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경영학 석사학위논문

CEO Educational Background and Firm Performance:

Evidence from China's NASDAQ

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ABSTRACT

CEO Educational Background and Firm Performance: Evidence from China's NASDAQ

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This paper examines whether CEO's different types of education-related background information influences firm performance by using data of China's ChiNext market listed companies from 2011 to 2016. Findings show that the level of CEO's higher education is significantly essential. The market price positively reacts to education background improvement in the short run around the CEO switch announcement day. Moreover, 2SLS results show that CEO with higher education contributes to higher firm profitability. In short, this paper suggests that the education level of CEO is an important factor that leads to higher firm performance.

Keywords: CEO's educational background, Firm Performance, China's ChiNext Market

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1. Introduction

Education affects a manager's ability through multiple channels. First, education can equip managers with the abilities to attain and process information and to understand technical concepts (Wally & Baum, 1994; Wiersema & Bantel, 1992). Second, educational attainment (graduation, college enrollment) is associated with more social capital, as stated by Dika and Singh (2002) as well as Belliveau, Charles A. O'Reilly, and Wade (1996). The social networks attained in school can benefit CEOs' career development.

However, when it comes to the question of whether CEO's higher education leads to the firm's better performance, the answer is ambiguous. Previous research analyzing different data sets show different relationships. More specifically, the answer varies across research examining different aspects of educational background, different types of firms, and different business environment (Chevalier and Ellison, 1999; Bhagat, Bolton, and Subramanian, 2010 ; Jalbert, Ramesh, and Jalbert, 2011; Gottesman and Morey, 2015; Joh and Jung 2016; King, Srivastav, and Williams (2016)).

In this paper, I explore the relationship between CEO education and firm performance within the Chinese Growth Enterprises Market (GEM, also called ChiNext), which mainly consists of high-tech firms. This NASDAQ-style

board catches more and more attention nowadays. By focusing on this specific market, I provide some new perspective to the existing literature. I utilize both event study and IV approach to address the endogeneity issue that exists in most of the previous studies and thus provide reliable results. I also incorporate various aspects of CEO education, including years of higher education, whether or not the CEO holds a bachelor's degree, whether or not the CEO has overseas study experience and whether or not the CEO's alma mater is publicly disclosed. By testing these education-related variables, this paper identifies which aspects of educational background matter more. The results show that higher education level of CEO can improve firm performance and can generate a short-term stock price run-up in this particular market.

The paper proceeds as follows. Section 2 first lists previous literature on CEO education and firm performance, and then presents the development of my hypothesis. Section 3 provides a brief introduction of ChiNext market, the data set and the list of variable description. Section 4 explains the details of OLS regression, event study method, and IV approach that I use to test the main hypothesis. Section 5 conducts empirical studies, and Section 6 concludes.

2. Background and Hypotheses

According to the upper echelons perspective developed by Hambrick and Mason (1984), managerial background characteristics of top managers partially predictive organizational outcomes, both strategic choices and performance levels. As a critical member of a firm's management team, CEO has a significant influence on the firm's production and management activities. More and more research has been devoted to testing the impacts of CEO's characteristics, including age, gender, education background, working experience, etc.

Previous studies on the relationship between CEO or top manager education background and firm performance have investigated various aspects of educational information, including the level of education, academic credential, MBA education background, academic specialty in finance or law, etc. However, the literature has not reached consistent conclusions yet.

Chevalier and Ellison (1999) show that fund managers who attained higher-SAT undergraduate institutions on average earn higher excess returns, even after controlling for behavioral differences between managers and selection biases. Joh and Jung (2016) analyze a dataset of South Korean firms and conclude that top managers' academic credentials from elite schools

contribute to firm value, especially when firms are facing challenging environments. King, Srivastav, and Williams (2016) find that both the level and the quality of CEO educational attainment are important for bank performance. Management education, such as MBA education, enables CEOs to manage risks and pursue aggressive policies and hence is helpful to achieve successful performance outcomes.

In contrast to the above, some papers show no relationship or even negative relationship between CEO education and firm performance. Bhagat et al. (2010) test the effects of CEO education on both CEO turnover and firm performance. The six main measures of CEO education used in this paper are whether or not the CEO attended a Top-20 undergraduate school, whether or not the CEO has an MBA, law or masters' degree, and whether or not the MBA or law degree is from a Top-20 program. The results seem to be conflicting: CEO's education level has no impact on CEO dismissal, but the education level of the new CEO is positively correlated with the previous ones; hiring new CEOs with MBA degrees improves short-term operating performance, but CEO education is not positively correlated long-term performance. Jalbert, Ramesh and Jalbert (2011) analyze CEO's education, compensation and firm performance of Large U.S. Firms from the Forbes 800 list, and suggest a quite surprising that CEOs who do not have an undergraduate or graduate degree outperform those CEOs who have an equivalent degree, in terms of both

compensation level and firm performance. Gottesman and Morey (2015) find no significant evidence that the type or selectivity of the education of the CEO is related to firm financial performance examining firms listed on the New York Stock Exchange with a CEO who has at least an undergraduate degree.

