MANAGERIAL OVERCONFIDENCE AND LABOR INVESTMENT EFFICIENCY

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ABSTRACT

Managerial overconfidence is known as a cognitive bias which leads managers to overestimate their ability and judgments and induces riskier capital investments. Research explored the influence of managerial overconfidence on labor investment efficiency. Author found a significantly positive association between CEO overconfidence and labor overinvestment. This result indicates that overconfident managers tend to invest more in labor, thus worsening labor investment efficiency under labor overinvestment. Further analysis reveals that internal funds increase negative impact of the managerial overconfidence on labor investment efficiency.

Keywords: Managerial Overconfidence, Labor Investment, Investment Efficiency, Agency Problem.

JEL Classification: G31; G34; G41

INTRODUCTION

Managerial overconfidence is a cognitive bias that induces managers to believe that they are more capable than or that their firms will perform better than average competitors (Kidd, 1970; Larwood & Whittaker, 1977; Moore, 1977; Svenson, 1981; Alicke, 1985; Camerer & Lavallo, 1999). Such overestimation of their abilities and judgements leads managers to seek more aggressive and risky ventures and invest excessively beyond the optimal level. This negative relation between managerial overconfidence and investment efficiency is empirically shown by Heaton (2002); Malmendier & Tate (2005), and Campbell et al. (2011).

Author extended the stream of studies by examining investments in labor, which is an important factor of production that has not been sufficiently documented thus far. One reason why labor investment has received less attention than physical capital investment may be related to the convention in classical microeconomics of considering labor inputs as simply varying in accordance with sales. The traditional labor economics literature argues that labor costs have more variable cost components than capital costs, while recent studies suggest that a sizeable portion of labor costs are fixed (Oi, 1962; Farmer, 1985; Hamermesh, 1996). As such, decisions regarding labor investment are as important for increasing firm value as physical capital investment (Merz & Yashiv, 2007).

After relating those two factors and examined the association between managerial overconfidence and labor investment efficiency. Unlike other physical capital investments, labor investment may not return visible and clear cash inflows (Schultz, 1961; Weisbrod, 1961; Ashton & Green, 1996; Wolf, 2002). Hence, decisions regarding labor investment may more heavily depend on managers' subjective judgments than physical capital investments. Considering this

characteristic, author believed that labor investment is more suitable for examining the impact of managerial overconfidence on investment. Given the difficulty of observing a clear relation between labor investment and prior cash inflow, labor investment depends more heavily on managers' future predictions. As overconfident CEOs make more positive predictions, and expected overconfident CEOs to increase labor investment, resulting in higher and lower investment efficiency for the labor underinvestment and overinvestment subsample, respectively. Hence, Author predicted that the influence of CEO overconfidence on labor investment efficiency depends on the level of labor overinvestment or underinvestment.

For the empirical analysis, study need to measure both labor investment efficiency and CEO overconfidence. For the former, research follows Pinnuck & Lillis (2007); Li (2011); and Jung et al. (2014). The firm's net hiring or the change in the number of employees is used as proxy for the firm's labor investment, and following prior literature, the actual net hiring is regressed on a battery of factors revealing the firm's economic and financial fundamentals. The absolute difference between the actual net hiring and fitted net hiring obtained from this regression is defined as the degree of labor investment inefficiency. Next, following Malmendier & Tate (2005) and Campbell et al. (2011), managerial overconfidence is measured using the CEO's net stock purchases and stock option holdings and exercising decisions.

This study contributes to the managerial overconfidence literature. CEOs' personal characteristics have recently been considered an integral factor in a corporation's behavior, and managers' overconfidence has been studied for its effect on various corporate decisions, such as investment-related decisions (Hiller & Hambrick, 2005; Malmendier & Tate, 2005; Campbell et al. 2011), and the internal decision-making structure (Picone et al., 2014; Haynes et al., 2015). Author found an additional influence of managerial overconfidence on corporate behavior, as seen in labor investment.

This study also contributes to the labor investment literature. Labor is recognized as an integral production factor for the firm's long-term survival and growth (Franke, 1994; Becker & Gerhart, 1996; Gimeno et al., 1997; Bartlett & Ghoshal, 2002). In addition, labor costs account for two-thirds of overall value added in the US economy (Hamermesh, 1996; Bernanke, 2010). Hence, the impact of managerial overconfidence on labor investment efficiency is essential for examining its association with the firm's long-term performance and for understanding the influence of CEO overconfidence.

The study first reviews the related literature and develops research hypothesis. Next, explains the research design to empirically examine research hypothesis and present research results. The conclusion summarizes and discusses the results.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Managerial Overconfidence and Corporate Investments

In the psychology literature, overconfidence is defined as an individual's overoptimistic estimation of his or her abilities or judgments (Miller & Ross, 1975; Kruger, 1999; Alicke & Govorun, 2005). Managerial overconfidence is specifically described as a better-than-average belief and asymmetric attribution of causality. In other words, overconfident managers believe that they are better than the average competitor in terms of their ability and judgments and display a higher tendency of attributing successful outcomes to themselves, while attributing unsuccessful results to exterior factors (Kidd, 1970; Larwood & Whittaker, 1977; Moore, 1977; Svenson, 1981; Alicke, 1985; Camerer & Lavallo, 1999).

Previous overconfidence-related psychology studies have further analyzed the impact of overconfidence on individual behaviors in three ways: overestimation of one's own ability, over precision of one's own judgments, and over placement of one's own performance over that of others (Picone et al., 2014). Accordingly, the influence of managerial overconfidence on corporate decisions can be threefold (Lai et al., 2017). First, the CEO's overestimation of his or her abilities in turn leads managers to overestimate the firm's resources (Malmendier & Tate, 2005). This induces overconfident CEOs to seek more risky investment opportunities and often to select those beyond the firm's availability (Campbell et al., 2011). On the other hand, the over precision induced by overconfidence allows the CEO to be less cautious while making decisions, and this can reduce the decision-making time (Hiller & Hambrick, 2005). In addition, the associated over placement causes manager to prefer a centralized corporate structure and a monopolized internal decision-making process (Haynes et al., 2015).

Hence, when research focuses on the predicted impact of managers' overconfidence on investment decisions, overconfident CEOs are expected to pursue aggressive and risky investment strategies and to overinvest, as they overestimate the results of investments. Heaton (2002) and Malmendier & Tate (2005) show that managers' choice of a suboptimal level of investment may stem from the CEO's overestimation of investments.

