likely to avoid ROE dilution related to debt-versus-equity choice when their performance-vested stock option plans are explicitly tied to ROE performance and when firms have a high level of access to bank loans. For firms with a low level of access to bank loans, the coefficient on the interaction term is insignificant as expected since those firms tend to have limited ability to raise debt financing.

In addition, the results for the control variables are generally consistent with our expectations and prior research. In particular, we find that the coefficient on *POTSHR* and *FCF* are positive and significant, suggesting that firms with more free cash flow and larger percentage of shares held by the largest shareholder are more likely to issue debt. In addition, the coefficient on *ISSUESIZE* is positive and significant, indicating that debt issues are larger in size in our sample.

Endogeneity

Since compensation structure and financing policies may be jointly determined (Smith and Watts, 1992), the above analyses may suffer from a potential endogeneity problem. Following Huang et al. (2014), we use two-stage

Table 2 Descriptive statistics

	N	P1	P25	P50	P75	P99	Mean	Sd
DEBTFINANCING	314	0.00	1.00	1.00	1.00	1.00	0.81	0.39
DILUTION	314	0.00	1.00	1.00	1.00	1.00	0.90	0.29
ROE	314	0.00	1.00	1.00	1.00	1.00	0.84	0.37
DEVIATION	314	−0.36	−0.12	−0.02	0.07	0.25	−0.03	0.14
MB	314	0.83	2.05	2.93	4.52	11.60	3.59	2.35
RET	314	−0.65	−0.20	0.20	0.94	6.87	0.64	1.46
ROA	314	−0.10	0.02	0.05	0.07	0.12	0.04	0.04
ISSUESIZE	314	0.01	0.07	0.11	0.16	0.38	0.12	0.07
POTSHR	314	0.10	0.23	0.33	0.47	0.74	0.35	0.16
FCF	314	−0.42	−0.07	−0.01	0.04	0.23	−0.02	0.11
SOE	314	0.00	0.00	0.00	0.00	1.00	0.15	0.36
NONTR	314	0.00	0.01	0.22	0.43	0.78	0.25	0.24

This table presents descriptive statistics on firm characteristics *DEBTFINANCING* is an indicator variable that equals one when net debt is issued and zero when net equity is issued. *DILUTION* equals one if equity issue will dilute ROE and zero otherwise. *ROE* is an indicator variable that equals one when ROE is used as a performance measure, and zero otherwise. *DEVIATION* is defined as the difference between a firm's observed leverage ratio and the median leverage of firms in the same industry and year. *MB* is market-to-book ratio, defined as (total assets − value of equity + market value of equity)/total assets; *RET* is defined as the dividend-adjusted raw return over the previous two years; *ROA* is defined as net income over total assets; *ISSUESIZE* is defined as new debt and equity issues, scaled by total assets; *FCF* is free cash flow, defined as (operating cash flows − capital expenditure)/total assets. SOE is a dummy variable that equals one when firms are SOEs, zero otherwise. *NONTR* is the percentage of non-tradable shares. *p* values are based on two-tailed tests

Table 3 The Relation between ROE Dilution, ROE Performance Measure and Debt-Equity Choices

Panel A: Full sample		
	Coeff.	*p* value
Intercept	0.71	0.34
DILUTION	0.25	0.65
ROE	−0.31	0.61
*ROE*DILUTION*	−0.43	0.54
DEVIATION	1.83	0.03
MB	0.00	1.00
RET	−0.05	0.59
ROA	0.45	0.83

Table 3 The Relation between ROE Dilution, ROE Performance Measure and Debt-Equity Choices *(Continued)*

