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# The Role of Equity Compensation in Reducing Inefficient Investment in Labour

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## ABSTRACT

This thesis examines the role of equity compensation in reducing inefficient investment in labour. Inefficient investment in labour takes two forms — over- and under-investment. Over-investment can occur when opportunistic executives over-hire and/or retain employees by expanding the size of the labour force beyond optimal levels. This situation can happen because executives want to gain more security, power, status and prestige, and greater professional attainment. Further, executives facing potential dismissal as a result of poor performance may collaborate with employees by abstaining from employee lay-offs and wage cuts even though the firm's deteriorating financial situation may require such actions to be taken. Under-investment can occur when risk-averse executives under-hire and/or over-fire employees in order to achieve short-term earnings targets. This situation can lead executives to turn down investments which may only become profitable in the long run.

Prior studies have examined determinants of labour investment efficiency such as stock price informativeness, institutional investor horizons, accounting quality and conditional conservatism. To date, no study has investigated the effect of equity compensation on labour investment. It is argued in this thesis that equity compensation is likely to be another determinant of efficient labour investment because theory suggests that equity compensation can align managers' interests with those of shareholders. In doing so, the differing influences of two components of equity compensation — stock options and restricted stock — on efficient investment in labour are explored.

Based on a sample of 12,118 firm-year observations from 1992 to 2014, it is found that stock options exacerbate over-investment and mitigate under-investment in labour. In contrast, restricted stock is found to mitigate both over- and under-investment in labour. The findings are robust after controlling for managerial ability, corporate governance and stock price informativeness. After addressing endogeneity issues using two-stage least squares, propensity score matching, change specification, firm fixed effects and difference-in-differences regressions, the results remain qualitatively similar to the main findings.

This thesis contributes to the literature and to practice in a number of ways. First, the results of the thesis research contribute to the emerging literature examining how the components of equity compensation affect investment decisions. The findings reported in this thesis provide nascent evidence on the differential associations between both stock options and restricted stock, and over- and under-investment in labour.

Second, the thesis also adds to the relatively scant literature investigating the determinants of efficient investment in labour. While prior research has examined stock price informativeness, institutional investment horizons, earnings quality and conditional conservatism as determinants of labour investment efficiency, the association between equity compensation and efficient labour investment is largely unexplored. In particular, the findings reported in this thesis contribute to this line of enquiry by investigating how stock options and restricted stock — as separate components of equity compensation — affect labour investment, an important factor of production.

Third, in addition to making a contribution to the academic literature, this thesis research has practical implications for firm governance. The findings of the thesis could assist boards of directors to design effective compensation packages that will align the interests of executives with the firm's goals. By documenting that equity compensation components impact on labour investment, and in particular that the association between over- and under-investment in labour and stock options differs from that with restricted stock, boards could make informed decisions about how each component of equity compensation can be used to influence executives' investment in labour. This could potentially reduce the monitoring costs often incurred by shareholders.

Finally, the results may facilitate better informed decision-making by investors, in particular through observing the changes in labour force size and labour turnover. Investors should be interested in executives' labour investment decisions because efficient labour investment is likely to increase firm value in the long run.

## DECLARATION

This thesis contains no material which has been accepted for the award of any other degree or diploma at any university or equivalent institution and, to the best of my knowledge and belief, this thesis contains no material previously published or written by another person, except where due reference is made in the text of the thesis.

Signature: 

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Date: 16 July 2018

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## DEDICATION

To my loving wife, Zakiya Tofik-Abu, and lovely children, Jaria Mohammed Aminu Ano-akocho and Mohammed Aarif Mohammed Aminu Okranlaku

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## LIST OF ACRONYMS

| | |
|---|---|
| ACQ | Acquisition Expenditure |
| APB | Accounting Principles Board |
| CAPX | Capital Expenditure |
| CDA | Compensation Discussion and Analysis |
| CEO | Chief Executive Officer |
| CFO | Chief Financial Officer |
| DOL | Department of Labor |
| FASB | Financial Accounting Standards Board |
| GAAP | Generally Accepted Accounting Principles |
| GFC | Global Financial Crisis |
| ISOs | Incentive Stock Options |
| NSO | Non-statutory Stock Option |
| PCAOB | Public Company Accounting Oversight Board |
| PIN | Probability of Informed Trading |
| R&D | Research and Development |
| RSTK | Restricted Stock |
| SEC | Securities and Exchange Commission |
| SOP | Stock Options |
| SOX | Sarbanes–Oxley Act |

# CHAPTER 1: INTRODUCTION

This thesis examines the role of equity compensation in reducing inefficient investment in labour. Inefficient investment in labour takes two forms — over- and under-investment. Over-investment in labour occurs when executives over-hire and/or retain employees associated with under-performing projects (Jung, Lee & Weber, 2014). A number of prior studies identify the sources of over-investment in labour. For example, the opportunistic behaviour of executives can lead them to expand the size of the labour force beyond optimal levels in order to gain more security, power, status and prestige, and greater professional attainment (Williamson, 1963), and top executives facing potential dismissal as a result of poor performance may collaborate with employees by abstaining from employee lay-offs and wage cuts even if the firm's economic fundamentals indicate that such actions should be taken (Pagano & Volpin, 2005).

Under-investment in labour, on the other hand, occurs when executives under-hire and/or dismiss employees who could be important to executing profitable projects (Jung et al., 2014). The benefits of intangible investment in labour may only become obvious in the long run (Stein, 2003; Ghaly, Dang & Stathopoulos, 2016). As such, executives with a myopic mindset may end up under-investing in labour, fearing that such investment will reduce earnings in the short run, negatively affecting stock prices. Executives are often willing to avoid investment that will be only profitable in the long run in order to meet short-run earnings targets (Graham, Harvey & Rajgopal, 2005) and firms can delay or eliminate hiring in order to meet earnings targets (Merz & Yashiv, 2007; Oyer & Schaefer, 2010).

Over- and under-investment in labour not only disrupt the business process of a firm, but can also adversely affect firm performance.[1] If executives over- and/or under-invest in labour (i.e., hire more and/or fewer employees than required to run profitable projects), the overall business or opportunity cost is likely to increase, making the realisation of earnings less certain (Jensen, 1986; Almeida & Carneiro, 2009; Jung et al., 2014). Evidence suggests that the costs of adjusting labour are large and amount to as much as the payroll cost for one year for the average worker (Mincer, 1962; Oi, 1962; Dolfin, 2006).

Given the adverse effects that over- and under-investment in labour can have on a firm's performance, recent research focuses on the factors that can overcome such labour investment problems. Extant research has explored factors such as conditional conservatism (Ha & Feng, 2018), stock price informativeness (Ben-Nasr & Alshwer, 2016), institutional investment horizons (Ghaly et al., 2016) and accounting quality (Jung et al., 2014) as determinants of efficient labour investment. However, compensation as a factor that has a direct influence on executive behaviour and firm performance has been overlooked.

Theory suggests that compensation, and in particular equity compensation, encourages executives to make efficient investment decisions that are consistent with shareholders' interests (Jensen & Meckling, 1976). However, the effect that equity compensation has on executives' behaviour is actively debated in the literature. Although Bebchuk and Fried (2003) suggest that a pay-for-performance system may induce executives to

[1] A business process is a collection of activities designed to produce a specific output for a particular customer or market. It emphasises how the work is done within a firm, i.e., a specific ordering of work activities across time and place with a beginning, an end, and clearly defined inputs and outputs (Sparx Systems, 2004; Jung et al., 2014).

exploit shareholders by extracting rent, while other scholars demonstrate that equity compensation incentivises executives to act in the best interest of shareholders (Aggarwal & Samwick, 1999; Kang, Kumar & Lee, 2006). While the latter appears more plausible, there is some evidence to suggest that the components of equity compensation have differing influences on executive investment decision-making. However, this has only been explored with respect to research and development (R&D) investment to date (Ryan & Wiggins, 2002; Năstăsescu, 2009).

This thesis, therefore, seeks to extend this line of research by exploring the differing influences of stock options and restricted stock on the level of labour investment — over- and under-investment in labour — focusing on chief executive officers (CEOs) because there is a general perception that CEOs make most of the important corporate investment decisions.

### 1.1 Issue and Research Questions

An effective compensation policy is a key part of the human resource function of a firm which can be used to attract and retain the best people. In particular, equity compensation contributes to organisational performance and success (Murphy, 2013). It influences how executives behave and also helps to shape the strategic direction of a firm (Mehran, 1995; Ryan & Wiggins, 2002), including investment decisions made by executives (Jensen & Meckling, 1976; Biddle, Hillary & Verdi, 2009). Equity compensation paid to executives encourages them to pursue valuable investment opportunities (Năstăsescu, 2009) which have a positive impact on the long-term performance of a firm. Making an appropriate investment decision is important because it can affect both present and future firm performance (Gibbons & Murphy, 1992).

Merz and Yashiv (2007) argue that making inappropriate investment decisions in labour, in the form of over-hiring or under-hiring, is likely to affect firms' operations and earnings, which in turn is likely to affect firms' value and shareholders' return (Faleye, Mehrotra & Morck, 2006; Almeida & Carneiro, 2009). Consequently, shareholders are likely to take considerable interest in the investment that executives make in labour (Jung et al., 2014; Ben-Nasr & Alshwer, 2016). If executives, for example, over- or under-invest in labour, this may negatively affect firm performance and ultimately reduce the share price, thus curtailing shareholder wealth. Accordingly, shareholders, through the board of directors, are likely to use equity compensation (Ryan & Wiggins, 2002) as one way to motivate executives to undertake efficient investment in labour (Jung et al., 2014). Equity compensation gives executives an ownership stake in a firm, therefore aligning them with shareholders' long-term goals (Murphy, 2013). Mehran (1995) argues that the form rather than the level of compensation is what motivates managers to increase firm value, and concludes in his study that equity compensation increases firm performance.