Chinese scholars have also investigated the impact of the educational background of CEOs or top managers on firm performance with data from the Chinese market intensively. Huang and Sheng (2013) conduct an event study on manager turnover among Chinese listed firms and find that there is an inverse U-shaped relationship between the education level of a new manager and stock market response. Stock price increases the most if the new manager has a bachelor's degree. This result means that neither too low or too high education level is favorable. A manager with a very low education level may lack the cognitive ability and social capital; A manager with very high education level may act inflexibly. Using the dataset of entrepreneurial firms listed in Small and Medium Enterprise Board of China, Yang, Chen, and Wang (2015) find that there is no relationship between chairman's education level and firm performance, but a positive correlation between TMT's average education and firm performance. Lu and Zhang (2015) find that a CEO with the high educational background can enhance firm value but not firm accounting performance in the short run by investigating firms listed in China

A-shares market.

Based on previous studies, I expect CEOs with higher education level can lead firms better. Education can enable CEOs to quickly respond to knowledge advancement and technical innovation, which are crucial to high-tech firms in ChiNext. Therefore, my main hypothesis is as follows: firms with a more educated CEO show better performance and have higher value.

3. Data and Variables

3.1 Data description

This article investigates ChiNext market listed companies that are traded on the Shenzhen Stock Exchange during the five years from 2011 to 2016. All company-specific data are collected from the CSMAR database. Besides, CSMAR and sina.com are used to collect CEO individual information, including names, gender, date of birth, and educational background, etc.

My final data set includes a total of 1,628 annual observations of 492 companies. 85% of the CEOs hold a degree higher or equal to bachelor's degree; 52% of the CEOs hold a degree higher or equal to a master's degree; 9% of the CEOs hold a Ph.D. degree. During the same sample period, a total of 210 CEO switch announcements are collected.

3.2 Variables

Following Jalbert, Rao, and Jalbert (2011), and Lu and Zhang (2015), I use dependent variables *ROA*, *Tobin's Q* and *rdratio* to measure profitability, market value, and R&D intensity respectively. The test variables are a series of education-related variables that indicate years of higher education (*lnedu_year*), bachelor's degree (*edu_um*), overseas study experience (*overseastudy*) and whether or not the CEO's alma mater is publicly disclosed (*schoolname*). *overseastudy* dummy is included because it is generally believed in China that universities in foreign countries- such as America, European countries, and other developed countries- provide education with higher quality than domestic universities. Besides, the experience of living in a foreign country can broaden one's horizon. Therefore, an overseas study experience can be viewed as an educational improvement. *Schoolname* is used as an alternative measure of academic credential. As Joh and Jung (2016) show, academic credentials from prestigious universities can be a source of competitive advantage and higher firm valuation. However, only about 30% of CEOs in my sample report the schools where they attain their degrees, so the academic credential could not be measured in the same way as Joh and Jung (2016) do. Therefore, I assume that a CEO is satisfied with the reputation of the awarding institution if he or she discloses the name of it.

The instrumental variable for education-related variables is the dummy variable *cul_re* which describes whether the CEO's education has been disturbed by the Cultural Revolution (1966-1976). During these ten years, higher education in China was almost entirely suspended. I assume that the CEO who was born between 1948-1958 could not get admitted to the university on time because of the Cultural Revolution. Control variables that indicate CEO characters and firm characters are also included. The description of variables is presented in Table 1. Table 2 summarizes the statistics, and Table 3 presents the correlation matrix of variables.

Table 1. Descriptions of Variables

Variable	Description
Dependent variables	
<i>ROA</i>	net profit divided by total assets at the end of the year
<i>Tobin's Q</i>	sum of market value of net assets market value of total liabilities
<i>R&D ratio</i>	R&D expenses over total assets
Test variables	
<i>lnedu_year</i>	the natural logarithm of years of higher education that CEO receives. Lower than college-0, college-3, bachelor-4, master-6, PhD-10
<i>edu_um</i>	dummy variable, which equals to 1 if the CEO's education level is higher or equal to bachelor level
<i>overseaeedu</i>	dummy variable, which equals to 1 if the CEO has overseas study experience
<i>schoolname</i>	dummy variable, which equals to 1 if the CEO's alma mater is disclosed
Instrument variables	
<i>cul_re</i>	dummy variable, which measures whether the CEO's education has been disturbed by the Cultural Revolution (1966-1976). It takes 1 if the CEO was born between 1948-1958.
Control variables	
<i>female</i>	dummy variable, which equals to 1 if the CEO is female
<i>lnage</i>	the natural logarithm of CEO's age
<i>professional</i>	dummy variable, which takes 1 if the CEO is a professional manager and take 0 if the CEO is the founder of company