ISSUESIZE	5.74	<0.01
POTSHR	1.45	0.03
FCF	10.14	<0.01
SOE	−0.51	0.12
Year Effect	YES	
Industry Effect	YES	
Pseudo R^2	0.421	
N	314	
Panel B: Firms with a high level of access to bank loans		
	Coeff.	*p* value
Intercept	1.75	0.18
DILUTION	−4.09	<0.01
ROE	−3.66	<0.01
*ROE*DILUTION*	3.89	<0.01
DEVIATION	1.51	0.25
MB	0.00	1.00
RET	0.04	0.81
ROA	−2.44	0.46
ISSUESIZE	9.26	0.01
POTSHR	4.03	<0.01
FCF	15.00	<0.01
SOE	−1.19	0.05
Year Effect	YES	
Industry Effect	YES	
Pseudo-R2	0.558	
N	157	
Panel C: Firms with a low level of access to bank loans		
	Coeff.	*p* value
Intercept	9.52	<0.01
DILUTION	2.08	0.10
ROE	−1.03	0.44
*ROE*DILUTION*	−1.84	0.27
DEVIATION	4.57	0.16
MB	0.51	0.03
RET	−0.04	0.93

Table 3 The Relation between ROE Dilution, ROE Performance Measure and Debt-Equity Choices *(Continued)*

ROA	−13.23	0.25
ISSUESIZE	12.11	0.12
POTSHR	−2.71	0.08
FCF	23.81	<0.01
SOE	−0.12	0.83
Year Effect	YES	
Industry Effect	YES	
Pseudo R^2	0.623	
N	157	

This table presents estimation results from model (1), where the dependent variable is DEBTFINANCING. All variables are defined in Table 2. Year and industry dummies are included. P values are based on two-tailed tests

procedures to address the potential endogeneity issue. First, we model the economic determinants of using ROE as a performance measure in executive compensation plans. Prior research suggests that self-interested managers have the tendency to favor equity over debt financing because of their undiversified human capital (e.g., Fama, 1980). Therefore, Huang et al. (2014) document that firms with greater degrees of conflict between shareholders and managers are more likely to include EPS as a performance measure to alleviate the underleveraging problem. Following Huang et al. (2014), we model the use of ROE as a function of the degree of agency conflicts between managers and shareholders and estimate the following probit regression:

$$\begin{aligned} ROE_{i,t} = {} & \gamma_0 + \gamma_1 SIZE_{i,t-1} + \gamma_2 COMPLEXITY_{i,t-1} + \gamma_3 FCF_{i,t-1} \\ & + \gamma_4 DEBTPAYMENT_{i,t-1} + \gamma_5 DIVIDENDS_{i,t-1} + \gamma_6 GROWTH_{i,t-1} \\ & + \gamma_7 MGSHARES_{i,t-1} + \gamma_8 DUAL_{i,t-1} + \gamma_9 MEETING_{i,t-1} \\ & + \gamma_{10} INDDIR_{i,t-1} \ \gamma_{11} ETR_{i,t-1} + \gamma_{12} COVERAGE_{i,t-1} + \varepsilon_t \end{aligned} \quad (2)$$

All the twelve independent variables in model (2) are used to measure agency conflicts. *SIZE* is firm size, defined as the log of assets. *COMPLEXITY* is firm complexity, defined as the log of the number of reporting segments. *DEBTPAYMENT* is defined as the sum of interest payments, divided by total assets. *DIVIDENDS* is defined as annual cash dividends. *GROWTH* is measured by the market-to-book ratio. *MGRSHARES* captures ownership structure, defined as the percentage of shares owned by the top management team. *ETR* is the effective tax rate, defined as income tax expenses divided by pretax income. *COVERAGE* is analyst coverage, defined as the log of the number of analysts following the firm. To capture managerial entrenchment, we also include the

number of board meetings (*MEETING*), a dummy variable that equals one if the CEO is also the chairman of the board and zero otherwise (*DUAL*), and the percentage of independent directors on the board (*INDDIR*). The above independent variables are lagged for one year.

Table 4 presents descriptive statistics for the independent variables in model (2) and univariate tests of differences in means and medians across the firms that use ROE as a performance measure (ROE = 1) versus those that do not (ROE = 0). We find that the ROE = 1 firms have significantly larger numbers of board meetings (median *MEETING* is 2.40 vs. 2.20, $p = 0.05$), indicating that firms that hold more board meetings are more likely to use ROE. We also find that mean *INDDIR* and mean *COMPLEXITY* is significantly lower for the ROE = 1 group, suggesting that firms with a lower percentage of independent shareholders and fewer reporting segments are more likely to include ROE in performance-vested stock option plans. We find no significant differences between the two groups for other variables.