The use of equity components in executive compensation contracts has increased in recent years (Ades-Laurent, 2017). Since 1997, equity-based incentive pay has increased to such a level that many U.S. firms have given away 10%, and in some cases up to 30%, of their equity to executive directors and other staff (Lee, 2002). The average equity compensation of Fortune 500 CEOs increased from US$857 million in 1993 to US$5.8 billion in 2007 (Hoskisson, Castleton & Withers, 2009). Further, equity-based compensation as a proportion of total compensation at S&P 1500 firms increased from 40.6% in 2010 to 45.4% in 2014 (Equilar, 2015). The rationale for the increase in equity

compensation is to stimulate executive behaviour towards reducing inefficient investments (Murphy, 2013), which can take the form of over- or under-investment.

Equity compensation comprises stock options and/or restricted stock. Stock options are financial contracts that give an executive a right, but no obligation, to purchase shares of stock at a predetermined price, called the exercise price or strike price (Thatcher, 2005; Năstăsescu, 2009). Restricted stock granted with vesting, on the other hand, is common stock that requires a certain period of time to pass or a specific firm's performance to be fulfilled before an executive can sell the stock (Năstăsescu, 2009).

Although theory suggests that equity compensation aligns executives' and shareholders' interests by inducing the former to undertake efficient investments with a consequent positive impact on the long-term value of a firm, it is important to distinguish between the types of award since they can have different effects on executives' investment decisions (Ryan & Wiggins, 2002; Năstăsescu, 2009). For example, stock options are likely to reduce risk aversion and encourage executive risk-taking because they expose executives to only the benefits of their investment decisions. In contrast, restricted stock is less likely to encourage risk-taking because it exposes executives to both the benefits and risks associated with their investment decisions (Ryan & Wiggins, 2002; Năstăsescu, 2009).

Stock options and restricted stock are also influenced differently by different economic determinants such as investment opportunities; so a firm may choose to reward an executive with any of the two forms of equity compensation depending upon what the firm is seeking to achieve. For example, high-growth firms with abundant investment opportunities may choose to reward executives with stock options because it

encourages risk-averse executives to accept risky, yet value increasing, investment projects (Bryan, Hwang & Lilien, 2000). Kole (1997) argues that the type of equity compensation granted to executives depends on the nature of assets being managed, and finds that firms dealing mainly with intangible assets such as human capital are more flexible in using equity-based compensation; and Mehran (1995) conclude that the type of compensation rather than the level determines how well executives increase firm value. Therefore, the findings of studies (e.g., Blackwell, Farrell & Wunsch, 1997; Kang, Kumar & Lee, 2006) that have used the total equity compensation paid to executives as the determinant of investment decisions, without differentiating the components of equity compensation, may present less than accurate findings.

Although all these arguments have been made by the extant research in the context of non-labour investments, and in particular capital investment, investment in labour is also likely to affect the profitability and value of a firm, as employees as factors in production are likely to add value to a firm's products and services. As such, over- and under-investment in labour in the form of over- or under-hiring (Jung et al., 2014) could negatively affect a firm's wealth and value (Jensen, 1986). If so, then stock options and restricted stock should provide appropriate incentives to executives to avoid such value-destroying investment decisions.

In light of the above discussion, the research questions to be addressed in this thesis are:

**RQ1**: Are stock options as a component of equity compensation associated with over- and under-investment in labour?

**RQ2**: Is restricted stock as a component of equity compensation associated with over- and under-investment in labour?

## 1.2 Motivation for the Thesis

Examining the role of equity compensation in reducing inefficient investment in labour is important for a number of reasons. These reasons follow a number of themes: the significance of labour as a production input; limitations of prior research with respect to determinants of labour investment decisions; and the inability to extrapolate findings from research examining other forms of investment.

### *1.2.1 The Significance of Labour as a Production Input*

The significance of labour as a production input has increased dramatically in recent years (Ghaly et al., 2016). Firms are now more human capital–intensive and operate in a setting where labour plays an increasingly important role in determining firms' competitive success (Barney, 1991; Pfeffer, 1996; Ghaly et al., 2016), especially in areas such as innovation and product development (Pfeffer, 1996; Ghaly et al., 2016). In addition, labour costs are one of the major factors that determine the output and profits of a firm, and represent about two-thirds of the cost of producing goods and services (Hamermesh, 1995; Bernanke, 2004; Jung et al., 2014). The U.S. Census Bureau's Annual Survey of Manufacturers reports that payroll and employee benefits in the manufacturing sector totalled US$636 billion for 2015, compared to US$175 billion in capital expenditure.[2] Therefore, inefficient investment in labour through over-hiring (i.e., over-investment) and/or under-hiring (i.e., under-investment) are likely to impact on the profits of a firm, and ultimately its value.

[2] These figures were sourced from the website of the U.S. Census Bureau on 24/09/2015: http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ASM_2013_31AS101&prodType=table

All else being equal, while over-hiring may increase a firm's wage bill and other related costs, under-hiring may decrease firm productivity. Each of these actions may affect revenue and cause greater uncertainty with respect to a firm's future earnings (Jensen, 1986; Almeida & Carneiro, 2009). Given the economic significance of labour, it is important to enhance understanding of whether equity compensation, in particular stock options and restricted stock, determines efficient labour investment. Becker (1962b) argues that the most successful firms are those that invest in their human capital (or labour) in the most effective and efficient manner.

### *1.2.2 Equity Compensation as a Determinant of Labour Investment*

Prior research has examined firm-specific factors such as conditional conservatism (Ha & Feng, 2018), stock price informativeness (Ben-Nasr & Alshwer, 2016), institutional investment horizons (Ghaly et al., 2016), earnings quality (Jung et al. 2014), corporate governance characteristics (Atanassov & Kim, 2009; Gospel, Pendleton, Vitol & Wilke, 2011) and firms' market value (Merz & Yashiv, 2007; Almeida & Carneiro, 2009) as determinants of efficient labour investment. Equity compensation is a further construct that may influence executives' efficient labour investment decisions, but has so far been unexplored. Theory suggests that equity compensation granted to managers aligns their interests with those of shareholders, thus encouraging managers to make efficient investment decisions (Jensen & Meckling, 1976). Anecdotal evidence suggests that if CEOs want to have an increase in their pay they usually reduce the size of the labour force. Adam Hartung notes that when Craig Dubow took over as Gannett's CEO in 2005 the workforce of the company dropped from 52,600 in 2005 to 32,600 in 2010, a decrease of about 38%. That action resulted in the CEOs getting US$4.7 million in 2009, including a cash bonus of US$1.45 million (Hartung, 2011). Hartung further

notes that "*CEOs can simply order across the board cuts, or they can hand out downsizing requirements by function or business line. It's the one thing any executive can do that is guaranteed to give an immediate improvement to the bottom line…Because the CEO's compensation is tied to profits and EPS, he is now entitled to a big, fat bonus for this behaviour.*" Brenda Barnes, as Hartung suggests, did that at Sara Lee for several years and the company eventually collapsed.[3] CEOs, as Florentine Sharon suggests, are also involved in hiring decisions. Justifying why CEOs should be involved in a firm's hiring, Aytekin Tank, the founder and CEO of online builder JotForm notes "*If I hire someone who becomes oil to our vinegar, it will be a disaster and could create a toxic environment that causes other valuable team members to leave. The resulting drain of talent could stunt our growth and, quite possibly, sink the company*."[4] If CEOs have the ultimate say in hiring decisions and anecdotal evidence suggests that they might make inappropriate employment decisions, then it is important to examine whether equity compensation granted to them could change that behaviour.

### *1.2.3 Labour Investment Compared to Other Forms of Investment*

Some recent research (e.g., Ryan & Wiggins, 2002; Năstăsescu, 2009; Baxamusa, 2012) has added to knowledge of the effects of equity compensation on investment by exploring the differing influences of stock options and restricted stock on investment in capital and R&D expenditures. However, it is difficult to infer from these studies how the components of equity compensation could affect investment levels in labour.

[3] Refer to Adam Hartung at https://www.forbes.com/sites/adamhartung/2011/02/25/paid-to-fire-how-ceo-compensation-is-wrong/#7892e9d33455 retrieved on 28/11/2018.

[4] Refer to Florentine Sharon at https://www.cio.com/article/3124755/hiring/5-reasons-ceos-should-be-involved-in-hiring-decisions.html retrieved from 28/11/2018.

Capital and R&D expenditures are predictable because, to a significant extent, executives can plan and predetermine their outcomes. However, labour, when compared to capital and R&D expenditures, is unpredictable because not only is the productivity of potential employees not known, but executives cannot control the mobility of their employees — it is difficult to control human behaviour in practice (Hansson, Johanson & Leitner, 2004) — because employees may leave a firm any time in response to better or alternative opportunities (Donangelo, 2014). Therefore, executives' investment decisions in relation to labour may differ. Given this, it is not clear whether stock options and restricted stock would have similar effects (compared to their effects on capital and R&D) on inefficient labour efficient. This is an unresolved question that this thesis seeks to answer.

Further, consistent with costs associated with capital and R&D investment, labour investment also faces adjustment costs. Adjustment costs are generally the short-term costs of transferring, maintaining or replacing resources in a firm (Dixit & Pindyck, 2012). Adjustment costs with respect to capital and/or R&D expenditures are substantial. Firms, for example, require significant financial expenditure to maintain or replace existing plant. Firms also expend significant financial resources at the initial phase of an R&D project to acquire necessary resources, with cost increasing when there is a breakthrough. Major expenditures for capital and R&D are carefully planned, with adjustments therefore being infrequent. In contrast, labour costs are easily and frequently adjusted. Labour adjustment costs pertain to transferring, maintaining and replacing the labour force (Hamermesh, 1995).