Managerial Overconfidence and Labor Investment Efficiency

Study aim to observe the impact of managerial overconfidence on labor investment. Malmendier & Tate (2005) document the association between CEO overconfidence and the sensitivity of corporate investment to cash flow and find that overconfident managers overinvest in the presence of sufficient internal funds while reducing investment more sharply when external financing is necessary. Thus, managerial overconfidence is found to be related to inefficient corporate investment.

Compared with physical capital investment, labor investment has not attracted considerable attention among researchers, as standard neoclassical economics do not relate labor to firm value (Tobin 1969; Tobin & Brainard 1977). Rather, classical labor economics has traditionally considered labor to be a purely variable factor, adjusted exactly with the production output, whereas capital is treated as a purely fixed factor. This simplified Marshallian microeconomics model has received considerable criticism, as it fails to incorporate various phenomena in reality (Oi, 1962; Oi, 1983; Merz & Yashiv, 2007). To address such criticism, Oi (1962) claims that labor is a quasi-fixed factor, arguing that both labor and capital investments include a certain proportion of fixed costs. The fixed costs of labor mainly come from adjustments costs related to hiring, training, and firing employees (Oi, 1983; Farmer, 1985; Hamermesh, 1996).

Investment in labor, as a part of overall corporate investment, is different from physical capital investment in that the expected benefit from labor investment is more difficult to measure than that from physical capital investment (Schultz, 1961; Weisbrod, 1961). Typical physical capital investments are implemented by purchasing tangible assets or incurring R&D expenditures and facilitating the observation of cash inflows, while the direct cash inflow is more difficult to observe for labor investments. This difficulty in calculating the expected net present value (NPV) can arise either from the difficult process of quantifying labor's economic contribution (Ashton & Green, 1996; Wolf 2002) or from the innate information asymmetry between employers and employees in the labor market (Stigler, 1962). Either way, as an observable and tangible prediction of future cash inflow is more difficult for labor investment;

the decision to invest in labor depends more heavily on managers' discretion.

The study made predictions regarding the impact of managerial overconfidence on labor investment efficiency based on this background. Research hypothesized that managerial overconfidence increases labor investment, as managers' overestimation of their own abilities and the firm's prospects leads to overinvestment in labor. However, managerial overconfidence can either improve or worsen labor investment efficiency, depending upon the firm's level of overinvestment or underinvestment in labor. Under labor overinvestment, further investment in labor induced by an overconfident CEO is expected to worsen labor investment efficiency, while under labor underinvestment, the same decision reduces the deviation of labor investment from its optimal level and improves labor investment efficiency. Therefore, with research hypothesis, Authors predicted two directions regarding the association between managerial overconfidence and labor investment efficiency: a negative relation between CEO overconfidence and labor investment efficiency for the firms that have already excessively invested in labor and a positive relation for the firms facing a shortage of labor and needing further investments to reach the optimal level. Overall, research develops following hypothesis:

H1: CEO overconfidence has effect on labor investment efficiency.

RESEARCH DESIGN

Specification of Labor Investment Efficiency

Following Pinnuck & Lillis (2007), Li, (2011), and Jung et al. (2014), the study estimates labor investment inefficiency by calculating the difference between predicted (or optimal) labor investment and actual labor investment. As in the prior literature, the change in the number of employees is used as a proxy for the firm's labor investment. This measure of net hiring is regressed on a set of economic and corporate factors to produce the fitted or predicted net hiring level as shown in equation (1).

$$
NET\_HIRE_{it} = \beta_0 + \beta_1 SALES\_GROWTH_{it-1} + \beta_2 SALES\_GROWTH_{it} + \beta_3 \Delta ROA_{it} + \beta_4 \Delta ROA_{it-1} + \beta_5 ROA_{it} + \beta_6 RETURN_{it} + \beta_7 SIZE\_R_{it-1} + \beta_8 QUICK_{it-1} + \beta_9 \Delta QUICK_{it-1} + \beta_{10} \Delta QUICK_{it} + \beta_{11} LEV_{it-1} + \beta_{12} LOSSBIN1_{it-1} + \beta_{13} LOSSBIN2_{it-1} + \beta_{14} LOSSBIN3_{it-1} + \beta_{15} LOSSBIN4_{it-1} + \beta_{16} LOSSBIN5_{it-1} + \varepsilon_{it}, \qquad (1)
$$

where *NET_HIRE* = the percentage change in employees; *SALES_GROWTH* = the percentage change in sales revenue; *ROA* = net income scaled by total assets at the beginning of the year; *RETURN* = the annual stock return for year *t*; *SIZE_R* = the log of market value of equity at the beginning of the year, ranked into percentiles; *QUICK* = the ratio of cash and short-term investments plus receivables to current liabilities; *LEV* = the ratio of long-term debt to total assets at the beginning of the year; and the *LOSSBIN* variables are indicators for each 0.005 interval of the prior year *ROA* from 0 to –0.025 (i.e., *LOSSBIN1* equals 1 if prior-year *ROA* is between –0.005 and 0, *LOSSBIN2* equals 1 if prior-year *ROA* is between –0.010 and –0.005, and so on). The equation also includes industry fixed effects. All variables are listed in the Appendix.

The research labor investment inefficiency measure is now computed as the absolute difference between the actual change in the number of employees and the expected net hiring calculated from regression equation (1). This absolute abnormal net hiring measure, |*AB_NET_HIRE*|, shows the firm's distance from its optimal labor investment level.

Specification of Managerial Overconfidence

Research follows Malmendier & Tate (2005) and Campbell et al. (2011) in measuring CEO overconfidence. They utilized the CEO's net stock purchases and stock option holdings and exercising decisions to proxy for CEO overconfidence. Based on prior studies, authors denoted the CEO overconfidence variable (OC) as equal to 1 if CEOs hold stock options with a stock price that exceeds the exercise price by more than 100%. To determine whether CEOs hold stock options that are higher than 100% in the money, study required that the CEO shows option-holding behavior more than once during the sample period. The option moneyness is calculated as specified in Campbell et al. (2011).