<i>isduality</i>	dummy variable, which takes 1 if the CEO also serves as chairman of the board
<i>leverage</i>	total debt divided by total assets
<i>lntotalassets</i>	total assets
<i>beta</i>	sensitivity to market risk
<i>Infirmage</i>	the natural logarithm of firm age

Table 2. Summary Statistics of Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
<i>roa</i>	1628	.0557523	.0461057	-.461988	.287147
<i>tobinsq</i>	1628	3.297517	1.619372	1.15719	8.31097
<i>rdratio</i>	1628	.0696148	.0545447	.004	.3647
<i>edu_year</i>	1628	5.154177	2.13011	0	10
<i>edu_um</i>	1628	.8538084	.3534068	0	1
<i>overseastudy</i>	1628	.0755528	.2643625	0	1
<i>schoolname</i>	1628	.3470516	.4761786	0	1
<i>cul_re</i>	1628	.1001229	.300256	0	1
<i>professional</i>	1628	.485258	.4999362	0	1
<i>isduality</i>	1628	.4232187	.4942213	0	1
<i>female</i>	1628	.0552826	.2286012	0	1
<i>age</i>	1628	48.60135	6.004213	29	70
<i>leverage</i>	1628	.2633384	.1568501	.01397	.775345
<i>beta</i>	1628	1.229822	.2827342	.415673	2.08283

Table 3. Correlation Matrix of Variables

This table presents the correlation coefficients among all variables described in Table 1.

	<i>roa</i>	<i>tobinsq</i>	<i>rdratio</i>	<i>lnedu_year</i>	<i>edu_um</i>	<i>overseastudy</i>	<i>choolname</i>	<i>cul_re</i>	<i>professional</i>	<i>isduality</i>	<i>female</i>	<i>age</i>	<i>leverage</i>	<i>beta</i>
<i>roa</i>	1.000													
<i>tobinsq</i>	0.257	1.000												
<i>rdratio</i>	-0.088	0.147	1.000											
<i>lnedu_year</i>	0.056	0.044	0.132	1.000										
<i>edu_um</i>	0.053	0.066	0.158	0.683	1.000									
<i>overseastudy</i>	0.064	0.071	-0.027	0.174	0.112	1.000								
<i>schoolname</i>	0.048	0.066	0.027	0.203	0.273	0.177	1.000							
<i>cul_re</i>	-0.020	0.002	-0.067	-0.130	-0.204	0.052	-0.114	1.000						
<i>professional</i>	-0.072	-0.002	-0.026	0.028	0.124	-0.031	-0.060	-0.029	1.000					
<i>isduality</i>	0.016	0.042	0.026	-0.019	-0.110	-0.038	0.028	0.033	-0.702	1.000				
<i>female</i>	0.007	-0.023	-0.070	0.016	-0.022	-0.069	0.010	0.000	0.023	-0.071	1.000			
<i>age</i>	0.021	0.080	-0.059	-0.041	-0.137	-0.004	-0.056	0.568	-0.149	0.192	-0.005	1.000		
<i>leverage</i>	-0.229	-0.121	-0.259	-0.020	-0.059	-0.041	0.020	-0.060	0.027	-0.006	-0.032	-0.037	1.000	
<i>beta</i>	-0.075	-0.031	0.043	0.024	0.045	-0.030	0.048	-0.025	0.017	-0.010	0.003	0.003	-0.057	1.000

4. Methodology

To test the main hypothesis, I examine whether CEO's education background information is reflected in firm performance using the following regression equation.

$$y_{it} = \alpha_0 + \alpha_t + \alpha_j + \beta_1 Edu_{it} + \beta_2 X_{it} + \varepsilon_{it} \quad [1]$$

In equation [1], dependent variable y_{it} represents ROA, Tobin's Q, and R&D ratio. Edu_{it} represents the main test variables, including years of higher education that the CEO receives, whether CEO holds a bachelor's degree, whether CEO has overseas study experience, and whether the CEO's alma mater is disclosed. I control for CEO's characteristics and firm characteristics, including CEO's gender, CEO's age, whether CEO is a founder of the company or a professional manager, whether CEO is also a chairman of the board, firm size, firm age, leverage, sensitivity to market risk. I also control for year fixed effect α_t and industry fixed effect α_j .

A crucial issue to address is the endogenous nature of the firm-CEO match, which is not a random assignment, but a two-sided choosing process. Good-performing companies usually have better reputations and are more likely to

pay high wages, attracting well-educated managers. Therefore, event study and IV approach are used to deal with the endogeneity issue.