Table 5 presents the results from the probit estimation of model (2). We find that the likelihood of using ROE as a performance measure in stock option plans is significantly positively related to *MEETING*, and significantly negatively related to *COMPLEXITY* and *INDDIR*. This is generally consistent with the univariate tests in Table 4. We find no significant association between use of ROE and the remaining variables.

We use the predicted value of ROE from model (2) as an instrument in the second stage. Table 6 presents the results. We find results that are consistent with our expectations. The coefficient on the interaction terms between *ROE* and *DILUTION* is still positive and significant for firms with a high level of access to bank loans and insignificant for the other group.

Another measure of the accessibility of bank loans

We use the level of financial development as another measure of the accessibility of bank loans. Prior research suggests that firms operating in areas with high (low) levels of financial development are more (less) likely to obtain bank loans (e.g., Li et al., 2008; Yu and Pan, 2008; Chen et al., 2015). Following Zhu and Chen (2009), we obtain financial development scores of Chinese provinces from the Financial Development Evaluation Report of Chinese Provinces, which is published by the Chinese Academy of Social Sciences (CASS). CASS publishes financial development scores every two years.

Panel A of Table 7 shows the average scores for the financial development levels of our sample. We next divide our sample into two groups: one with financial development scores larger than the sample median (0.56) and the other with financial development scores smaller than the sample median. We find the

Table 4 Univariate Tests of Determinants of the Use of an ROE Performance Measure

	Full sample (*N*=214)		ROE=1 subsample (*N*=187)		ROE=0 subsample (*N*=27)		T test for difference in means	Wilcoxon test for difference in medians
	Mean	Median	Mean	Median	Mean	Median	*p* value	*p* value
SIZE	22.05	21.84	22.03	21.82	22.17	22.03	0.58	0.33
COMPLEXITY	0.85	0.69	0.82	0.69	1.06	1.10	0.08	0.07
FCF	–0.02	0.01	–0.02	0.01	–0.02	0.00	0.95	0.74
DEBTPAYMENT	0.02	0.00	0.02	0.00	0.01	0.00	0.26	0.94
DIVIDENDS	0.11	0.10	0.11	0.10	0.10	0.08	0.49	0.23
GROWTH	3.49	2.90	3.55	2.89	3.10	3.07	0.35	0.61
MGRSHARES	0.07	0.00	0.07	0.00	0.07	0.00	0.84	0.91
DUAL	0.32	0.00	0.31	0.00	0.41	0.00	0.29	0.29
MEETING	2.40	2.40	2.41	2.40	2.26	2.20	0.06	0.05
INDDIR	3.22	3.00	3.18	3.00	3.52	3.00	<0.01	<0.01
ETR	0.18	0.17	0.18	0.17	0.21	0.18	0.19	0.82
COVERAGE	2.26	2.49	2.25	2.40	2.36	2.64	0.59	0.58

This table presents descriptive statistics on the determinants of the use of ROE in performance-vested stock option plans. The ROE = 1 (ROE = 0) subsample includes firms with performance-vested stock option plans that are (are not) based on ROE as a performance measure. SIZE is the log of assets. *COMPLEXITY* is the log of the number of reporting segments. FCF is free cash flow, defined as (operating cash flows − capital expenditure)/total assets. *DEBTPAYMENT* is interest payments scaled by total assets. *MGRSHARES* is the percentage of outstanding stock held by top management. DUAL is an indicator variable that equals one if the CEO is also the chairman of the board and zero otherwise. *MEETING* is defined as the number of board meetings. *INDDIR* is defined as the percentage of independent directors on the board. *ETR* is the effective tax rate, defined as income tax expenses divided by pretax income. *COVERAGE* is defined as the log of the number of analysts following the firm. *P* values are based on two-tailed tests