Control Variables

Control variables are added in equation (2) below based on prior labor investment-related studies, such as Biddle & Hilary (2006) and Biddle, Hilary, & Verdi (2009). The controls are growth options (MTB_{it-1}), firm size ($SIZE_{it-1}$), liquidity ($QUICK_{it-1}$), leverage (LEV_{it-1}), dividend payout ($DIVDUM_{it-1}$), cash flow and sales volatilities (STD_CFO_{it-1} , STD_SALES_{it-1}), tangible assets ($TANGIBLE_{it-1}$), incidence of losses ($LOSS_{it-1}$), and net hiring volatility ($STD\_NET\_HIRE_{it-1}$), as these variables are expected to affect net hiring, or labor investment. Following Cella (2009), the proportion of outstanding shares held by institutions ($INSTI_{it-1}$) is also included in this study regression analysis to capture the influence of institutional investors' monitoring role on corporate employment decisions. The research analyze the effects of managerial overconfidence on labor investment efficiency using ordinary least square (OLS) regression. All these factors are included in this research the main regression equation as shown below.

$$|AB\_NET\_HIRE|_{it} = \beta_0 + \beta_1 OC_{it-1} + \beta_2 MTB_{it-1} + \beta_3 \text{SIZE}_{it-1} + \beta_4 \text{QUICK}_{it-1} + \beta_5 LEV_{it-1} + \beta_6 DIVDUM_{it-1} + \beta_7 STD\_CFO_{it-1} + \beta_8 STD\_SALES_{it-1} + \beta_9 \text{TANGIBLE}_{it-1} + \beta_{10} \text{LOSS}_{it-1} + \beta_{11} INSTI_{it-1} + \beta_{12} STD\_NET\_HIRE_{it-1}, \tag{2}$$

where OC = 1 if CEOs hold stock options with a stock price exceeding the exercise price by more than 100% and 0 otherwise; MTB = the ratio of market value to book value of common equity at the beginning of the year; $SIZE$ = the log of market value of equity at the beginning of the year; $DIVDUM$ = 1 if the firm pays dividends in the previous year and 0 otherwise; STD_CFO = the standard deviation of cash flow from operations over years $t-5$ to $t-1$; STD_SALES = the standard deviation of sales revenue over years $t-5$ to $t-1$; $TANGIBLE$ = the ratio of property, plant, and equipment (PPE) to total assets at the beginning of the year; $LOSS$ = 1 if the firm reported a loss in the previous year and 0 otherwise; $INSTI$ = the proportion of outstanding common shares held by institutions at the end of year $t-1$; STD_NET_HIRE = the standard deviation of the percentage change in employees over years $t-5$ to $t-1$; and all other variables are as previously defined. The model includes industry and year dummy variables, and all standard errors are corrected for firm-level clustering.

The study regresses authors main dependent variable of labor investment inefficiency, or absolute abnormal net hiring ($|AB\_NET\_HIRE|$), on this research primary independent variable, CEO overconfidence (OC_{it-1}) and the control variables. If managerial overconfidence leads the firm to deviate more from optimal labor investment, the coefficient of OC (β_1) is expected to be

significantly positive. In contrast, a significantly negative coefficient of OC (β_1) implies that CEO overconfidence helps the firm reach the optimal labor investment level.

Sample

Research obtained data on CEO option holdings from the ExecuComp database to calculate CEO overconfidence (OC). Most of the research other variables, such as the number of employees and variables on firm characteristics are obtained from Compustat and the Center for Research in Security Prices (CRSP) databases. Institutional ownership data are obtained from Thomson Reuters' CDA/Spectrum database.

The final sample consists of 72,059 firm-year observations ranging from 1992 to 2015 reduced from the study initial sample due to the availability of many explanatory variables. The study begins the sample in 1992 because ExecuComp provides data on managers' stock option holdings from 1992.

Estimation of Abnormal Net Hiring

To estimated research labor investment inefficiency measure, research regresses the actual net hiring on a set of firm characteristic variables, as demonstrated in equation (1). Summary statistics for the variables used in equation (1) are shown in Panel A of Table 1. The results of the regression analysis performed on these variables are shown in Panel B of Table 1. Panel B reports results consistent with Pinnuck & Lillis's (2007) results. The estimated coefficient of $SALES\_GROWTH_{it}$ is 0.324, which is similar to the value of 0.330 reported by Pinnuck & Lillis (2007), and all five coefficients of $LOSSBIN$ are negative, three of which are significant at 5% level, which is also consistent with Pinnuck & Lillis's (2007) estimation. The study takes the absolute value of the residuals from (1) to compute the study absolute abnormal net hiring (|AB_NET_HIRE|) variable and the raw value of the residuals from (1) to obtain the raw abnormal net hiring (AB_NET_HIRE) variable.

Table 1 ESTIMATION OF THE EXPECTED LEVEL OF NET HIRING AND ABNORMAL HIRING						
Panel A: Descriptive statistics for variables in model (1)						
Variables	**N**	**Mean**	**Median**	**Std. dev.**	**Q1**	**Q3**
NET_HIRE_{it}	72,059	0.0855	0.0302	0.3170	–0.0426	0.1429
$SALES\_GROWTH_{it-1}$	72,059	0.2222	0.0894	0.6969	–0.0150	0.2460
$SALES\_GROWTH_{it}$	72,059	0.1566	0.0794	0.4602	–0.0234	0.2207
ΔROA_{it-1}	72,059	0.0642	–0.1604	5.6850	–0.8255	0.2746
ΔROA_{it}	72,059	–0.1831	–0.1502	4.2307	–0.7956	0.2731
ROA_{it}	72,059	0.0018	0.0393	0.1923	–0.0219	0.0894
$RETURN_{it}$	72,059	0.1526	0.0684	0.6075	–0.2108	0.3690
$SIZE\_R_{it-1}$	72,059	0.6477	0.7000	0.2540	0.4600	0.8700
$Quick_{it-1}$	72,059	2.2027	1.2839	4.0460	0.7924	2.3204
$\Delta Quick_{it-1}$	72,059	0.1781	–0.0009	0.9011	–0.1982	0.2343
$\Delta Quickt_{it}$	72,059	0.0926	–0.0127	0.6353	–0.2067	0.2015
LEV_{it-1}	72,059	0.2098	0.1746	0.2013	0.0182	0.3349
Panel B: Regression results (dependent variable = NET_HIRE)						
Independent variables			**Predicted sign**	**Coefficient**	**(*t*-value)**	
Intercept			+/–	–0.044	(–3.24) ***	
$SALES\_GROWTH_{it-1}$			+	0.019	(12.44) ***	
$SALES\_GROWTH_{it}$			+	0.324	(142.48) ***	