Although adjustments in labour can improve a firm's labour investment, self-serving executives may inappropriately adjust the firm's labour force, leading to an increase in the firm's operating costs or a decrease in firm productivity. Equity compensation granted to executives is expected to prevent such behaviour by aligning executives' and shareholders' interests. Therefore, as a result of differing behaviours with respect to both adjustment costs and the predictability of expenditure, prior research that has examined the association between capital or R&D investment and equity compensation cannot be extrapolated to the association between labour investment and equity compensation. Merz and Yashiv (2007) show that, as a result of the frequency of labour adjustment costs, investments in labour have an incremental effect on firm value beyond capital expenditure, and Jung et al. (2014) demonstrate that investments in labour are not simply driven by other contemporaneous investments such as investments in capital and R&D.[5] Labour and capital investments can also be influenced by different economic factors such as the level of labour unionisation and gross domestic product (GDP), and therefore results of research examining capital investment cannot necessarily be extrapolated to investment in labour (Li, 2011).

### 1.3 Summary of Research Design and Overview of Main Findings

A central issue in the design of this research is the determination of the dependent variable — over- and under-investment in labour. Following Ben-Nasr and Alshwer (2016) and Jung et al. (2014), the percentage change in the number of employees (i.e., net hiring) is regressed on a number of firm-level fundamental economic variables. The

[5] By focusing on labour as a factor in production used by all firms, rather than on other types of investment such as R&D which are not necessarily utilised by all firms, the impact of stock options and restricted stock on investment across a broad cross-section of firms can be tested.

estimated coefficients from this regression are then applied to each firm-year observation to obtain the expected net hiring (see *Model 1*). The positive (or negative) difference between the actual and expected net hiring is then captured as over-hiring (or under-hiring) in labour. In this thesis, over- and under-hiring are equated with over- and under-investment in labour, which are used as the dependent variables in *Models 2* and *3* to test the hypotheses developed to answer *RQ1* and *2*.

Based on a sample of 12,118 firm-year observations from 1992 to 2014 identified mainly from the Compustat and Standard and Poor's ExecuComp databases, stock options are found to exacerbate over-investment in labour, while restricted stock mitigates over-investment in labour. Further, both stock options and restricted stock are observed to mitigate under-investment in labour.[6] These findings are consistent with the thesis hypotheses and the before the fact theoretical argument that stock options granted to executives encourage risk-taking because they do not expose executives to the risks of such action while restricted stock discourages executive risk-taking because it exposes them to both benefits and risks (Ryan & Wiggins, 2002). The findings are robust: to using alternative measures to capture the dependent variable (i.e., over- and under-investment in labour); to controlling for managerial ability, corporate governance, stock price informativeness and the FAS 123R; and to addressing endogeneity concerns using two-stage least squares, propensity score matching, change specification and firm fixed effects regressions.

[6] The competing negative effects of stock options and restricted stock on under-investment in labour are further examined using standardised coefficients (see Section 8.4 and Table 8.14) and find that stock options have greater effect in reducing under-investment in labour than restricted stock (−0.0282 versus −0.0245).

In additional analyses, the competing effects of stock options and restricted stock on under-investment in labour are assessed given that both stock options and restricted stock play similar roles in mitigating under-investment in labour. This assessment is conducted by estimating and comparing the standardised coefficients of the two variables. The results show that stock options, compared to restricted stock, have the highest mitigating effect on under-investment in labour.

### 1.4 Contributions of the Thesis

This thesis contributes to the finance, accounting and management literature in a number of important ways. First, this thesis provides new evidence on the differential associations between both stock options and restricted stock and over- and under-investment in labour. By showing that stock options and restricted stock differ in their associations with over-investment in labour but play similar roles in their associations with under-investment in labour, the thesis extends prior research that has linked the components of equity compensation, stock options and restricted stock to investments in capital and R&D (Ryan & Wiggins, 2002; Năstăsescu, 2009; Baxamusa, 2012) and demonstrates that stock options and restricted stock, collectively, play significant roles in aligning executives' and shareholders' interests, leading to a reduction in under-investment in labour. The thesis also shows that, while stock options exacerbate over-investment in labour, restricted stock mitigates such investment, suggesting that, in the context of over-investment in labour, stock options do not align executives' interests with those of shareholders.

Second, this thesis adds to the relatively scant literature investigating the determinants of inefficient investment in labour. Prior research has examined conditional

conservatism (Ha & Feng, 2018), stock price informativeness (Ben-Nasr & Alshwer, 2016), institutional investment horizons (Ghaly et al., 2016), earnings quality (e.g., Jung et al., 2014) and corporate governance characteristics (e.g., Jackson, Höpner & Kurddelbusch, 2004; Faleye et al., 2006; Atanassov & Kim, 2009; Gospel et al., 2011) as determinants of inefficient labour investment. The thesis, therefore, adds to this expanding stream of research, providing additional insights into the determinants of efficient labour investment.

In addition to making a contribution to the academic literature, this thesis has potential practical implications for firm governance and for investors. The findings could help boards of directors of firms to design effective compensation packages that will align the interests of executives with firms' goals. By documenting that equity compensation is associated with inefficient labour investment, and in particular that the association with stock options differs from that with restricted stock, the thesis could inform boards of directors about how each of the components of compensation can be used to influence executives' investment in labour. This could help to reduce the monitoring costs often incurred by shareholders.

Given that stock options and restricted stock differentially reduce or exacerbate over- and under-investment in labour, boards could rearrange the equity compensation mix in remuneration packages in order to motivate executives to make the best labour investment decisions. For example, if executives are already over-investing in labour, the board, rather than granting them stock options, could grant them restricted stock, since the latter reduces executives' incentives to over-invest in labour.

Also, investors often evaluate the performance of firms based on their investment decisions. This is because efficient investment decisions are likely to increase firm value through an increase in share prices (Esther, Alberto & Julio, 2003). Merz and Yashiv (2007) argue that firms which invest efficiently in labour are also likely to increase their market value. Therefore, the results from this thesis may help investors to make better informed decisions, in particular by observing changes in the size of the labour force and/or the labour turnover, as labour investment is one of the investment decisions made by executives.

### 1.5 Organisation of the Thesis

The remainder of the thesis is structured as follows. Chapter 2 presents the regulatory setting within which this thesis research is situated with respect to equity compensation and labour investment. A review of the current body of literature pertaining to the components of equity compensation is presented in Chapter 3. The chapter also discusses accounting treatments of the components of equity compensation and their influences on firms' investment decisions in relation to labour. In Chapter 4, empirical literature on the link between equity compensation and investment generally is reviewed, leading to identification of the research gap.

In light of prior literature examining how the components of equity compensation affect investment decisions, the theoretical framework of the thesis is developed and presented in Chapter 5, culminating in the development of testable hypotheses. The research design utilised to test the hypotheses is presented in Chapter 6. Sample selection and data sources, variable measurement and statistical models are discussed.

Chapters 7 presents the descriptive statistics, main results and discussion; while additional analyses are described in Chapter 8.

The thesis concludes by reiterating the objectives of the research, summarising the major findings and presenting the implications of the results, limitations of the thesis and opportunities for future research in Chapter 9.

# CHAPTER 2: REGULATORY FRAMEWORK

This chapter outlines U.S. federal regulations governing executive compensation, examines the reason they were introduced and outlines recent changes and amendments. First, the chapter discusses the current regulations on executive compensation, including the Sarbanes–Oxley Act of 2002 and the Dodd–Frank Act of 2010. Second, employment regulations in the U.S.A. are discussed, since the thesis focuses on investment in labour and employment regulations can affect executives' labour investment decision-making. Finally, the chapter draws conclusions based on the significance of these regulations in relation to executive compensation and in particular equity compensation.

## 2.1 Regulation of Executive Compensation

This section discusses Securities and Exchange Commission (SEC) Acts and Requirements Governing Executive Compensation, the Sarbanes–Oxley (SOX) Act of 2002 and the Dodd–Frank Executive Compensation Reform Act. These are followed by a discussion of the Executive Compensation Disclosure Rules on executive compensation.

### *2.1.1 SEC Acts and Requirements Governing Executive Compensation*

The federal securities laws require clear, concise and comprehensible disclosure about compensation paid to senior executive officers of public firms (SEC, 2011; 2016). Several documents that a company is required to file with the SEC incorporate information about its executive compensation policies and practices: (1) the company's annual proxy statement; (2) the company's annual report on Form 10-K; and (3)

registration statements filed by the company to register securities for sale to the public (SEC, 2016).

It is in the annual proxy statement that firms are required to disclose information concerning the level and type of compensation paid to their CEOs, chief financial officers (CFOs) and the three most highly compensated executive officers (SEC, 2011; 2016). The criteria used in reaching executive compensation decisions and the relationship between a firm's executive compensation practices and corporate performance are also disclosed in the annual proxy statement (Faulkender & Yang, 2013; Murphy, 2013; SEC, 2016). Therefore, shareholders are able to evaluate the effectiveness of a firm's compensation packages in aligning executives' interests with theirs. The disclosure rule under SEC Acts and Requirements Governing Executive Compensation was further strengthened in the SOX Act of 2002 as a result of the abundance of accounting scandals in the early 2000s (SOX, 2002; Ades-Laurent, 2017).

### *2.1.2 Sarbanes–Oxley Act of 2002*

The accounting scandals that erupted across corporate America during the early 2000s, resulting in the collapse of firms such as WorldCom, Xerox and others, led to the passing of the SOX Act[7] (SOX, 2002; Murphy, 2013). Although the Act primarily focuses on curbing accounting irregularities (not compensation), it has now been extended to the regulation of executive pay.