Table 5 Probit Regression of Determinants of the Use of an ROE Performance Measure

	Coeff.	*p* value
Intercept	0.31	0.93
$SIZE_{t-1}$	0.08	0.63
$COMPLEXITY_{t-1}$	–0.39	0.04
FCF_{t-1}	–0.05	0.97
$DEBTPAYMENT_{t-1}$	9.20	0.23
$DIVIDENDS_{t-1}$	1.80	0.15
$GROWTH_{t-1}$	0.13	0.11
$MGRSHARES_{t-1}$	0.27	0.80
$DUAL_{t-1}$	–0.42	0.13
$MEETING_{t-1}$	0.78	0.03
ETR_{t-1}	–1.17	0.29
$INDDIR_{t-1}$	–0.66	<0.01
$COVERAGE_{t-1}$	–0.26	0.11
Pseudo R^2	0.17	
N	214	

This table presents estimation results from model (2), where the dependent variable is ROE. All variables are defined in Table 4. *P* values are based on two-tailed tests

Table 6 Use of a Two-stage Procedure to Control for Potential Endogeneity

Panel A: Full sample		
	Coeff.	*p* value
Intercept	7.92	<0.01
DILUTION	–0.44	0.87
ROE	–0.49	0.86
*ROE*DILUTION*	0.14	0.96
DEVIATION	2.50	0.02
MB	–0.07	0.51
RET	0.56	0.01
ROA	–0.11	0.97
ISSUESIZE	7.59	0.01
POTSHR	–0.07	0.94
FCF	13.19	<0.01
SOE	–0.36	0.40

Table 6 Use of a Two-stage Procedure to Control for Potential Endogeneity *(Continued)*

Year Effect	YES	
Industry Effect	YES	
Pseudo R^2	0.478	
N	214	
Panel B: Firms with a high level of access to bank loans		
	Coeff.	*p* value
Intercept	25.27	<0.01
DILUTION	–24.37	<0.01
ROE	–21.81	0.01
*ROE*DILUTION*	26.89	<0.01
DEVIATION	0.03	0.99
MB	0.09	0.69
RET	0.28	0.21
ROA	–1.34	0.77
ISSUESIZE	19.55	<0.01
POTSHR	1.69	0.37
FCF	24.21	<0.01
SOE	–0.97	0.21
Year Effect	YES	
Industry Effect	YES	
Pseudo R^2	0.650	
N	107	
Panel C: Firms with a low level of access to bank loans		
	Coeff.	*p* value
Intercept	9.09	<0.01
DILUTION	–1.74	0.57
ROE	1.02	0.76
*ROE*DILUTION*	1.08	0.78
DEVIATION	3.95	0.11
MB	0.24	0.26
RET	1.15	0.01
ROA	–19.48	0.08
ISSUESIZE	–1.92	0.70
POTSHR	–0.37	0.80
FCF	14.37	<0.01

Table 6 Use of a Two-stage Procedure to Control for Potential Endogeneity *(Continued)*

SOE	0.00	1.00
Year Effect	YES	
Industry Effect	YES	
Pseudo R^2	0.637	
N	107	

This table presents estimation results from our main model-model (1) after controlling for potential endogeneity, where the dependent variable is *DEBTFINANCING*. We obtain the predicted value of ROE from a probit estimation (Table 5); the second stage probit regression is estimated using this predicted value of ROE. *p* values are based on two-tailed tests

Table 7 Using financial development to measure the accessibility of bank loans

Panel A: Average scores of the level of financial development		
Province	Average score	**N**
Guangzhou	0.59	73
Zhejiang	0.68	40
Beijing	0.65	38
Jiangsu	0.58	16
Anhui	0.47	14
Shandong	0.53	14
Shanghai	0.73	12
Fujian	0.58	11
Hubei	0.40	10
Liaoning	0.48	10
Jiangxi	0.41	9
Henan	0.39	8
Hunan	0.42	8
Sichuan	0.45	8
Yunnan	0.40	6
Jilin	0.38	5
Guizhou	0.31	4
Hainan	0.36	4
Hebei	0.41	4
Neimenggu	0.38	4
Tianjin	0.58	4
Chongqing	0.58	4