I use market model event study methodology to investigate the market reaction to announcements of CEO switches. I regress the cumulative average abnormal return (CAAR) on education-related variables to see whether higher education level of the new CEO positively influences short-term stock price. The following is the regression model.

$$CAAR_{it} = \alpha_0 + \alpha_t + \alpha_j + \beta_1 Eduup_{it} + \beta_2 X_{it} + \varepsilon_{it} \quad [2]$$

In equation [2], the dependent variable $CAAR_{it}$ represents cumulative average abnormal returns during the event windows [-1,1], [-2,2], [-5,5], [-10,10]. Edu_{it} represents the main test variables, including $eduup$, $overseasup$, and $schoolnameup$. Dummy variable $eduup$ equals 1 if the new CEO holds a higher academic degree than the old CEO. Dummy variable $overseasup$ equals 1 if the new CEO has overseas study experience, while the old CEO does not. Dummy variable $schoolnameup$ equals 1 if the new CEO discloses his or her alma mater, while the old CEO does not. Same control variables are included in this regression model as done in equation [1].

Moreover, due to the omitted variable issue of education-related variables, this paper also use instrumental variable cul_re to control the endogeneity of educational variables as done in Meng and Gregory (2002). Dummy variable

cul_re represents the influence of Culture Revolution during which period many people missed the chance to go to university. Whether the birth year is between 1948-1958 has no direct impact on firm performance, but has a significantly adverse effect on education level.

5. Empirical Studies

5.1 OLS results

In this session, I run OLS regression of ROA, Tobins'Q, and rdratio on education-related variables (*lnedu_year*, *edu_um*, *overseastudy*, *schoolname*) respectfully, based on regression model [1]. The regression results are presented from Table 4 to Table 6.

Table 4 shows supportive evidence for my main hypothesis. Each education-related variable solely has a significant, positive effect on ROA, as shown in univariate regression models from column (1) to column (4). However, the coefficients of *lnedu_year* and *schoolname* turn insignificant in column (5), and the coefficient of *schoolname* turns insignificant in column (6). It is possibly because of the high correlation among the four test variables. The magnitude of two dummy variable *edu_um* and *overseastudy* are similar in the multivariate model (6). Compared with a CEO with no bachelor's degree,

a CEO with an education level equal to or higher than a bachelor's degree on average increases firm's ROA by 0.0081. Compared with a CEO with no overseas education background, a CEO who has overseas study experience on average increases firm's ROA by 0.0084.

Among the control variables, *beta*, *professional*, and *isduality* are negatively related to ROA, which indicates that a firm has lower profitability if the firm faces risk, or the CEO is a professional manager instead of the firm's founder, or the CEO also serves as chairman of the board. Also, CEO's age and firm size are positively related to ROA.

Table 4. OLS Regression of ROA on CEO Educational Background

This table reports OLS regression results of firm profitability on CEO education background, and other CEO and firm information. Firm profitability is measured as ROA, which is net profit divided by total assets at the end of the year. *lnedu_year* is the natural logarithm of years of higher education that CEO receives. *edu_um* is a dummy variable which equals to 1 if the CEO's education level is higher or equal to bachelor level. *overseastudy* is a dummy variable which equals to 1 if the CEO has overseas study experience. *Schoolname* is a dummy variable which equals to 1 if the CEO's alma mater is disclosed. Columns (1), (2), (3) and (4) show the results of univariate regressions on four education-related variables separately. Columns (5) and (6) show univariate regression results where three education-related variables are included in one regression model. *lnedu_year* and *edu_um* are not included in any regression model simultaneously because they are highly correlated. All regressions control for year-fixed and firm-fixed effects. Levels of significance 1%, 5%, and 10% are indicated by ***, **, and * respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
<i>lnedu_year</i>	0.005** (0.003)				0.004 (0.003)	
<i>edu_um</i>		0.010*** (0.003)				0.008** (0.003)
<i>overseastudy</i>			0.010** (0.003)		0.008* (0.003)	0.008* (0.003)

			(0.004)	(0.004)	(0.004)
<i>schoolname</i>			0.005**	0.004	0.003
			(0.002)	(0.003)	(0.003)
<i>lnage</i>	0.020**	0.022**	0.020**	0.021**	0.021**
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
<i>female</i>	0.001	0.002	0.002	0.0009	0.002
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
<i>isduality</i>	-0.007**	-0.006**	-0.006*	-0.006**	-0.006*
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
<i>lntotalasset</i>	0.009***	0.009***	0.009***	0.009***	0.009***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
<i>beta</i>	-0.025***	-0.025***	-0.024***	-0.025***	-0.025***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
<i>professional</i>	-0.010***	-0.010***	-0.009***	-0.009***	-0.009***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
<i>Infirmage</i>	0.003	0.003	0.002	0.003	0.002
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Industry FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Adjusted R ²	0.082	0.084	0.082	0.082	0.084
Number of Observations	1628	1628	1628	1628	1628

The results of Table 5 show that education-related information significantly and positively affects Tobin's Q, except *schoolname* whose coefficient is only significant in the univariate model (4). The results support my main hypothesis and indicate that stronger education background of CEO,

including higher academic level and overseas education experience, do increase investors' confidence towards the firm. In these regressions, CEO's age also has a positive relationship with Tobin's Q, while firm size and beta have negative relationships with Tobin's Q. Professional dummy is not significant.