[7] SOX is arranged into eleven titles. As far as compliance is concerned, the most important sections are often considered to be 302, 304, 401, 402, 404, 409, 802 and 906. However, in the context of this thesis, only 302, 304 and 402 are discussed because they relate specifically to what is being examined.

Prior to the adoption of the SOX Act, firms routinely offered loans to their executives to buy company stocks, often on a non-recourse basis so that the executives could fulfil their loan obligations by returning the purchased shares (SOX, 2002; Murphy, 2013). Consequently, Section 402 of the SOX Act prohibits all personal loans to executives and directors, especially those that are used to buy the company's shares or stocks (SOX, 2002; Murphy, 2013).

Further, Section 304 of the SOX Act requires executives, particularly CEOs and CFOs, to reimburse the firm for any bonus or equity compensation and also any 'profits realised from selling shares, in the twelve months commencing with the filing of financial statements that are subsequently restated because of corporate misconduct' (Murphy, 2013, p.289). Such corporate misconduct can include option backdating (Collins, Gong & Li, 2009: Liu, 2016) and inappropriate investment decisions (Biddle et al., 2009).

Section 403 of the SOX Act, therefore, mandates executives to disclose new grants of stock options within two business days of the grant; prior to this, options were not required to be disclosed until ten days after the end of the month when options were granted (Murphy, 2013; Ades-Laurent, 2017). That provided incentive for managerial misconduct that took the form of options backdating and back-door repricing of options. The 403 provision has a beneficial effect of curbing option backdating for top executives, which is likely to serve the interest of executives at the expense of shareholders (Ryan & Wiggins, 2002; SOX, 2002; Ellig, 2007; Murphy, 2013).

Several updates were made to the SOX legislation from August 2002 to October 2005. From August 2002, a new Section 302 requires CEOs and CFOs to review and certify

the company's quarterly and annual reports to be true and without any inconsistencies. This update increases managerial involvement and information disclosure, and holds top executives accountable in the event of any inaccuracies in information, including compensation information for the CEO (SOX, 2002; Ellig, 2007; Cohen, Dey & Lys, 2008). Also, in October 2002 and July 2003, updates were added to the SOX Act to improve regulations for shareholder approval requirements regarding equity compensation policies (SOX, 2002; Ellig, 2007).

These amendments to the SOX Act require firms to seek shareholder approval when setting the performance-contingent portion of CEO compensation (SOX, 2002). These requirements were meant to curb inappropriate payments to executives and to ensure that the accounting scandals, which were contributed to by inappropriate compensation to executives, do not recur (SOX, 2002; Cohen et al., 2008). However, the fallout from this contributed to the global financial crisis (GFC). Ades-Laurent (2017) argues that the standard executive pay arrangements appeared to both reward executives for upsurges in short-term performance at the cost of long-term value and produce incentives for excessive risks.

### *2.1.3 Dodd–Frank Executive Compensation Reform Act of 2010*

In response to the GFC, the U.S. Congress passed the Dodd–Frank Wall Street Reform and Consumer Protection Act of 2010 (Dodd–Frank Act) (Dimitrov, Palia & Tang, 2015). The passage of the Act increased the disclosure requirements for listed public companies, as there had been a mismatch between executive equity pay and firm performance (Earle, 2011; Murphy, 2013; Ades-Laurent, 2017).

Part (a) of Section 956 of the Dodd–Frank Act requires financial institutions to identify and disclose to their relevant regulator any incentive-based compensation arrangements that could lead to material financial loss to the financial institution or that provide a CEO, director, employee or principal shareholder of the financial institution with excessive compensation, fees or benefits (Dodd–Frank Act, 2010; Murphy, 2013). Part (b) of Section 956 of the Dodd–Frank Act prohibits financial institutions from adopting any incentive plan that regulators determine encourages inappropriate risks.

While the Dodd–Frank Act focuses on regulating firms in the financial services industry, the authors of the Act seized the opportunity to pass sweeping reforms to executive compensation and corporate governance, which are imposed on all large, publicly traded companies across all industries (Murphy, 2013). Section 953 requires the SEC to direct publicly listed companies to report on the ratio of CEO compensation to the median pay for all other company employees, and the relationships between realised compensation and the firm's financial performance, including stock-price performance (Dodd–Frank Act, 2010; Thatcher, 2012; Murphy, 2013). Also, Section 954 requires the SEC to direct the stock exchanges to require listed companies to develop and implement compensation clawback policies, enabling the recovery of incentive-based compensation from current and former executives following a restatement of financial results (Dodd–Frank Act, 2010; Ades-Laurent, 2017). These provisions are likely to encourage executives to invest efficiently in order to increase firm performance, especially if executive pay is linked to firm performance and the pay structure of executives is also disclosed.

*2.1.4 SEC Executive Compensation Disclosure Rules*

The SEC Executive Compensation Disclosure Rules date back to 1933, when companies were required to disclose the compensation of their executives (Securities Act of 1993). Although firms abided by that regulation and disclosed the compensation of their executives, such disclosure was not comprehensive, as firms only reported the compensation of their executives in a Registration Statement (Securities Act of 1993; Donahue, 2008). A registration statement is a set of legal documents, including a prospectus, which a company must file with the SEC before it proceeds with a public offering (Donahue, 2008; Espahbodi, Liu & Westbrook, 2016). In 1938, the SEC, after observing that executive compensation needed more specific attention, enacted its first executive-compensation disclosure rule for proxy statements. That required firms to provide a narrative explanation of the levels of compensation, present them in a tabular form or provide both types of disclosure (Donahue, 2008; Ades-Laurent, 2017). Since then, the SEC has continued to change its disclosure rules on executive compensation.

The most recent amendment in 2006 followed persistent calls to broaden the required disclosures that firms make to shareholders so that the latter can better enforce accountability in relation to executive compensation (Gillan, Hartzell, Kotch & Starks, 2013; SEC, 2016; Ades-Laurent, 2017). In addition to the narrative disclosure of their executive compensation, firms are encouraged to provide in their Compensation Discussion and Analysis (CD&A)[8] a discussion and analysis of the material factors underlying compensation policies, with decisions presented in tables. In line with the

[8] The SEC's stated goal is to provide investors with detailed and useful disclosure regarding executive compensation (SEC, 22 December 2006).

CD&A, the SEC requirement for executive compensation disclosure covers three broad categories (SEC, 2016, p.12):

- compensation with respect to the last fiscal year (and the two preceding fiscal years), as reflected in an amended Summary Compensation Table that presents compensation paid currently or deferred (including options, restricted stock and similar grants) and compensation consisting of current earnings or awards that are part of a plan, and as supplemented by a table providing back-up information for certain data in the Summary Compensation Table
- holdings of equity interests that relate to compensation or are potential sources of future gains, with a focus on compensation-related equity interests that were awarded in prior years and are 'at risk', whether or not these interests are in-the-money, as well as recent realisation on these interests, such as through vesting of restricted stock or the exercise of options and similar instruments; and
- retirement and other post-employment compensation, including retirement and deferred compensation plans, other retirement benefits and other post-employment benefits, such as those payable in the event of a change in control.

In addition to the CD&A, the new SEC rules mandate the disclosure of various aspects of a firm's use of options and restricted stock in compensating its executives and directors, including any programs, plans or practices with regards to the vesting of option grants (Murphy, 2013; SEC, 2016). Such a disclosure is likely to offer material information to curb the abuse of executive compensation, especially equity compensation. The disclosure of equity compensation requires a determination of the amount to be recognised in the financial statements, and the Financial Accounting Standard Board (FASB) provides the accounting rules with regards to its measurement

(a detailed discussion of this is provided in Chapter 3). The disclosure of executive equity compensation may have an effect on executives' decision-making, including employment decisions. The next section discusses relevant employment regulation and how it affects the hiring decisions of executives.

### 2.2 Regulation of Employment

The U.S. Department of Labor (DOL) administers and enforces more than 180 federal laws governing labour that affect companies, employees and jobseekers (DOL, 2018). In particular, the legislation protects employers and employees in the event that employment is terminated so that neither is disadvantaged. Employment is often distinguished by whether it is 'at-will' or subject to a collective bargaining or other employment contract (DOL, 2018). Under the at-will employment code, both employees and employers can end the employment relationship any time (Baker & McKenzie, 2011). Therefore, unless contractual obligations exist, employees can be terminated from, or leave, a position at any time without the employer providing any severance payment (Baker & McKenzie, 2011). If an employment is terminated, or if an employee leaves their position without prior notice, this can affect the number of employees required to accomplish existing tasks and subsequently affect the business process of a firm. The fall in the number of employees below the optimal level will lead to under-hiring, which is labelled under-investment in labour in this thesis.

However, employees may be protected by a 'just cause' requirement within their contract so that employers cannot terminate their contract at will. Under the just cause requirement, an employer and an employee must end their employment relationship in accordance with the employment contract. The contract may contain specific provisions

that authorise the circumstances of a termination, such as a change in control of the company or an act of gross misconduct by the employee. The contract may also set forth detailed compensation and severance provisions (Baker & McKenzie, 2011; DOL, 2018). This requirement not only makes it difficult for employers to fire their employees at will, but employees are also unable to leave at just any time. Therefore, if employers hire more employees, then the number of employees may exceed the plant capacity, leading to excess employment (i.e., over-hiring), which may also affect firm performance. Over-hiring is labelled over-investment in labour in this thesis.

### 2.3 Conclusion

The disclosure of information concerning executive compensation by U.S. firms is influenced by a number of regulations. Since the accounting scandals that erupted across corporate America during the early 2000s, which resulted in the collapse of firms such as WorldCom, Xerox and others, there have been a number of regulations requiring publicly listed companies to disclose detailed information about their operations including how much compensation is paid to executives.