Table 7 Using financial development to measure the accessibility of bank loans (*Continued*)

Heilongjiang	0.35	3
Gansu	0.30	2
Shanxi	0.36	2
Xinjiang	0.24	1
Total		314
Panel B: Firms operating in areas with high levels of financial development		
	Coeff.	*p* value
Intercept	4.37	<0.01
DILUTION	–3.81	<0.01
ROE	–3.88	<0.01
*ROE*DILUTION*	3.39	<0.01
DEVIATION	1.44	0.14
MB	–0.06	0.52
RET	0.00	0.99
ROA	–0.05	0.99
ISSUESIZE	5.62	0.03
POTSHR	1.41	0.10
FCF	11.66	<0.01
SOE	0.02	0.97
Year Effect	YES	
Industry Effect	YES	
Pseudo R^2	0.430	
N	183	
Panel C: Firms operating in areas with low levels of financial development		
	Coeff.	*p* value
Intercept	–0.87	0.52
DILUTION	1.39	0.15
ROE	0.56	0.57
*ROE*DILUTION*	–1.72	0.17
DEVIATION	3.25	0.04
MB	0.34	0.01
RET	–0.62	0.05
ROA	–6.65	0.28

Table 7 Using financial development to measure the accessibility of bank loans (*Continued*)

ISSUESIZE	9.34	0.01
POTSHR	2.97	0.10
FCF	10.88	<0.01
SOE	–1.15	0.01
Year Effect	YES	
Industry Effect	YES	
Pseudo R^2	0.553	
N	131	

Panel A of Table 7 shows the average scores of the level of financial development. The scores are collected from the Financial Development Evaluation Report of Chinese Provinces published by the Chinese Academy of Social Sciences. We separate our sample into two groups based on the sample median of the scores (0.56). Panel B (C) presents the results of firms operating in areas with high (low) levels of financial development. All variables are defined in Table 2

results consistent with our expectations that managers are more likely to avoid ROE dilution related to debt-versus-equity choice when their performance-vested stock option plans are tied to ROE and when firms operate in areas with high levels of financial development. In addition, untabulated results show that the results hold when we control for potential endogeneity.

Conclusion

In this paper, we hand-collect the performance measures used in performance-vested stock option plans in China. We document that return on equity (ROE) is the second most frequently used performance measure, with about 84% of firms explicitly using it in performance-vested stock option plans. An ROE performance measure is different from most of other measures, such as net income and sales revenue. Specifically, it is directly affected by the number of share outstanding.

When executive compensation contracts are tied to ROE performance, in order to avoid the reduction in reported ROE through the issuance of additional common shares (i.e., ROE dilution), managers have an incentive to influence their compensation not only through the operating and reporting decisions that affect the numerator, net income, but also through financing decisions that influence the number of shares outstanding used to calculate shareholders' equity (Huang et al., 2014).

Different from firms in developed countries, Chinese firms mainly rely on bank loans for debt financing. The choice of debt financing is largely affected by the accessibility of bank loans (Wu and Yue, 2009). We find that managers are

more likely to avoid ROE dilution related to debt-versus-equity choice when their performance-vested stock option plans are explicitly tied to ROE performance and when firms have a high level of access to bank loans. However, there is no such link when firms have a low level of access to bank loans. The results hold after controlling for potential endogeneity in executive compensation and corporate financing decisions.

First, our study contributes to the executive compensation literature by extending the emerging research on the use of specific performance measures (e.g., Marquardt and Wiedman, 2005; Young and Yang, 2011; Huang et al., 2014). We also contribute to the corporate finance literature by documenting the impact of executive compensation design on corporate financing decisions. Our study shows that the association between executive compensation and corporate financing decisions depends on the accessibility of bank loans, demonstrating the importance of institutional factors in China.

Endnotes

[1]The focus of our study is the "denominator effect", the number of shares outstanding. Prior research has examined the impact of accounting-based performance measures on the numerator, net income (e.g., Su and Lin, 2010; Xiao et al., 2013).