ΔROA_{it-1}	+	0.001	(5.57) ***
ΔROA_{it}	−	0.001	(3.94) ***
ROA_{it}	+	0.102	(18.02) ***
$RETURN_{it}$	+	−0.005	(−2.93) ***
$SIZE\_R_{it-1}$	+	0.024	(5.63) ***
$Quick_{it-1}$	+	0.001	(5.29) ***
$\Delta Quick_{it-1}$	+	0.027	(23.32) ***
$\Delta Quickt_{it}$	+/−	−0.024	(−14.92) ***
LEV_{it-1}	+/−	−0.069	(−12.14) ***
$LOSSBIN1_{it-1}$	−	−0.023	(−2.51) **
$LOSSBIN2_{it-1}$	−	−0.034	(−3.62) ***
$LOSSBIN3_{it-1}$	−	−0.030	(−3.04) ***
$LOSSBIN4_{it-1}$	−	−0.010	(−1.04)
$LOSSBIN5_{it-1}$	−	−0.013	(−1.19)
Industry fixed effects			Yes
[*F-value*]			[304.87] ***
R^2			0.267
N			72,059

Note: Panel A summarizes the descriptive statistics of the dependent/independent variables in Model (1). It presents the mean, median, standard deviation, 25th percentile, and 75th percentile values. Panel B reports the regression results of *NET_HIRE* on various control variables. The *t*-statistics are reported in parentheses. The *F-value* is reported in square brackets. The definitions of the variables are presented in Appendix. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

RESULTS

Descriptive Statistics and Univariate Results

Summary statistics for the variables in the study main regression equation (2) are displayed in Table 2. Researcher's main dependent variable, abnormal net hiring has a mean value of 0.1133 and a median value of 0.0687. Researcher's main explanatory variable, CEO overconfidence, has a mean value of 0.2672, which indicates that about 26.72% of managers in research sample are overconfident managers according to study definition of managerial overconfidence.

Table 2 DESCRIPTIVE STATISTICS FOR VARIABLES IN THE ABNORMAL NET HIRING MODEL (MODEL 2)					
Variables	Mean	Median	Std.	Q1	Q3
$\|AB\_NET\_HIRE\|_{it}$	0.1133	0.0687	0.1525	0.0328	0.1307
$AB\_NET\_HIRE_{it}$	−0.0072	−0.0311	0.1864	−0.0865	0.0364
OC_{it-1}	0.2672	0.0000	0.4425	0.0000	1.0000
MTB_{it-1}	3.8521	2.3374	62.8056	1.4963	3.7530
$SIZE_{it-1}$	7.2100	7.0391	1.6635	6.0467	8.2683
$Quick_{it-1}$	1.8150	1.2597	2.0284	0.8146	2.0518
LEV_{it-1}	0.2117	0.1917	0.2068	0.0388	0.3174
$DIVDUM_{it-1}$	0.4523	0.0000	0.4977	0.0000	1.0000
STD_CFO_{it-1}	171.682	42.213	549.628	16.762	122.562
STD_SALE_{it-1}	906.758	188.685	3451.520	69.324	565.215
$TANGIBLE_{it-1}$	0.2760	0.2097	0.2212	0.1042	0.3906
$LOSS_{it-1}$	0.1769	0.0000	0.3816	0.0000	0.0000
$INSTI_{it-1}$	0.7875	0.8513	0.2229	0.6706	0.9881

STD_NET_HIRE $_{it-1}$	0.2013	0.1188	0.3272	0.0661	0.2231

Note: This table summarizes the descriptive statistics of the dependent/independent variables in our main regression model (Model 2). It presents the mean, median, standard deviation, 25th percentile, and 75th percentile values. Variables are defined in the Appendix.

Table 3 shows correlation coefficients for the study variables. Both Pearson's raw and Spearman's rank-order correlation coefficients are presented. Authors observed significantly positive correlation coefficients between absolute abnormal net hiring (|*AB_NET_HIRE*|) and CEO overconfidence (*OC*) using both Pearson's (0.066) and Spearman's (0.024) methods. Therefore determine that the univariate analysis implies that managerial overconfidence increases the deviation from optimal labor investment and impairs labor investment efficiency. The correlation coefficient between raw abnormal net hiring (*AB_NET_HIRE*) and CEO overconfidence (*OC*) is also significantly positive using both Pearson's (0.121) and Spearman's (0.141) methods. This supports the hypothesis that managerial overconfidence is positively related to labor investment.