The passage of the SOX and Dodd–Frank Acts has increased the disclosure requirements for listed public companies and this is likely to affect executives' decision-making at the firm level. It is likely that the increased disclosure requirements in relation to executive compensation, especially equity compensation, will influence the labour investment decisions of executives. If compensation, in particular executive equity compensation, is disclosed, this may provide appropriate incentive for executives to make efficient labour investment decisions in order to increase firm value because providers of capital can monitor the level of executive equity compensation

and measure that against executives' hiring decisions. Top CEOs make 300 times more than average workers. While CEOs of the 350 largest U.S. public firms has an average compensation of over US$16 million, workers' average is US$53 thousand (Hartung, 2015). Given that there is a requirement to disclose the pay multiple (i.e., how many times the compensation of the CEO cover that of an average employee) of the CEO, CEOs may have an incentive to reduce the size of the labour in order to increase earnings. This can be done to silence shareholders as they will also receive higher returns resulting from higher earnings.

This thesis examines the role of equity compensation in reducing inefficient investment in labour. The evolution of equity compensation, the components of equity compensation and their accounting treatments are reviewed in Chapter 3. It is likely that the manner in which equity compensation is used and the accounting treatment of equity compensation may change to reflect the changes in legislation. This is also examined in Chapter 3, before the literature on equity compensation and investment is reviewed in Chapter 4.

# CHAPTER 3: ACCOUNTING FOR EQUITY COMPENSATION

The FASB plays a key role in the disclosure of accounting information. It produces the accounting standards that guide and regulate the preparation of general-purpose financial statements (GPFS) (FASB, 2014). Authorised by the SEC as a non-government agency, the FASB is responsible for establishing the Generally Accepted Accounting Principles (GAAP) for public firms in the U.S.A. (FASB 162, 2014; FASB, 2014). The FASB has issued several accounting standards relating to executive compensation. FAS 123 and its subsequent revisions, the FAS 123R and FAS 132(R)-1, address employers' disclosures including accounting treatment of stock options (FAS 132, 1998; FAS 123R, 2004). The chapter begins with a discussion of the evolution of equity compensation. This is followed by a discussion of the components of equity compensation and their accounting treatment.

## 3.1 Evolution of Equity Compensation

Although equity as a component of executive compensation packages has been used in the U.S.A. since the late 1950s, its use increased during the 1990s (Ofek & Yermack, 2000; Core, Guay & Larker, 2003; Murphy, 2013). Morgenson (1998) reports that in 1997, the 200 largest U.S. firms had reserved more than 13% of their common shares for compensation awards to executives, up from less than 7% eight years earlier. The move to the use of equity compensation was heavily encouraged by institutional investors and shareholder activists because they believed that managerial ownership would reduce agency problems and align executives' and shareholders' long-term interests (Ofek & Yermack, 2000). However, evidence from 2001 suggests that the

components of equity compensation are likely to have differing influences on executive behaviour (see Ryan & Wiggins, 2002; and Năstăsescu, 2009 for reviews). Therefore, the following sections discuss stock options and restricted stock, and their accounting treatments.

### 3.2 Stock Options

Stock options are contracts giving the holder the right, but no obligation, to buy or sell a share at a fixed or predetermined price, known as the exercise or strike price, within a specific period of time (Năstăsescu, 2009; SEC, 2016). The strike price of executive stock options is almost always a fixed price quantified at grant date. The defining characteristic of a stock option is that the payoff is based on the positive difference, if any, between the share price at exercise or settlement and the strike price of the instrument (Walker, 2009). There are generally two types of stock options — incentive stock options (ISOs) and non-qualified (non-statutory) stock options (NSOs). ISOs are a form of executive stock option that can be granted only to employees and give them a U.S. tax benefit. The tax benefit is that on exercise the individual does not have to pay ordinary income tax on the difference between the exercise price and the fair market value of the shares issued. NSOs, however, are stock options, which do not qualify for the special tax treatment given to ISOs, and are granted to employees, consultants and advisors and board members. The main difference between ISOs and NSOs is that the former accords employees tax advantage. In this thesis, the focus is on NSOs since the target is on executive stock options, and executives are board members. Table 3.1 summarises the key differences between ISOs and NSOs (Gaver, 1998; Thatcher, 2005).

**Table 3. 1: Comparison of Incentive Stock Options and Non-qualified Stock Options**

| | Non-qualified stock options (NSOs) | Incentive stock options (ISOs) |
|---|---|---|
| Recipient | It is issued to anyone, for example, employees, consultants, board members, etc. | It is issued to only employees. |
| Exercise price/strike price | Exercise price or strike price is not fixed. | Exercise price/strike price must be at least equal to the fair market value at the time of grant. |
| Tax implications (recipient) | There is no tax payment at the time of grant. The recipient receives normal income (or loss) upon exercise, which is equal to the difference between the grant price and the fair market value of the stock at the date of exercise. | There is no tax payment at the time of grant or at exercise. But there is capital gain (or loss) tax when an employee holds the stock for at least a year after exercising the option. |
| Tax implications (issuing firm) | A firm can deduct the costs incurred as operating expense as long as the firm fulfills withholding obligations. The cost is equal to the ordinary income declared by the recipient. | There are no deductions available to the firm. |
| Value of stock | There is no limit on the value of stock that can be received arising from the exercise of the option. | The total fair market value, which is determined at the grant date, of stock bought by exercising ISOs that are exercisable for the first time cannot exceed US$100,000 in a calendar year. |
| Holding period | There are no restrictions. | Once options are exercised, the employee owns the stock. The stock must be held for a minimum of one additional year before it can be sold. If sold before one year, it is a disqualifying sale and treated as non-qualified stock options. |
| Transferability | It may or may not be transferable. | It must be non-transferable and exercisable no more than ten years from grant. |

Sources: Adapted and modified from (1) www.diffen.com/difference/Qualified_vs_Non-qualified_Stock_Options on 10/11/2018 and (2) Thatcher (2005).

### *3.2.1 Accounting Treatment of Stock Options*

The accounting treatment of stock options has not been consistent over the years. Prior to 1993, accounting for stock options was governed by the *Accounting Principles Board Opinion No. 25* (APB 25), where the intrinsic value method was used. Under the intrinsic value method, the compensation cost of stock options was the excess, if any, of the quoted market price of the stock at the grant date or other measurement date over the amount an executive had to pay to acquire the stock (i.e., the strike price) (Thatcher, 2005; Walker, 2009). In short, it was the difference between the market price of the options and the exercise price, if any, on the day of the grant (Hayes, Lemmon & Qiu, 2012).

The APB 25 generated a great deal of criticism because most firms set the exercise price above the stock price to avoid recognition (Chen, 1996). It was therefore replaced by the FAS 123 in 1995. Between 1995 and 2005, firms accounted for equity compensation under the FAS 123, which encouraged the use of the fair value–based method (Thatcher, 2005; FASB, 2016). Under the fair value method, compensation expenses associated with stock options were measured on the grant date and recognised over the service period, which was commonly the vesting period. Fair value was determined using an option-pricing model that took account of the stock price at the grant date, the exercise price, the expected life of the option, the volatility of the underlying stock, expected dividends and the risk-free interest rate over the expected life of the option (Thatcher, 2005). While the FAS 123 encouraged the use of fair value to measure the compensation cost, this standard allowed firms to continue to record compensation expenses on their income statement using the APB 25 intrinsic value

method and provide *pro forma* footnote disclosure of the fair value compensation expense numbers (Hayes, Lemmon & Qiu, 2012).

In 2004, the FASB issued a revised version of the FAS 123 that required the use of fair values in the income statement (FASB, 2016). The FAS 123R became effective for large public firms for the first interim or annual reporting period beginning after 15 June 2005 (Hayes et al., 2012; FASB, 2016). In addition to restricting firms to the use of fair value, the FAS 123R was issued for the following principal reasons: (1) to address the concerns of users and others; (2) to improve the comparability of reported financial information by eliminating alternative accounting methods; (3) to simplify the U.S. GAAP; and (4) to converge with international accounting standards (FASB, 2016).

The accounting difference resulting from the FAS 123R has to do with the treatment of fixed stock options, where the number of shares and the strike price are known at the grant date. Prior to the FAS 123R, most firms chose to use the intrinsic value method of the APB 25 — this approach was still used under the FAS 123 (Hayes et al., 2012). Since the strike price of fixed stock options is commonly set to the stock price at the grant date, no compensation expense is recognised under the intrinsic value method. However, under the FAS 123R the compensation cost of all employee stock options is measured using fair value, so fixed stock options now result in compensation expense appearing on the income statement (FASB, 2016). This is likely to have implications for the number of stock options issued to employees, including corporate executives. As explained earlier in this section, the fair value of the option grant is measured on the grant date and the value of the options that are expected to vest is expensed over the vesting period. Adjustments are made to the compensation expense for fixed options

only for changes in expected vesting percentages — i.e., the proportion of options that an employee exercises or takes.

### 3.3 Restricted Stock

Restricted stock is stock that is awarded to an executive, usually without cost or for a nominal price (Thatcher, 2005). The rights associated with the stock are restricted until certain vesting conditions are met — i.e., length of service or performance conditions (Ofek & Yermack, 2009; Baker & McKenzie, 2011). The issuing method of the restricted stock includes (1) restricted stock awards (RSA) and (2) restricted stock units (RSU) (Tai, 2018). Firms issuing RSA transfer the stock to an executive on the grant date, and the executive can acquire the entire stock rights after meeting the vesting conditions; while those issuing RSU do not directly deliver the stock to an executive on the grant date, and the executive can only acquire stock ownership after meeting the vesting conditions (Thatcher, 2005; Tai, 2018). The characteristics of RSA and RSU are shown in Table 3.2.