[2]When performance measure data is missing from Wind, we hand-collect the data from firms' performance-vested stock option plans.

[3]Different from developed countries, the public bond market in China is very small and firms mainly rely on bank loans for debt financing. In our sample, there are only 17 observations with outstanding bond issues. Among the 17 firms with access to the bond markets, 16 companies use ROE as a performance measure in their performance-vested stock option contracts. Prior studies often use the ratio of interest expenses to total debt to measure cost of debt (e.g., Li and Liu, 2009; Wei et al., 2012).

[4]The Chinese government has implemented a series of share reforms since 2005. Our sample starts in 2006 (i.e., in our sample, there is only one observation from the year 2006) since Chinese listed companies started adopting stock option plans in 2006. Therefore, we expect that using the percentage of non-tradable shares to measure the accessibility of bank loans is less likely to be affected by the reforms.

Appendix: The Effect of Debt and Equity Issues on Reported ROE

The relative effect of a debt versus an equity issue on reported ROE depends on the relation between the firm's ROE and the after-tax cost of debt divided by the sum of one and after-tax cost of debt.

To illustrate, assume that at the beginning of the year the firm finances a

project by issuing either debt or equity, where the amount of financing equals ISSUE. In the case of a debt issue, reported ROE at the end of the year may be expressed as $\frac{\text{EARNINGS} - \text{ISSUE} \times r_d}{\text{EQUITY}_{t-1} + \text{EARNINGS} - \text{ISSUE} \times r_d}$ where EARNINGS is annual earnings before interest on the debt issued; r_d is the after-tax interest rate on the debt; EQUITY_{t-1} equals the amount of owners' equity at the beginning of the year. In the case of an equity issue, reported ROE at the end of the year should be $\frac{\text{EARNINGS}}{\text{EQUITY}_{t-1} + \text{ISSUE} + \text{EARNINGS}}$.

Reported ROE will be higher when debt financing is used instead of equity financing whenever the following holds:

$$\frac{\text{EARNINGS} - \text{ISSUE} \times r_d}{\text{EQUITY}_{t-1} + \text{EARNINGS} - \text{ISSUE} \times r_d} > \frac{\text{EARNINGS}}{\text{EQUITY}_{t-1} + \text{ISSUE} + \text{EARNINGS}} \quad (3)$$

Algebraic manipulation yields the following relation:

$$\frac{\text{EARNINGS}}{\text{EQUITY}_{t-1} + \text{ISSUE} + \text{EARNINGS}} > \frac{r_d}{1 + r_d} \quad (4)$$

Note that the left side of the equation, $\frac{\text{EARNINGS}}{\text{EQUITY}_{t-1} + \text{ISSUE} + \text{EARNINGS}}$, is reported ROE assuming an equity issue. Equation (4) indicates that an equity issue will result in lower reported ROE, relative to a debt issue, whenever reported ROE after the equity issue is greater than the after-tax cost of debt divided by the sum of one and after-tax cost of debt. Alternatively, we may express Eqs. (4) as:

$$\frac{\text{EARNINGS}^*}{\text{EQUITY}_{t-1} + \text{EARNINGS}^*} > \frac{r_d}{1 + r_d} \quad (5)$$

where $\text{EARNINGS}^* = \text{EARNINGS} - \text{ISSUE} \times r_d$; $\frac{\text{EARNINGS}^*}{\text{EQUITY}_{t-1} + \text{EARNINGS}^*}$ is reported ROE assuming a debt issue. Equation (5) indicates that a debt issue will result in higher reported ROE, relative to an equity issue, whenever reported ROE after the debt issue is higher than the after-tax cost of debt divided by the sum of one and after-tax cost of debt. Note that, with both equity and debt issues, the left side of the equation would be annual reported ROE of the firm. We conclude from Eqs. (4) and (5) that, for financial reporting purposes, debt financing is favorable to equity financing whenever annual reported ROE is higher than the after-tax cost of debt divided by the sum of one and after-tax cost of debt.

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