Table 3
CORRELATIONS

#	Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	|AB_NET_HIRE|		0.465	0.066	0.001	-0.124	0.114	-0.023	-0.117	-0.030	-0.016	-0.023	0.085	-0.099	0.145
			(0.000)	(0.000)	(0.897)	(0.000)	(0.000)	(0.008)	(0.000)	(0.001)	(0.063)	(0.007)	(0.000)	(0.000)	(0.000)
2	AB_NET_HIRE	-0.209		0.121	-0.009	-0.029	0.061	-0.036	-0.075	-0.029	-0.019	-0.031	-0.080	-0.009	0.030
		(0.000)		(0.000)	(0.305)	(0.001)	(0.000)	(0.000)	(0.000)	(0.001)	(0.024)	(0.000)	(0.000)	(0.320)	(0.000)
3	OC	0.024	0.141		0.028	0.005	0.045	-0.056	-0.131	-0.049	-0.033	-0.055	-0.118	-0.009	0.035
		(0.006)	(0.000)		(0.001)	(0.594)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.302)	(0.000)
4	MTB	-0.034	0.116	0.257		0.021	-0.002	0.017	0.001	0.002	-0.002	-0.012	-0.017	0.003	-0.008
		(0.000)	(0.000)	(0.000)		(0.016)	(0.784)	(0.048)	(0.916)	(0.787)	(0.838)	(0.167)	(0.052)	(0.751)	(0.376)
5	SIZE	-0.139	-0.007	0.009	0.397		-0.147	0.064	0.351	0.398	0.325	0.043	-0.285	0.250	-0.130
		(0.000)	(0.424)	(0.294)	(0.000)		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
6	Quick	0.095	0.047	0.058	0.071	-0.178		-0.257	-0.208	-0.075	-0.080	-0.250	0.054	-0.022	0.040
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.010)	(0.000)
7	LEV	-0.047	-0.026	-0.081	-0.113	0.136	-0.444		0.084	0.039	0.018	0.228	0.086	-0.017	0.028
		(0.000)	(0.002)	(0.000)	(0.000)	(0.000)	(0.000)		(0.000)	(0.000)	(0.033)	(0.000)	(0.000)	(0.043)	(0.001)
8	DIVDUM	-0.124	-0.074	-0.131	0.031	0.337	-0.254	0.154		0.142	0.123	0.159	-0.196	-0.032	-0.172
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
9	STD_CFO	-0.087	-0.057	-0.077	0.071	0.756	-0.273	0.263	0.255		0.715	0.084	-0.030	-0.035	-0.027
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)		(0.000)	(0.000)	(0.000)	(0.000)	(0.002)
10	STD_SALE	-0.077	-0.030	-0.041	0.072	0.691	-0.339	0.270	0.259	0.819		0.066	-0.037	-0.032	0.015
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)		(0.000)	(0.000)	(0.000)	(0.081)
11	TANGIBLE	-0.035	-0.024	-0.062	-0.137	0.044	-0.381	0.298	0.208	0.131	0.118		-0.009	-0.108	-0.015
		(0.000)	(0.005)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)		(0.317)	(0.000)	(0.089)
12	LOSS	0.111	-0.096	-0.118	-0.200	-0.284	0.022	0.068	-0.196	-0.075	-0.128	-0.018		-0.136	0.095
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.012)	(0.000)	(0.000)	(0.000)	(0.000)	(0.040)		(0.000)	(0.000)
13	INSTI	-0.062	0.005	-0.003	0.032	0.219	0.064	-0.016	-0.109	0.153	0.129	-0.143	-0.105		-0.055
		(0.000)	(0.565)	(0.746)	(0.000)	(0.000)	(0.000)	(0.070)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)		(0.000)
14	STD_NET_HIRE	0.202	0.027	0.047	-0.071	-0.250	0.125	-0.009	-0.300	-0.143	-0.053	-0.117	0.178	-0.051	
		(0.000)	(0.002)	(0.000)	(0.000)	(0.000)	(0.000)	(0.296)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	

Note: This table presents the Pearson (upper right triangle) and Spearman (bottom left triangle) correlation matrix among of the dependent/independent variables in the study main regression model (model 2). p-values are presented in parentheses.

Main Regression Results

Table 4 reports the empirical analysis results of equation (2). The first three columns show analyses with absolute abnormal net hiring ($|AB\_NET\_HIRE|$) as the dependent variable. The first column shows regression results using the full sample, and authors found a significantly positive coefficient for CEO overconfidence (OC). This indicates that managerial overconfidence worsens the firm's labor investment efficiency, implying that overconfidence leads managers to engage in more labor investment than the optimal investment level. When the study further observes the results in the second and third columns, authors found that the relationship between CEO overconfidence and labor investment efficiency differs between the labor overinvestment and underinvestment observations. The second column shows the results from analyzing a subsample with actual net hiring exceeding the predicted (or optimal) net hiring, and the third column shows the results from analyzing a subsample with actual net hiring under the predicted (or optimal) net hiring. In other words, the second and third columns display the results of analyses performed for subsamples of overinvestment and underinvestment in labor, respectively. For the labor overinvestment subsample, the study still observe a significantly positive coefficient for OC, but the significantly positive association between managerial overconfidence and labor investment inefficiency disappears in the third column that is, for the labor underinvestment subsample. The researchers can interpret this finding to indicate that overconfident CEOs decrease labor investment efficiency given labor overinvestment, but there is no significant relationship if the firm has underinvested in labor. The fourth column uses the raw difference between actual net hiring and optimal net hiring as the dependent variable. This dependent variable has a positive value for overinvestment in labor and a negative value for underinvestment in labor. The results in the fourth column imply that CEO overconfidence has a tendency to increase the firm's net hiring for the entire sample. Research results extend the findings of Malmendier & Tate (2005) that the managerial overconfidence is related to inefficient investment. Overall, we can summarize that managerial overconfidence increases labor investment, especially when labor overinvestment is present, and this worsens labor investment efficiency.

	Table 4 EFFECT OF MANAGERIAL OVERCONFIDENCE ON ABNORMAL NET HIRING			
	Dependent variable:			
	$|AB\_NET\_HIRE|$	$|AB\_NET\_HIRE|$	$|AB\_NET\_HIRE|$	AB_NET_HIRE
	Full sample	$AB\_NET\_HIRE > 0$	$AB\_NET\_HIRE < 0$	Full sample
Independent variables	(1)	(2)	(3)	(4)
Intercept	0.1274***	0.1576**	0.0885***	0.0722***
	(6.13)	(4.41)	(5.84)	(3.13)
OC	0.0169***	0.0264***	0.0004	0.0396***
	(4.63)	(3.88)	(0.14)	(9.82)
MTB	0.0001	0.0001	0.0001***	0.0001***
	(0.89)	(–0.57)	(3.55)	(–4.03)
SIZE	–0.0044***	–0.0052**	–0.0036***	–0.0016
	(–4.17)	(–2.19)	(–4.20)	(–1.29)
Quick	0.0061***	0.0102***	0.0034***	0.0036**
	(4.94)	(5.48)	(3.96)	(2.21)
LEV	–0.0067	–0.0051	–0.0037	–0.0027
	(–0.83)	(–0.30)	(–0.61)	(–0.31)
DIVDUM	–0.0155***	0.0221***	–0.0047*	–0.0288***