Table 5. OLS Regression of Tobin's Q on CEO Educational Background

This table reports OLS regression results of firm value on CEO education background, and other CEO and firm information. Firm value is measured as Tobin's Q, *lnedu_year* is the natural logarithm of years of higher education that CEO receives. *edu_um* is a dummy variable which equals to 1 if the CEO's education level is higher or equal to bachelor level. *overseastudy* is a dummy variable which equals to 1 if the CEO has overseas study experience. *Schoolname* is a dummy variable which equals to 1 if the CEO's alma mater is disclosed. Columns (1), (2), (3) and (4) show the results of univariate regressions on four education-related variables separately. Columns (5) and (6) show univariate regression results where three education-related variables are included in one regression model. *lnedu_year* and *edu_um* are not included in any regression model simultaneously because they are highly correlated. All regressions control for year-fixed and firm-fixed effects. Levels of significance 1%, 5%, and 10% are indicated by ***, **, and * respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
<i>lnedu_year</i>	0.235*** (0.071)				0.181** (0.073)	
<i>edu_um</i>		0.243*** (0.092)				0.183* (0.095)
<i>overseastudy</i>			0.471*** (0.124)		0.396*** (0.126)	0.424*** (0.125)
<i>schoolname</i>				0.144** (0.068)	0.0780 (0.070)	0.074 (0.071)
<i>lnage</i>	0.727*** (0.263)	0.782*** (0.265)	0.743*** (0.263)	0.748*** (0.264)	0.772*** (0.263)	0.815*** (0.264)
<i>female</i>	-0.210 (0.141)	-0.196 (0.141)	-0.162 (0.141)	-0.212 (0.142)	-0.187 (0.141)	-0.168 (0.141)

<i>isduality</i>	-0.040 (0.091)	-0.031 (0.092)	0.001 (0.092)	-0.031 (0.092)	-0.005 (0.092)	0.004 (0.092)
<i>lnotalasset</i>	-0.983*** (0.053)	-0.970*** (0.053)	-0.973*** (0.053)	-0.974*** (0.053)	-0.984*** (0.053)	-0.974*** (0.053)
<i>beta</i>	-0.821*** (0.159)	-0.814*** (0.159)	-0.769*** (0.159)	-0.812*** (0.160)	-0.791*** (0.159)	-0.783*** (0.159)
<i>professional</i>	-0.085 (0.089)	-0.093 (0.090)	-0.043 (0.090)	-0.064 (0.090)	-0.046 (0.090)	-0.051 (0.090)
<i>lnfirmage</i>	-0.083 (0.084)	-0.080 (0.084)	-0.117 (0.0840)	-0.102 (0.084)	-0.107 (0.084)	-0.107 (0.084)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R ²	0.396	0.395	0.397	0.394	0.400	0.399
Number of Observations	1628	1628	1628	1628	1628	1628

Table 6 summarizes that among education-related variables academic level has significant, positive effect on R&D ratio. Both *lnedu_year* and *edu_um* maintain significance in the multivariate model (5) and (6). CEOs with a higher academic level on average attach more importance to R&D. The coefficient of *schoolname* dummy is negative and significant only in the model (6), but its magnitude is relatively small compared with *edu_um* dummy. Firm size is negatively related to R&D ratio, while beta, professional and duality dummy are not significant.