**Table 3. 2: Characteristics of Restricted Stock Units and Restricted Stock Award**

| | Restricted stock unit (RSU) | Restricted stock award (RSA) |
|---|---|---|
| Grant date | Firm does not provide shares to an executive. | Firm provides shares to an executive. |
| Vesting conditions | An executive must work to a point in the future or meet specific performance target. | An executive has to work to a specific point in the future or meet a specific performance target. |
| Prior to vesting date | An executive does not own any shares right. | 1. An executive usually owns the right of the dividend received and voting.<br>2. A firm can withdraw the shares if an executive does not meet the vesting condition. |
| Vesting date | Firm provides shares or equivalent cash payment to an executive. | An executive owns the whole shares right. |
| Expense recognition | Vesting date | Grant date or vesting date[9] |

Source: Adapted and modified from Tai (2018) and Thatcher (2005).

### *3.3.1 Accounting Treatment of Restricted Stock*

Under the FAS 123R, the accounting treatment of restricted stock is unaffected. This is because restricted stock with no performance or market conditions can be viewed as a fixed option with a strike price of zero, so the compensation cost under both the intrinsic value and fair value methods is the grant-date fair value (Hayes et al., 2012). Therefore, the compensation expense relating to restricted stock is the fair market value of the stock at the grant date (Thatcher, 2005; Murphy, 2013; FASB, 2016). The compensation cost is recognised over the vesting period. If the award is forfeited before vesting, any compensation expense previously recognised would be reversed. However, dividends paid on unvested restricted stock do not result in additional compensation

[9] According to the US Internal Revenue Code Section 83 (a) and (b), firms and executives can agree on a taxable year. Section 83 (a) states that an executive can decide the vesting date of completing a contract as the taxable time, and firms can recognise the salary expense on the vesting date; while Section 83 (b) notes that the grant date can be chosen as the taxable time because an executive shoulder the risk in the contract period, and firms can recognise the salary expense on the grant date.

expense unless the stock is later forfeited and the dividends are not repaid to the company (Thatcher, 2005; FASB, 2016).

In summary, the expensing of stock options on the income statement, according to the FAS 123R requirement, has put restricted stock and stock options on the same level, leading to an expansion in the use of restricted stock over stock options (Murphy, 2013; Ades-Laurent, 2017). This phenomenon is likely to affect the amount and type of stock options that firms issue to their executives and the differing influence that each component is likely to have on executives' investment decisions, in particular labour investment.

### 3.4 Conclusion

Prior to the adoption of the FAS 123R in 2005, unlike restricted stock the compensation expense relating to stock options was not put onto the income statement. This provided an incentive for firms to issue stock options to their employees, resulting in the upsurge of stock options in the period leading up to 2005, when firms were mandated to expense the compensation cost associated with stock options on their income statement. After the adoption of the FAS 123R, attention was shifted to restricted stock, with firms now issuing more restricted stock relative to stock options (Murphy, 2013).

An alignment of the accounting treatments of stock options and restricted stock, and the subsequent decline in the issue of stock options, are likely to influence the differential effects that each of them may have on the decisions made by executives, in particular investment decisions in a firm. By relying on the discussion that has been provided in this chapter, the next chapter delineates the link between equity

compensation and investment in general, and highlights the research gap to be filled in this thesis.

# CHAPTER 4: EQUITY COMPENSATION AND LABOUR INVESTMENT

The previous chapter discussed the evolution of equity compensation and the accounting treatments of the components of equity compensation — stock options and restricted stock. This chapter first discusses the link between equity compensation and investment, as seen in the academic literature. In addition to exploring the association with investment generally, research that has explored labour investment is also presented. Second, prior studies examining the determinants and consequences of labour investment efficiency are evaluated. Finally, the chapter concludes with a discussion of the gap in the literature that is being addressed in this thesis.

## 4.1 Equity Compensation and Investment

Prior research has examined equity compensation as a consequence and a determinant of investment in capital and R&D expenditures. Gaver and Gaver (1995) find a significant association between equity compensation and firm investment opportunities, arguing that executives of firms with abundant investment opportunities may be granted equity compensation as an incentive to increase their investments in profitable projects. While Gaver and Gaver (1995) and earlier studies such as those of Lewellen, Loderer and Martin (1987) and Smith and Watts (1992) have examined equity compensation as a consequence of firm-level investment, subsequent studies such as those of Kang et al. (2006) and Eisdorfer, Giaccotto and White (2013) have explored equity compensation as a determinant of firm-level investment. Kang et al. (2006) find that equity compensation is a significant determinant of capital expenditure investment. Eisdorfer et al. (2013) support this conclusion by providing evidence that awarding equity

compensation to executives encourages them to over-invest in capital expenditure. These findings are based on the argument that equity compensation aligns executives' interests with those of shareholders, thus providing incentive to executives to invest in profitable projects (Baxamusa, 2012).

Xian, Chen and Moldousupova (2011) investigate the moderating effect of equity-based compensation incentives on the association between earnings management and investment, finding that equity-based compensation can decrease the tendency for earnings management and improve efficiency of investment decision-making. Broussard, Buchenroth and Pilotte (2004) conclude that pay-performance sensitivity, which incorporates equity compensation, reduces the agency costs of free cash flow and improves investment efficiency. These findings suggest that equity compensation granted to executives reduces their sub-optimal investment behaviour, and therefore, enhances firms' investment efficiency.

Although a stream of research has found that equity compensation is associated with investment in capital and R&D expenditures, another has shown that the components of equity compensation have differing influences on executives' risk-taking behaviour (e.g., Ryan & Wiggins, 2002). These studies argue that, while stock options encourage risk-taking, restricted stock does not provide such incentive. Rajgopal and Shevlin (2002) examine the relationship between stock options and risk-taking, finding that stock options granted to executives provide them with incentive to take risk, thus mitigating risk-related incentive problems. Their empirical results support the theoretical argument that stock options offer incentive to risk-averse executives to invest in high-risk, high-return projects on behalf of risk-neutral shareholders (Jensen

& Meckling, 1976). Building on the different risk-taking incentives provided by stock options and restricted stock, Năstăsescu (2009) examines the differing influences of stock options and restricted stock on firms' risky investment, finding that awarding CEOs with stock options increases firm-level investment in R&D, while in contrast restricted stock awarded to CEOs decreases R&D investment. An earlier study by Ryan and Wiggins (2002) draws a similar conclusion. Xia et al. (2011) find that while stock options exacerbates the relation between earnings management and investment decision-making, restricted stock has no significant influence on such an association, suggesting that stock options have a stronger moderating effect than restricted stock on the association between earnings management and investment.

This tension in the literature, therefore, necessitates further study of the differing influences of the components of equity compensation — stock options and restricted stock — on labour investment, a unique form of investment in a firm. The uniqueness of labour has been discussed in Chapter 1, Section 1.3 of the thesis.

### 4.2 Determinants of Inefficient Labour Investment

To date, there is a limited body of research that examines the determinants of inefficient labour investment. Prior research has examined factors such as conditional conservatism (Ha & Feng, 2018), stock price informativeness (Ben-Nasr & Alshwer, 2016), institutional investor horizons (Ghaly et al., 2016) and accounting quality (Jung et al., 2014). The common theme of these studies is that agency problems between executives and shareholders are likely to make the former invest inefficiently in labour. That is, if executives become self-serving and fail to act in the best interest of shareholders, they can make inappropriate labour investment decisions by either over-

hiring or under-hiring. These determinants are therefore predicted to improve both internal and external monitoring, thereby mitigating such agency problems. Consistent with these theoretical arguments, Jung et al. (2014), for example, find that greater financial reporting quality is associated with lower labour investment inefficiency. The authors also find that financial reporting quality mitigates both over- and under-investment in labour.

Kong, Liu and Xiang (2018) examine the effect of political promotion incentives on labour investment efficiency. Specifically, they focus on the association between political promotion and human capital misallocation, and find that promotion incentives of local politicians increase firm-level employment growth, which, in turn, exacerbates labour investment inefficiency. The authors also find that, for under-hiring firms, promotion incentives only increase the employment of low human capital, hence distorting human capital structure and increasing labour investment inefficiency.

While there is a paucity of research on the determinants of labour investment inefficiency, a number of extant studies have only shown how investment distortions in labour could occur in a firm. Cantor (1990) explores the effect of leverage on corporate investment and hiring decisions. The author compares investment and employment patterns of firms with different levels of indebtedness, and concludes that highly leveraged firms experience more than average volatility in their labour, suggesting that inefficient labour investment could occur in highly leveraged firms. Subsequent studies such as Calomiris, Orphanides and Sharpe (1994) and Sharpe (1994) provide similar conclusions, arguing that leverage has a significant impact on a firm's hiring decisions.

Garmaise (2008) models the effects of financial constraints on labour and capital, demonstrating that financially constrained firms cannot easily attract new employees to replace existing staff, leading to greater employee retention. In a cross-country study, Campello, Graham and Harvey (2010) study the real effects of financial constraints during the global financial crisis in 2008, finding that constrained firms do not only have deeper cuts in technology and capital spending, but they also reduce employment. This will have implications on the number of employees. Popov (2014) concludes that lack of access to finance reduces a firm's investment in labour.

Atanassov and Kim (2009) examine the relation between labour and corporate governance. The authors find that in a weak investor protection environment combined with strong union laws employees and managers may create alliances to prevent large-scale layoffs. They also conclude that such alliances are formed to retain management. In an earlier study, Pagano and Volpin (2005) show that managers facing potential dismissal may collaborate with employees by offering them long-term employment contracts as a means to entrench themselves. This may lead to over-hiring of employees.