	(−4.86)	(−3.06)	(−1.87)	(−7.90)
STD_CFO	−0.0001	−0.0001*	0.0000	−0.0001
	(−0.27)	(−1.66)	(0.68)	(−0.65)
STD_SALE	0.0001	0.0001	0.0001	0.0001
	(0.91)	(0.49)	(0.91)	(0.05)
TANGIBLE	−0.0538***	−0.0854***	−0.0333***	−0.0231*
	(−4.55)	(−3.35)	(−3.62)	(−1.87)
LOSS	0.0179***	−0.0094	0.0359***	−0.0441***
	(4.52)	(−1.02)	(9.79)	(−9.19)
INSTI	−0.0235**	−0.0237	−0.0265***	0.0128
	(−2.54)	(−1.27)	(−3.57)	(1.20)
STD_NET_HIRE	0.0451***	0.0562***	0.0345***	0.0083
	(6.55)	(4.56)	(5.45)	(1.27)
Year-fixed effect	Yes	Yes	Yes	Yes
Industry-fixed effect	Yes	Yes	Yes	Yes
[F-value]	[26.06] ***	[11.47] ***	[92.30] ***	[12.07] ***
R^2	0.080	0.093	0.113	0.044
N	13,597	4,896	8,701	13,597

Note: This table presents the regression results of abnormal net hiring (|AB_NET_HIRE| or AB_NET_HIRE) on managerial overconfidence (OC) and the control variables. The t-statistics are reported in parentheses. Models (1), (2), and (3) use the absolute value of abnormal net hiring (|AB_NET_HIRE|) as the dependent variable, and Model 4 uses signed abnormal net hiring (AB_NET_HIRE) as the dependent variable. Models (1) and (4) test the full sample, and Models (2) and (3) test two different subsamples with positive and negative abnormal net hiring, respectively. The t-statistics are reported in parentheses. The F-value is reported in square brackets. The definitions of the variables are presented in the Appendix. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Subsample Analysis

The research labor overinvestment subsample (*AB_NET_HIRE* >0) is now further decomposed into two more subsamples: overhiring and underfiring subsamples. The overhiring subsample includes observations with positive *AB_NET_HIRE* values and positive expected net hiring ($\widehat{NET\_HIRE}$) values. This subsample contains labor overinvestment observations with a positive optimal labor investment level or overhiring. Likewise, the underfiring subsample comprises observations with positive *AB_NET_HIRE* values and negative expected net hiring ($\widehat{NET\_HIRE}$) values. This subsample indicates overinvestment when the optimal labor level is negative, representing the condition of underfiring.

Table 5 presents the results of the subsample analysis. Each column shows the results for the overhiring and underfiring subsamples. For the overhiring subsample, we find a significantly positive coefficient for *OC*, and for the underfiring subsample, we observe a significantly negative coefficient. The results from both columns consistently indicate that overconfidence induces CEOs to invest more in labor for both cases of labor overinvestment. Therefore, in the overhiring situation, CEO overconfidence increases labor inefficiency, but in the underfiring situation, CEO overconfidence improves labor investment efficiency. Additionally, the results in these two columns imply that if labor overinvestment exists, CEO overconfidence increases labor investment inefficiency only for the overhiring subsample and decreases labor investment inefficiency for the underfiring subsample, even though managerial overconfidence was uniformly shown to increase investment inefficiency in the second column of Table 4.

Table 5 EFFECT OF MANAGERIAL OVERCONFIDENCE ON OVERHIRING AND UNDERFIRING		
	Dependent variable: |AB_NET_HIRE|	
	Overhiring	Underhiring
Independent variables	(1)	(2)
Intercept	0.1756***	0.0787***
	(4.91)	(2.63)
OC	0.0246***	−0.0207**
	(3.55)	(−2.32)
MTB	−0.0001	−0.0002***
	(−0.58)	(−2.80)
SIZE	−0.0062**	0.0011
	(−2.49)	(0.53)
Quick	0.0099***	−0.0011
	(5.25)	(−0.55)
LEV	0.0001	−0.0011
	(0.01)	(−0.09)
DIVDUM	−0.0214***	−0.0132**
	(−2.83)	(−2.27)
STD_CFO	−0.0001	−0.0001
	(−1.56)	(−0.01)
STD_SALE	0.0001	0.0001**
	(0.41)	(2.07)
TANGIBLE	−0.0883***	−0.0380**
	(−3.28)	(−2.10)
LOSS	−0.0022	0.0099*
	(−0.22)	(1.87)
INSTI	−0.0224	−0.0398**
	(−1.15)	(−1.99)
STD_NET_HIRE	0.0558***	0.0240
	(4.49)	(1.35)
Year-fixed effect	Yes	Yes
Industry-fixed effect	Yes	Yes
[*F-value*]	[13.07] ***	[4.76] ***
R^2	0.091	0.321
N	4,671	322

Note: This table reports the results of estimating Model (2) on two different subsamples. Overhiring is the sample of observations whose abnormal net hiring and expected net hiring are both positive. Underfiring is the sample of observations whose abnormal net hiring is positive and expected net hiring is negative. The t-statistics are reported in parentheses. The F-value is reported in square brackets. Definitions of the variables are presented in the Appendix. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Effect of Cash-flow on Research Hypothesized Relationships

We additionally examine the impact of cash-flow on the association between managerial overconfidence and labor investment following Malmendier & Tate (2005). These authors empirically show that overconfident CEOs tend to overinvest in the presence of sufficient internal funds, while they reduce investments in external funds. This increase in the sensitivity of investment to cash flow is driven by both the difference between managers' and shareholders' interests (Jensen & Meckling, 1976; Jensen 1986) and the asymmetric information between managers and the outside capital market (Myers & Majluf, 1984). Overconfident managers perceive external financing to be expensive because they predict a very positive future, which

induces them to use internal capital for investments.

To empirically investigate the association between overconfidence and investment-cash flow sensitivity, we first measure internal capital, or *Cashflow*, by earnings before extraordinary items plus depreciation, and we normalize the measure by capital at the beginning of the year. We insert this variable (*Cashflow*) and its interaction with overconfidence (*OC*Cashflow*) in the main regression equation (2) and observe the coefficient of the interaction term. As we hypothesize that labor investment decisions depend more heavily on managerial discretion, we expect that overconfidence magnifies the sensitivity of labor investment to cash flow, consistent with Malmendier & Tate's (2005) results.