Table 6. OLS Regression of R&D ratio on CEO Educational Background

This table reports OLS regression results of R&D activity on CEO education background, and other CEO and firm information. R&D activity is measured as RD ratio, which is R&D expenses divided by total assets. *lnedu_year* is the natural logarithm of years of higher education that CEO receives. *edu_um* is a dummy variable which equals to 1 if the CEO's education level is higher or equal to bachelor level. *overseastudy* is a dummy variable which equals to 1 if the CEO has overseas study experience. *Schoolname* is a dummy variable which equals to 1 if the CEO's alma mater is disclosed. Columns (1), (2), (3) and (4) show the results of univariate regressions on four education-related variables separately. Columns (5) and (6) show univariate regression results where three education-related variables are included in one regression model. *lnedu_year* and *edu_um* are not included in any regression model simultaneously because they are highly correlated. All regressions control for year-fixed and firm-fixed effects. Levels of significance 1%, 5%, and 10% are indicated by ***, **, and * respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
<i>lnedu_year</i>	0.015*** (0.003)				0.016*** (0.003)	
<i>edu_um</i>		0.020*** (0.004)				0.022*** (0.004)
<i>overseastudy</i>			0.001 (0.005)		-0.003 (0.005)	-0.001 (0.005)
<i>schoolname</i>				-0.001 (0.003)	-0.004 (0.003)	-0.005* (0.003)
<i>lnage</i>	-0.002 (0.010)	0.004 (0.010)	-0.004 (0.010)	-0.004 (0.010)	-0.004 (0.010)	0.002 (0.010)
<i>female</i>	-0.010* (0.006)	-0.009 (0.006)	-0.009 (0.006)	-0.009 (0.006)	-0.010* (0.006)	-0.008 (0.006)
<i>isduality</i>	-0.001 (0.004)	-0.001 (0.004)	-0.001 (0.004)	-0.001 (0.004)	-0.002 (0.004)	-0.001 (0.004)
<i>lntotalasset</i>	-0.008*** (0.002)	-0.007*** (0.002)	-0.007*** (0.002)	-0.007*** (0.002)	-0.007*** (0.002)	-0.007*** (0.002)
<i>beta</i>	-0.004 (0.006)	-0.003 (0.006)	-0.003 (0.006)	-0.003 (0.006)	-0.004 (0.006)	-0.003 (0.006)

<i>professional</i>	-0.004 (0.004)	-0.005 (0.004)	-0.004 (0.004)	-0.004 (0.004)	-0.005 (0.004)	-0.006* (0.004)
<i>Infirmage</i>	-0.004 (0.003)	-0.003 (0.003)	-0.005 (0.003)	-0.005 (0.003)	-0.003 (0.003)	-0.003 (0.003)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R ²	0.189	0.190	0.174	0.174	0.189	0.191
Number of Observations	1628	1628	1628	1628	1628	1628

5.2 Event study results

This paper then conducts an event study on CEO switch events by regressing CAAR on education-related variables.

CAAR are calculated the four event windows [-1,1], [-2,2], [-5,5], [-10,10]. Parameters are estimated over 250 days prior to the CEO switch announcement using market model methodology.

As shown in Table 7, when the new CEO's education level is higher than the old CEO's, market price reacts positively during short periods [-2,2], [-5,5] after controlling for other firm and CEO characters. This result shows that investors believe that the new CEO who has a higher education will lead to better firm performance. However, Table 8 and Table 9 show that the market does not respond to positive change in CEO overseas education background

or school name disclosure in any window period. After dealing with the endogeneity issue, the level and length of higher education that CEO receives are still important for firm value, whereas overseas study experience and school name disclosure are not. For event windows [-2,2] and [-5,5], ROA of last year is negatively related to CAAR, suggesting that the investors support CEO switch if the firm performed poorly last year. Table 8 and Table 9 show similar relationships between ROA of the previous year and CAAR during [-2,2] and [-5,5].

Table 7. The Relationship between CAAR and Improvement of CEO's Education Level

This table presents the event study of a total of 210 CEO switch events. Dependent variables are CAAR between t-1 and t+1, between t-2 and t+2, between t-5 and t+5, and between t-10 and t+10. Test variable is *eduup* which equals 1 if the new CEO holds a higher academic degree than the old CEO. *lroa* is the nature logarithm of last year ROA, *lnsize* is the nature logarithm of firm size. Other firm characteristics and CEO characteristics for both the previous CEO and the new CEO are controlled. All regressions control for year-fixed and firm-fixed effects. Levels of significance 1%, 5%, and 10% are indicated by ***, **, and * respectively.

	CAAR[-1,1]	CAAR[-2,2]	CAAR[-5,5]	CAAR[-10,10]
<i>Eduup</i>	0.010 (0.009)	0.024** (0.011)	0.030* (0.017)	0.0240 (0.024)
<i>Female</i>	0.017 (0.018)	0.003 (0.024)	-0.019 (0.036)	-0.032 (0.051)
<i>Age</i>	0.000 (0.001)	0.000 (0.001)	-0.001 (0.001)	-0.002 (0.002)
<i>Lroa</i>	-0.148 (0.277)	-0.607* (0.355)	-1.352** (0.541)	-1.134 (0.766)

<i>Lnsiz</i> e	-0.000 (0.006)	-0.007 (0.007)	-0.015 (0.011)	-0.024 (0.016)
Other characteristics controlled	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Adjusted R ²	-0.014	0.016	0.030	-0.002
Number of Observations	210	210	210	210

Table 8. The Relationship between CAAR and Improvement of CEO's Overseas Education

This table presents the event study of a total of 210 CEO switch events. Dependent variables are CAAR between t-1 and t+1, between t-2 and t+2, between t-5 and t+5, and between t-10 and t+10. Test variable is which equals 1 if the new CEO has overseas study experience. *lroa* is the nature logarithm of last year ROA, *lnsize* is the nature logarithm of firm size. Other firm characteristics and CEO characteristics for both the previous CEO and the new CEO are controlled. All regressions control for year-fixed and firm-fixed effects. Levels of significance 1%, 5%, and 10% are indicated by ***, **, and * respectively.