### 4.3 Consequences of Inefficient Labour Investment

It is argued that labour is an important factor of production (Ghaly et al., 2016). Therefore, efficient investment in labour is likely to lead to favourable financial outcomes for a firm. Prior research has so far explored tax avoidance and the implied cost of equity as consequences of inefficient labour investment. Alhadi (2015) examines the effect of inefficient labour investment on corporate tax avoidance. Specifically, the author finds support for the argument that firms that efficiently utilizes their investment in labor through less under-hiring and over-hiring are more likely to

pay more tax. The author concludes that managers' efficient decision-making in labor contracting and hiring can affect corporate tax payment.

Cheung, Naidu and Navissi (2015) examine the effect of abnormal labor investment on implied cost of equity, finding that abnormal hiring in the forms of over-hiring and under-hiring increases the implied cost equity. The authors conclude that inefficient hiring would make providers of equity capital to demand higher returns on their investments, culminating in an increase in the firm's implied cost of equity. Similarly, Chen, Kacperczyk and Ortiz-Molina (2011) investigate the association between labour unions, operating flexibility and the cost of equity capital, and conclude that the implied cost of equity is greater for firms in more unionised industries. This suggests that firms in unionised industries are more likely to have problems with hiring and firing staff even in periods where the firm's fundamental economic variables suggest such actions should be taken; these restrictions may affect firm earnings and make providers of equity capital charge higher returns, leading to an increase in the costs of equity capital.

Merz and Yashiv (2007) examine the role labour plays in firms' market value, finding that optimal hiring and investment are significant determinants of firms' value. Pagano and Volpin (2005) conclude that layoff or layoff announcements significantly reduces stock price, suggesting that a reduction in the number of staff can affect firm performance. Belo, Lin and Bazdresch (2014) investigates labour hiring decisions, investment and stock return predictability in a cross-section of firms, finding that the link between firms' hiring decisions and future stock returns is weak; they also find that firms with greater hiring rates tend to be more productive and more profitable, suggesting that firms with greater hiring may record higher future stock returns.

## 4.4 Conclusion

This review of the extant literature has shown that no study has so far explored equity compensation — as a determinant or consequence of — inefficient labour investment. Prior studies have, however, examined equity compensation as a consequence and determinant of non-labour investment (i.e., capital and R&D). Labour investment is a unique form of investment in a firm because: (1) the adjustment costs associated with labour are frequent; and (2) the productivity of potential employees is not known and employees can leave a job at any time in response to better opportunities (Hamermesh, 1995; Donangelo, 2014; Hansson et al., 2004). Labour is also a significant factor in production and contributes about two-thirds of the cost of producing goods and services. Thus the phenomenon of labour may have an influence on executives' labour investment decision-making in a firm.

Studies that have examined determinants of efficient labour investment have used agency theory in developing testable hypotheses. The before the fact arguments are that financial reporting quality (Jung et al., 2014), stock price informativeness (Ben-Nasr & Alshwer, 2016), institutional investor horizons (Ghaly et al., 2016) and conditional conservatism (Ha & Feng, 2018) may improve the information environment and enhance the monitoring role of equity providers, thus reducing suboptimal investment in labour.

In developing the research hypotheses in this current thesis, the variants of agency theory — empire-building and risk-aversion — are used. These are discussed in Chapter 5.

# CHAPTER 5: THEORETICAL FRAMEWORK AND HYPOTHESIS DEVELOPMENT

This chapter outlines the foundations of agency theory — the theoretical framework utilised in this thesis to underpin the development of the research hypotheses. Agency theory is the predominant theory used in the accounting literature to understand the relationships that exist between a firm and outsiders, including shareholders. The chapter commences with a discussion of the theory and how it can assist to explain investment inefficiencies that are likely to be made in a firm, and how equity incentives given to executives are likely to mitigate such investment inefficiencies. This framework is then used to develop testable hypotheses.

## 5.1 Theoretical Framework

### *5.1.1 Equity Compensation, Investment and Agency Theory*

Agency theory explains relationships whereby one or more persons (the principal) hire the services of another (the agent) to perform some service on their behalf. In such an environment, the principal delegates their decision-making authority to the agent, so the agent can act on behalf of the principal in all matters relating to that agency (Jensen & Meckling, 1976). This is referred to as an agency relationship. Although the agent has a legal and fiduciary duty to act in the best interest of the principal, the supposition that both are utility maximisers and will actually work to satisfy their own interests means that the agent will not always act in the best interest of the principal (Jensen & Meckling, 1976).

The divergence of principal–agent interests often leads to agency problems. These problems include empire-building and risk aversion. Empire-building is the tendency of managers to expand the size of a firm they control in order to increase their power, prestige, status and compensation (Stein, 2003). Risk aversion refers to the general avoidance of risk-taking (Stein, 2003). Managers generally prefer less risk than do shareholders because they have a significant portion of their human capital tied to the firm (Fama, 1980; Lambert, 1986) and may suffer in the event of poor firm performance. Both empire-building and risk-aversion problems, as detailed below, often lead to investment distortions in a firm (Stein, 2003).

Investment is one major determinant of corporate value and performance and, as such, investment decisions represent one of the most critical types of decision made by managers (Pfeffer, 1996; Stein, 2003). However, there are distortionary forces that are likely to affect efficient investment decisions in a firm. The most pervasive distortionary force stems from agency problems (Hubbard, 1994; Stein, 2003; Strobl, 2014). Given that managers and shareholders have differing interests, the investment decisions made by managers are unlikely to be in line with shareholders' goals.

Much of the literature, going back to Berle and Means (1932) and including the influential work of Jensen and Meckling (1976), argues that managers of publicly traded firms pursue their own private objectives, which are inconsistent with those of shareholders. This theoretical argument has received empirical support from many others, including Ryan and Wiggins (2002), Aggarwal and Samwick (2006), Low (2009), Biddle et al. (2009) and Jung et al. (2014), who show that the misalignment of

interests between executives and shareholders creates agency problems, which subsequently lead to over- or under-investment in a firm.

Aggarwal and Samwick (2006) argue that agency problems impact on the investment decisions of executives and so executives are likely to either over- or under-invest. Over-investment occurs where executives grow firms beyond their optimal size (an empire-building tendency) to increase their personal utility associated with power, status and prestige, by investing in all projects, including those with negative net present values (Jensen & Meckling, 1976). Jensen (1986), in developing his free cash flow hypothesis, predicts that monitoring difficulty creates the potential for executives to spend internally generated cash flows on projects that are beneficial to them but costly to shareholders.

Executives are also likely to under-invest by opting out of optimal and profitable investment projects due to the high risks involved (Myers & Majluf, 1984; Lambert, 1986). Theoretical models predict that risk-averse executives will shirk their responsibilities by rejecting risky but profitable investment projects if they perceive such projects are likely to increase their personal risk (Lambert, 1986), leading to under-investment. This argument also receives empirical support from Low (2009), who concludes that executives under-invest in risky but profitable projects because their personal costs are high in the case of project failures, while the personal benefits are low for successful outcomes.

Given that there is a general consensus in the empirical and theoretical literature that agency problems can lead to over- and under-investment, there should be mechanisms to control such agency problems. Oyer and Schaefer (2010), in the context of personnel

and organisational economics, argue that financial incentives can change executives' behaviour by aligning them with the goals of the firm. Empirical research in this field shows that financial incentives do change behaviour in firms. Lazear (2000), Shearer (2004) and Bandiera, Barankay and Rasul (2009), among others, show that financial incentives given to employees induce them to perform better (Oyer & Schaefer, 2010), which subsequently increases firm value (Jensen & Meckling, 1976; Merz & Yashiv, 2007; Oyer & Schaefer, 2010) and shareholders' return on investment (Gibbons & Murphy, 1992; Ryan & Wiggins, 2002).

## 5.2 Hypothesis Development

The previous section outlined how agency theory can be used to explain investment inefficiencies, and the role of equity compensation in mitigating them. This section develops the hypotheses to be tested in this thesis. Hypotheses predicting an association between equity compensation (stock options and/or restricted stock) and over-investment are developed in Section 5.2.1, while hypotheses predicting an association between equity compensation (stock options and/or restricted stock) and under-investment are developed in Section 5.2.2.

### *5.2.1 Equity Compensation and Over-investment in Labour*

Conventional finance theory suggests that executives should accept only projects that increase firm value. However, in practice executives have incentives to deviate from that policy (Eisdorfer et al., 2013) because they have personal interests, which often conflict with those of shareholders. Stein (2003) argues that one way in which executives' interests may diverge from those of shareholders is that executives may have a preference for running large firms as opposed to simply profitable ones. This

empire-building incentive is also noted by Donaldson (1984) and Jensen (1986), among others, who suggest that empire-building executives are likely to over-invest in a firm (Eisdorfer et al., 2013). Jensen (1986) explains that executives have incentive to grow a firm beyond its optimal size because their power increases with the increase in resources, including the labour force, under their control (Jung et al., 2014). This is because, if executives increase the resources under their control, not only will they enjoy higher compensation, but they will also enjoy greater perquisite benefits and be held in high esteem by their peers (Jensen & Meckling, 1976; Donaldson, 1984; Ryan & Wiggins, 2002; Cheng, 2004).

Equity compensation granted to executives (Ryan & Wiggins, 2002) is likely to reduce their incentive to over-invest in labour. Over-investment causes both the present and future cash flows of a firm to deteriorate, affecting the business process and ultimately the value of the firm (Berle & Means, 1932; Jensen, 1986). Dogru (2017) notes that over-investment is detrimental to firm value because it does not only limit a firm's cash flow but reduce its ability to expand; and Jung et al. (2014) concludes that over-investment in labour deteriorates future firm performance, suggesting that such investment can affect firm value in the long run. Ha and Feng (2018) provide similar conclusion.

The discussion in the theoretical literature suggests that equity compensation, in particular, is likely to align executives' and shareholders' interests (Jensen & Meckling, 1976) and lead to a reduction in over-investment in labour (Jung et al., 2014). Because equity compensation leads executives to become owners of the firm, they are less likely to engage in activities that would destroy firm value.