Table 6 displays the impact of cash-flow on the research hypothesized relationship. As shown in Table 4, columns (1) through (3) use |*AB_NET_HIRE*| as the dependent variable, while column (4) uses *AB_NET_HIRE* as the dependent variable. We find significantly positive coefficients for *Cashflow* and *OC*Cashflow* in all the analyses presented in columns (1) to (3), which implies that internal funds tend to decrease labor investment efficiency and that managerial overconfidence enlarges such a tendency for both the labor overinvestment and underinvestment subsamples. The fourth column, with *AB_NET_HIRE* as the dependent variable, also shows significantly positive coefficients for all these variables, *Cashflow* and *OC*Cashflow*. Thus, we observe that both managerial overconfidence and internal funds lead to more investments in net hiring, and CEO overconfidence increases the sensitivity of labor investment to cashflow. Overall, however, as column (3) shows, in the presence of labor underinvestment, cashflow decreases labor investment even more, and overconfidence deepens the negative impact of cashflow on labor investment. Hence, we can conclude that, overall, internal funds worsen labor investment efficiency, and managerial overconfidence increases the negative influence of internal funds on labor investment efficiency. These overall results are consistent with Malmendier & Tate's (2005) empirical findings.

	Table 6			
	EFFECT OF CASHFLOW ON RESEARCH HYPOTHESIZED RELATIONSHIP			
	Dependent variable:			
	|AB_NET_HIRE|	|AB_NET_HIRE|	|AB_NET_HIRE|	AB_NET_HIRE
	Full sample	AB_NET_HIRE > 0	AB_NET_HIRE < 0	Full sample
Independent variables	(1)	(2)	(3)	(4)
Intercept	0.1281***	0.1572***	0.0871***	0.0750***
	(6.04)	(4.61)	(5.65)	(3.26)
OC	0.0144**	0.0466***	0.0107*	0.0492***
	(2.27)	(4.03)	(1.86)	(6.78)
Cashflow	0.0011*	0.0196**	0.0090***	0.0190***
	(1.68)	(2.56)	(3.61)	(4.96)
OC*Cashflow	0.0005*	0.0359**	0.0115*	0.0207**
	(1.68)	(2.53)	(1.80)	(2.43)
MTB	0.0001	-0.0001	-0.0001***	-0.0001***
	(0.96)	(-0.56)	(3.57)	(-4.14)
SIZE	-0.0045***	-0.0059**	-0.0030***	-0.0025**
	(-4.17)	(-2.41)	(-3.48)	(-2.03)
Quick	0.0057***	0.0101***	0.0034***	0.0035**
	(4.55)	(5.45)	(3.84)	(2.17)
LEV	-0.0035	-0.0041	-0.0069	0.0003
	(-0.42)	(-0.24)	(-1.10)	(0.04)
DIVDUM	-0.0147***	-0.0228***	-0.0046*	-0.0293***

	(-4.57)	(-3.17)	(-1.83)	(-8.06)
STD_CFO	-0.0001	-0.0001	-0.0001	-0.0001
	(-0.33)	(-1.61)	(0.55)	(-0.54)
STD_SALE	0.0001	0.0001	0.0001	0.0001
	(0.94)	(0.46)	(0.76)	(0.11)
TANGIBLE	-0.0528***	-0.0879***	-0.0277***	-0.0294**
	(-4.45)	(-3.35)	(-2.99)	(-2.35)
LOSS	0.0177***	-0.0061	0.0332***	-0.0404***
	(4.46)	(-0.66)	(8.94)	(-8.29)
INSTI	-0.0237***	-0.0221	-0.0276***	0.0140
	(-2.54)	(-1.18)	(-3.69)	(1.32)
STD_NET_HIRE	0.0452***	0.0561***	0.0339***	0.0086
	(6.56)	(4.56)	(5.44)	(1.32)
Year-fixed effect	Yes	Yes	Yes	Yes
Industry-fixed effect	Yes	Yes	Yes	Yes
[F-value]	[25.41] ***	[10.68] ***	[1116.32] ***	[13.94] ***
R^2	0.081	0.095	0.116	0.045
N	13,498	4,886	8,693	13,498

Note: This table presents the regression results of examining the moderate effect of cashflows on research hypothesized relationship between abnormal net hiring (|AB_NET_HIRE| or AB_NET_HIRE) and managerial overconfidence (OC). The t-statistics are reported in parentheses. Models (1), (2), and (3) use the absolute value of abnormal net hiring (|AB_NET_HIRE|) as the dependent variable, and Model 4 uses signed abnormal net hiring (AB_NET_HIRE) as the dependent variable. Models (1) and (4) test the full sample, and Models (2) and (3) test two different subsamples with positive and negative abnormal net hiring, respectively. The t-statistics are reported in parentheses. The F-value is reported in square brackets. The definitions of the variables are presented in tge Appendix. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Robustness Test

We follow Campbell et al. (2011) in conducting a false test. We construct a low optimism measure for managers, the opposite of a manager's high optimism or CEO overconfidence. Following Campbell et al. (2011), a low-optimism CEO is defined as one who exercises stock options that are less than 30% in the money and who does not hold options that are exercisable and greater than 30% in the money. Similar to research computation of the CEO's high-optimism measure, one is also required to exercise stock options that are less than 30% in the money at least twice in the sample period for the low optimism measure. If the CEO shows low optimism, the study dummy variable (LC) equals 1 and 0 otherwise.

Then regresses reserch labor investment inefficiency measure, absolute abnormal net hiring (|AB_NET_HIRE|), on the CEO Low optimism measure (LC) and other control variables as in equation (2). Research expected opposite results for the coefficient of LC compared with the coefficients of OC. Table 7 displays the study false test results.

As expected, the first column with the full sample shows a significantly negative coefficient for CEO low optimism (LC), but the second and third columns with the labor overinvestment and underinvestment subsamples, respectively, do not show significant coefficients for LC. The fourth column with raw abnormal net hiring (AB_NET_HIRE) as the dependent variable also shows a significantly negative coefficient for LC. Thus, low-optimism CEOs are shown to decrease labor investment and increase labor investment efficiency on average. The study false test mostly strengthens the main regression results.