	CAAR[-1,1]	CAAR[-2,2]	CAAR[-5,5]	CAAR[-10,10]
<i>overseasup</i>	0.004 (0.015)	0.016 (0.019)	0.022 (0.029)	0.006 (0.041)
<i>Female</i>	0.019 (0.019)	0.008 (0.024)	-0.013 (0.036)	-0.029 (0.051)
<i>Age</i>	0.000 (0.001)	0.000 (0.001)	-0.001 (0.001)	-0.001 (0.002)
<i>Lroa</i>	-0.158 (0.278)	-0.622* (0.359)	-1.367** (0.545)	-1.161 (0.769)
<i>Lnsiz</i> e	-0.001 (0.006)	-0.009 (0.008)	-0.018 (0.011)	-0.026 (0.016)

Other characteristics controlled	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Adjusted R ²	-0.020	-0.002	0.018	-0.006
Number of Observations	210	210	210	210

Table 9. The Relationship between CAAR and Improvement of CEO's School Name Disclosure

This table presents the event study of a total of 210 CEO switch events. Dependent variables are CAAR between t-1 and t+1, between t-2 and t+2, between t-5 and t+5, and between t-10 and t+10. Test variable is dummy variable *schoolnameup* equals 1 if the new CEO discloses his or her alma mater. *lroa* is the nature logarithm of last year ROA, *lnsize* is the nature logarithm of firm size. Other firm characteristics and CEO characteristics for both the previous CEO and the new CEO are controlled. All regressions control for year-fixed and firm-fixed effects. Levels of significance 1%, 5%, and 10% are indicated by ***, **, and * respectively.

	CAAR[-1,1]	CAAR[-2,2]	CAAR[-5,5]	CAAR[-10,10]
<i>schoolnameup</i>	-0.004 (0.011)	-0.012 (0.014)	-0.012 (0.022)	-0.043 (0.030)
<i>female</i>	0.018 (0.018)	0.004 (0.024)	-0.016 (0.036)	-0.035 (0.051)
<i>age</i>	0.000 (0.001)	0.000 (0.001)	-0.001 (0.001)	-0.001 (0.002)
<i>lroa</i>	-0.177 (0.281)	-0.687* (0.362)	-1.440*** (0.550)	-1.329* (0.771)
<i>lnsize</i>	-0.001 (0.006)	-0.008 (0.008)	-0.017 (0.011)	-0.024 (0.016)

Other characteristics controlled	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Adjusted R ²	-0.020	-0.002	0.017	0.003
Number of Observations	210	210	210	210

5.3 2SLS results

Based on the event study, I further investigate the impact of CEO's higher education year (continues variable) and whether or not the CEO holds a bachelor degree (dummy variable) with the 2SLS approach. The first-stage results for test variable *edu_um* are shown in Table 10. The F-value is larger than 10, verifying the validity of the instrument variable. The culture revolution dummy variable has a significantly negative influence on CEO's education, as I explained above. The unreported first-state regression analysis for test variable *lnedu_year* shows simmilar resluts.

Table 10. First-stage Regression Results

This table presents the first-stage results of 2SLS regression. Dummy variable *cul_re*, which measures whether or not the CEO's education has been disturbed by the Cultural Revolution, is used as an instrumental variable for test variable *edu_um*. Firm characteristics and CEO characteristics are controlled. All regressions control for year-fixed and firm-fixed effects. Levels of significance 1%, 5%, and 10% are indicated by ***, **, and * respectively.

	<i>cul_re</i>	<i>lnage</i>	<i>isduality</i>	<i>female</i>	<i>lntotalasset</i>	<i>lnfirmage</i>	<i>leverage</i>	<i>professional</i>
Coefficient	-0.197*** (0.042)	-0.074 (0.085)	-0.027 (0.024)	-0.022 (0.043)	0.008 (0.014)	-0.055** (0.022)	-0.229*** (0.069)	0.066*** (0.023)
Std. Dev.								
Adjusted R ² = 0.0820								
F(25, 1602) = 10.39								
Number of Observations = 1628								

As we can see from Table 11, both year of higher education and bachelor dummy are positively related to ROA, but not to Tobin's Q or R&D ratio. These results indicate that highly educated CEOs do contribute to firm profitability, but not to long-term market valuation or R&D expenditure. These results contradict those of Lu and Zhang (2015). This might because that we focus on different markets whose types of firms are very different. The coefficient of professional is negative in Column (1) and (4), inferring that the founder of a firm is more capable of improving firm profitability than a professional manager does. Column (1) and (4) also show that firm size and firm age have positive impacts on ROA, while leverage has a negative impact on ROA. Column (3) and (6) show that the coefficients of the *female* dummy are negative, indicating that female CEOs generally spend less on R&D relative to total asset than male CEOs do.