	Table 7 FALSE TEST			
	Dependent variable			
	|AB_NET_HIRE|	|AB_NET_HIRE|	|AB_NET_HIRE|	AB_NET_HIRE
	Full sample	AB_NET_HIRE > 0	AB_NET_HIRE < 0	Full sample
Independent variables	(1)	(2)	(3)	(4)
Intercept	0.1353***	0.1685***	0.0854***	0.1068***
	(6.62)	(4.66)	(5.56)	(4.48)
LC	-0.0051*	-0.0092	0.0033	-0.0292***
	(-1.77)	(-1.32)	(1.44)	(-8.58)
MTB	0.0001	0.0001	0.0001***	-0.0001***
	(1.25)	(-0.36)	(3.57)	(-3.82)
SIZE	-0.0044***	-0.0048**	-0.0034***	-0.0023*
	(-4.10)	(-2.02)	(-3.93)	(-1.88)
Quick	0.0062***	0.0100***	0.0034***	0.0036**
	(4.95)	(5.40)	(3.97)	(2.25)
LEV	-0.0076	-0.0070	-0.0039	-0.0039
	(-0.94)	(-0.41)	(-0.65)	(-0.45)
DIVDUM	-0.0175***	-0.0257***	-0.0050**	-0.0321***
	(-5.45)	(-3.56)	(-2.00)	(-8.81)
STD_CFO	-0.0001	-0.0001*	0.0001	0.0001
	(-0.36)	(-1.74)	(0.56)	(-0.50)
STD_SALE	0.0001	0.0001	0.0001	-0.0001
	(0.80)	(0.40)	(0.94)	(-0.29)
TANGIBLE	-0.0549***	-0.0894***	-0.0335***	-0.0241*
	(-4.61)	(-3.48)	(-3.62)	(-1.94)
LOSS	0.0166	-0.0111	0.0350***	-0.0434***
	(4.10)	(-1.18)	(9.44)	(-8.90)
INSTI	-0.0243***	-0.0263	-0.0266***	0.0112
	(-2.61)	(-1.42)	(-3.57)	(1.06)
STD_NET_HIRE	0.0454***	0.0564***	0.0345***	0.0092
	(6.53)	(4.53)	(5.45)	(1.39)
Year-fixed effect	Yes	Yes	Yes	Yes
Industry-fixed effect	Yes	Yes	Yes	Yes
[F-value]	[26.38] ***	[16.45] ***	[66.83] ***	[11.17] ***
R^2	0.078	0.090	0.114	0.041
N	13,597	4,896	8,701	13,597

Note: As a robustness test, this table presents the regression results of abnormal net hiring (|AB_NET_HIRE| or AB_NET_HIRE) on managerial low confidence (LC) and the control variables. The t-statistics are reported in parentheses. Models (1), (2), and (3) use the absolute value of abnormal net hiring (|AB_NET_HIRE|) as the dependent variable, and Model 4 uses signed abnormal net hiring (AB_NET_HIRE) as the dependent variable. Models (1) and (4) test the full sample, and Models (2) and (3) test two different subsamples with positive and negative abnormal net hiring, respectively. The t-statistics are reported in parentheses. The F-value is reported in square brackets. Definitions of the variables are presented in the Appendix. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

CONCLUSION

The study investigated the association between managerial overconfidence and labor investment efficiency. Research hypothesized that managerial overconfidence leads to higher investment in labor from overestimation. The empirical analysis reveals that given labor overinvestment, managerial overconfidence increases labor investment and decreases labor investment efficiency. Hence, CEO overconfidence affects labor investment efficiency

differently according to the existence of labor overinvestment. Therefore, to examine the impact of managerial overconfidence, the asymmetric influence due to overinvestment or underinvestment in labor should be considered. Managerial overconfidence of large firms has a tendency to result in improved labor investment efficiency. Research conjecture is that this is due to the endogeneity problem. The proxies of managerial overconfidence and labor investment efficiency that author use in the study have room for improvement in the ongoing research. Further analyses with additional subsamples, with cashflow and with a measure of CEOs' low optimism, all support and strengthen research hypothesis.

Appendix 1	
VARIABLES AND THEIR DEFINITIONS	
Variable names	Definitions
NET_HIRE	The number of employees at the end of the year less the number of employees at the beginning of the year, divided by the number of employees at the beginning of the year
SALES_GROWTH	Sales revenue at the beginning of the year less sales revenue at the beginning of the previous year, divided by the sales revenue at the beginning of the year
ROA	Net income at the end of the year divided by beginning of the year total assets
RETURN	Stock price at the end of year divided by stock price of the end of previous year
SIZE_R	Natural logarithm of market value of equity at the beginning of the year and ranked into percentiles
QUICK	Ratio of cash and short-term investments and receivables to current liabilities at the beginning of the year
LEV	Ratio of long-term debt to total assets at the beginning of the year
LOSSBIN	*LOSSBIN1* equals 1 if prior-year ROA is between –0.005 and 0 and 0 otherwise. *LOSSBIN2* equals 1 if prior-year ROA is between –0.010 and –0.005 and 0 otherwise. *LOSSBIN3* equals 1 if prior-year ROA is between –0.015 and –0.010 and 0 otherwise. *LOSSBIN4* equals 1 if prior-year ROA is between –0.020 and –0.015 and 0 otherwise. *LOSSBIN5* equals 1 if prior-year ROA is between –0.025 and –0.020 and 0 otherwise.
$\widehat{NET\_HIRE}$	Fitted value of *NET_HIRE* from the regression equation (1)
|AB_NET_HIRE|	The absolute difference between *NET_HIRE* (actual net hiring) and $\widehat{NET\_HIRE}$ (expected or fitted net hiring)
OC	Equals 1 if CEO holds stock options in which the stock price exceeds the exercise price by more than 100 percent and 0 otherwise
LC	Equals 1 if CEO exercises stock options that are less than 30% in the money and does not hold exercisable options that are greater than 30% in the money and 0 otherwise
Cashflow	Earnings before extraordinary items plus depreciation and are normalized by capital at the beginning of the year
MTB	Ratio of market value of common equity to book value of common equity at the beginning of the year
SIZE	Natural logarithm of market value of equity at the beginning of the year
DIVDUM	Equals 1 if the firm paid dividends in the previous year and 0 otherwise
STD_CFO	Standard deviation of cash flow from operations over years $t-5$ to $t-1$
STD_SALES	Standard deviation of sales revenue over years $t-5$ to $t-1$
TANGIBLE	Ratio of property, plant, and equipment (PPE) to total assets at the beginning of the year
LOSS	Equals 1 if the firm reported negative net income in the previous year and 0 otherwise
INSTI	The number of outstanding common shares held by institutions divided by the number of total outstanding shares at the end of the previous year
STD_NET_HIRE	Standard deviation of the percentage change in employees over years $t-5$ to $t-1$

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