Table 11. Second-stage Regression Results

This table presents the second-stage results of 2SLS regression. In column (1), (2), and (3), the test variable is *lnedu_year*, the predicted value of *lnedu_year* from first

stage regression, while dependent variables are ROA, Tobin's Q and RD ratio respectfully. In column (4), (5), and (6), the test variable is $\widehat{edu_um}$, the predicted value of edu_um from first stage regression, while dependent variables are ROA, Tobin's Q and RD ratio respectfully. Firm characteristics and CEO characteristics are controlled. All regressions control for year-fixed and firm-fixed effects. Levels of significance 1%, 5%, and 10% are indicated by ***, **, and * respectively.

	(1) ROA	(2) Tobin's Q	(3) rdratio	(4) ROA	(5) Tobin's Q	(6) rdratio
$\ln \widehat{edu_year}$	0.037*	-0.153	0.021			
	(0.022)	(0.653)	(0.023)			
$\widehat{edu_um}$				0.039*	-0.160	0.022
				(0.022)	(0.681)	(0.024)
$Lnage$	0.011	0.447*	-0.013	0.020*	0.409	-0.008
	(0.009)	(0.246)	(0.010)	(0.011)	(0.311)	(0.012)
$Female$	0.001	-0.174	-0.009***	0.003	-0.183	-0.008**
	(0.005)	(0.124)	(0.004)	(0.005)	(0.122)	(0.003)
$\ln totalasset$	0.016***	-0.748***	-0.000	0.018*	-0.755***	0.001
	(0.003)	(0.078)	(0.003)	(0.003)	(0.064)	(0.002)
$\ln firmage$	0.005*	-0.082	-0.004	0.006*	-0.084	-0.004
	(0.003)	(0.084)	(0.004)	(0.003)	(0.086)	(0.004)
$Leverage$	-0.084***	-1.857***	-0.087***	-0.082***	-1.868***	-0.086***
	(0.011)	(0.265)	(0.011)	(0.011)	(0.291)	(0.011)
$professional$	-0.009***	-0.034	-0.003	-	-0.028	-0.004
	(0.003)	(0.092)	(0.004)	(0.004)	(0.101)	(0.004)
Other characteristics controlled	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Adjusted R ²	0.036	0.399	0.232	0.083	0.402	0.235
Number of Observations	1628	1628	1628	1628	1628	1628

6. Conclusion

This paper examines the impact of different education-related information on CEO on firm performance and finds that the level and length of higher education that CEO receives are of great importance even after controlling for endogeneity. The market price positively reacts to education background improvement during short event period around CEO switch announcement day. Moreover, CEO with a higher education level attribute to higher firm profitability.

The main contribution of this paper is that it investigates China's ChiNext market listed firm, most of which are small-medium size high-tech firms, and provide some new perspectives to the existing CEO education-firm performance literature.

This paper has several limitations as follows. First, this paper does not include CEO's academic credential as one variable due to lack of related data in China's stock market. Joh and Jung (2016) have shown that top managers'

academic credentials from elite schools contribute to firm value with a sample of firms in South Korea. Whether or not the CEO graduates from prestigious universities is an essential aspect of education-related background.

Second, this paper only includes one instrumental variable `cul_re` dummy in the 2SLS analysis due to data accessibility. University freshman intake rate when the CEO was 18 years old, and whether the CEO was born in big cities with rich education resources are two alternatives for instrumental variables as used in Lu and Zhang (2015), and Joh and Jung (2016). However, only about 30% of CEOs have data of these two variables.

Third, this paper has not explained why highly educated CEO leads to better firm performance in this market. Future research focusing on the uniqueness of high-tech firms might be helpful to answer this question.

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국 문 초 록

CEO의 교육 배경과 기업 성과:

중국판 NASDAQ 시장을 중심으로

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본 연구는 2011년부터 2016년 사이 중국 ChiNext 상장 기업들을 대상으로 CEO의 교육 배경이 기업의 성과에 미치는 영향을 살펴보고자 하였다. 그 결과 CEO의 학력이 굉장히 중요한 요소인 것으로 드러났다. 새로운 CEO의 학력이 이전 CEO의 학력보다 더 높을 때 해당 기업의 주가가 단기적으로 증가하는 것으로 나타났다. 또한, 본 연구는 2SLS 분석을 통해 학력이 높은 CEO가 기업의 수익 창출에 더 긍정적으로 기여하는 것을 밝혔다. 결과적으로, 본 연구는 CEO의 학력이 기업 성과에 긍정적인 영향을 미치는 요소임을 입증하였다.

주요어: CEO의 교육 배경, 기업 성과, 중국 ChiNext 시장

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