Recent research, however, shows that it is not equity compensation *per se* that influences investment. Different components of equity compensation influence investment in different ways (Ryan & Wiggins, 2002; Năstăsescu, 2009). The differing effect of the components of equity compensation on investment is, in part, attributed to the risk-taking incentives provided by stock options. Carpenter (2000) examines whether option compensation increases managerial risk appetite, finding that options, in particular those that are deep out of the money, provide incentives for excessive risk taking; and Chen and Ma (2011) conclude that stock options has a positive effect on managerial risk-taking, which in turn, lead managers to increase firm investment.

As discussed above, agency theory suggests that executives often 'build their empire' by increasing the size of the firm in order to gain greater organisational power and influence (Stein, 2003). One method of pursuing this goal is through building the size of the labour force. Labour is easy for executives to adjust relative to capital expenditure. The executives of a firm may expand employee numbers beyond optimal levels in order to gain more security, power, status and prestige, and greater professional achievement (Williamson, 1963) and may be reluctant to trim an unproductive labour force because they do not want to be the subject of corporate scrutiny (Bertrand & Mullainathan, 2003). Pagano and Volpin (2005) conclude that top executives facing possible dismissal for poor performance may collaborate with their labour force by abstaining from lay-offs or wage cuts.

Over-investment in labour is likely to reduce a firm's earnings, as the wage bill and other related costs increase with growth in employee numbers. This will potentially have a detrimental impact on the firm's stock price. It might be expected that stock

options granted to executives should mitigate such problems because this can align executives' interests with shareholders'. However, awarding stock options is in fact likely to induce executives to hire more employees, regardless of the risks involved in doing so. Stock options can exacerbate over-investment in labour because executives with stock options are not likely to be exposed to the risks of their labour-related investment decisions. That is, if an over-investment leads to a decline in share price, executives are less likely to exercise the option; they are more likely to exercise the option only if it is in-the-money (Ryan & Wiggins, 2002; Murphy, 2013). Such characteristics of stock options expose executives to more benefit than risk, and as such are likely to encourage them to undertake investments even if such investments may destroy the value of the firm. Năstăsescu (2009) supports this view, finding that awarding executives with more stock options increases a firm's investment levels.

In contrast, restricted stock granted to executives is likely to reduce their incentive to over-invest in labour. Restricted stock exposes executives to both benefits and risks, and as such is likely to induce risk-averse executives to avoid investments that may adversely affect the performance of the firm (Ryan & Wiggins, 2002; Năstăsescu, 2009). Tai (2018) examines whether the granting of restricted stock to employees affect firm performance, finding that restricted stock grants enhance future firm performance. Hall and Murphy (2003) note that restricted stock effectively aligns executives' interests with shareholders' since the former gain (or loss) with an increase (or a decrease) in a firm's stock price, resulting from firm performance; and Thatcher (2005) concludes that the possibility of executives partaking in dividends during the restriction period makes them to take decisions that increase firm performance.

Over-investment in labour has been shown to be value-destroying (Jung et al., 2014; Ben-Nasr & Alshwer, 2016) because any additional expenditure on hiring will increase labour costs beyond optimal levels and adversely affect the firm's earnings. Executives with restricted stock grants are therefore likely to be adversely affected because they also receive dividends during the restriction period (Ryan & Wiggins, 2002; Thatcher, 2005). Fama (1980) and Lambert (1986) also argue that executives with restricted stock bear more financial risk and therefore are likely to invest less in activities that are likely to destroy firm value.

In line with the above empirical and theoretical arguments, the thesis hypotheses predicting associations between stock options and restricted stock and over-investment in labour are as follows.

**$H_{1a}$:** Stock options as a component of equity compensation are likely to be positively associated with over-investment in labour.

**$H_{1b}$:** Restricted stock as a component of equity compensation is likely to be negatively associated with over-investment in labour.

*5.2.2 Equity Compensation and Under-investment in Labour*

Agency theory suggests that risk-averse managers are likely to avoid activities that may affect their personal wealth, reputation or career (Fama, 1980; Lambert, 1986; Donaldson & Davis, 1991; Smith & Watts, 1992). Manager risk aversion may lead to under-investment. Under-investment reflects the tendency for managers to avoid investment in projects that are risky but have positive net present value, because the personal costs associated with failed projects are high (Coles, Daniel & Naveen, 2006; Ghosh, Moon & Tandon, 2007). Research shows that, when risk-averse managers are

given the opportunity, they are likely to take on less than optimal levels of risk (Low, 2009).

Under the agency model, risk-neutral shareholders would expect managers to take on all projects with positive net present value regardless of their risk, while risk-averse managers prefer less risk, hence passing up some risky projects with positive net present value. They do so to protect their firm-specific human capital (Amihud & Levi, 1981; Smith & Stulz, 1985; Wyatt & Frick, 2010) and their perquisite consumption (Williams, 1987; Ryan & Wiggins, 2002), both of which are likely to be jeopardised by firm risk. Unlike well-diversified shareholders, who prefer to accept all projects with positive net present value regardless of project risk, managers are likely to turn down projects with positive net present value that increase risk if the cost of the increased risk to managers is greater than the benefit to them from the increase in firm value (Low 2009).

Risk-averse executives are less likely to hire more employees, even if the firm's economic fundamentals indicate that such an action should be taken (Hansson et al., 2004; Jung et al., 2014). Hiring employees can be risky because not only is the productivity of potential employees unpredictable, it also increases the business cost. Employees can leave the company at any time in favour of a better paying role. As shown in Section 2.2 of this thesis, Baker and McKenzie (2011) provide support for this argument.

Firms do not own labour — an important factor in production — but merely rent it from willing individuals, who have the flexibility to leave in response to better opportunities (Donangelo, 2014). Therefore, if an employee leaves a job without prior notice, risk-averse executives may choose not to replace them because the incoming employee may

also leave. Hence the number of employees is likely to reduce below the optimal level, leading to under-investment. Under-investment in labour can also stem from pressure from myopic investors. Such investors, who are most interested in the short-term performance of a firm, may put pressure on risk-averse executives to reduce investment in labour because intangible investments such as labour only yield results in the long run (Ghaly et al., 2016). Further, firms facing financial distress may reduce staff or even fail to hire if the firm's fundamental economic variables suggest more hiring. Campello et al. (2010) provide support for this, arguing that firms in financial difficulties may reduce staff as a way to save cost and enhance the firms' cash flows. However, this may be possible if the reduction in the number of employees results in a measured decrease in labour cost.

Cost stickiness hypothesis argues that changing committed resource levels is costly because it entails incurring resource adjustment costs, such as severance payment to fired employees (Anderson, Banker & Janakiraman, 2003). Sticky costs occur when costs increase more when activity rises than they decrease when activity falls by an equivalent amount. In sticky costs literature, cost behaviour is assessed by correlating the current growth in Selling General and Administrative costs with current revenue growth (Anderson et al., 2003; Yang, 2015; Wu-lung & Kenneth, 2017). However, in the context of this thesis, labour cost is considered sticky if it is correlated with the reduction in the number of employees. As the number of employees reduces, firms are more likely to spend less on labour cost, leading to cost savings. Prabowo, Hooghiemstra and Veen-Dirks (2018) argue that managerial self-interests may restrain managers from laying off employees or reducing employee wages when sales decrease, leading to greater labour cost stickiness. However, it is argued in this thesis that

managerial risk-aversion may lead managers to maintain the staff numbers or fail to hire when sales increase, leading also to greater cost stickiness. The failure of managers to respond to sales growth by hiring more staff will lead to under-hiring, i.e., under-investment in labour.

Equity compensation can be used to incentivise managers to avoid under-investment (Jenson & Meckling, 1976; Stein, 2003). However, in the context of under-investment, stock options and restricted stock as components of equity compensation are likely to play similar roles in mitigating under-investment in labour. Since stock options as a component of equity compensation do not expose executives to risk, they encourage executives to take more risk, including by investing in labour, thereby reducing the problems of under-investment (Smith & Stulz, 1985; Smith & Watts, 1992; Wright, Kroll, Lado & Van, 2002).

Granting restricted stock is also likely to align executives' goals with those of shareholders, thus inducing a reduction in activities that lead to under-investment in labour. This is because it exposes executives to both benefits and risks. As such, executives with restricted stock are less likely to under-invest because this will be value-destroying and may expose executives to the risk (Low, 2009) of such investments. Ryan and Wiggins (2002) find support for this view. Bettis, Bizjak, Coles and Kapathy (2010) suggest that firms which grant restricted stock to their executives have significantly better subsequent operating performance than firms which do not. This is because restricted stock is effective in aligning executives' goals with the goal of the firm. Therefore, restricted stock granted to executives may incentivise them to

reduce under-investment in labour, since significant investment in labour increases productivity, and thus financial performance.

Further, given that the value of restricted stock is related to stock price (Ryan & Wiggins, 2002) and that executives with restricted stock are likely to be affected in the event of a deteriorating stock price, they have incentive to reduce under-investment in labour. Restricted stock granted to executives aligns their interests with those of shareholders, reducing under-investment. Ghosh et al. (2007) support this proposition, showing that under-investment is likely to decline when the interests of executives and shareholders are aligned through restricted stock, because executives are likely to avoid non-value-maximising decisions such as the decisions to under-hire and/or over-fire employees (Jung et al., 2014). If executives under-hire and/or over-fire, the productivity or output of the firm is likely to be impacted; therefore, the earnings of the firm are likely to be affected. If the earnings of the firm are negatively affected, then any returns on the executives' restricted stock will also decline. As such, restricted stock granted to executives is likely to induce them to reduce under-investment in labour.

The preceding theoretical and empirical arguments lead to the following hypotheses.

**$H_{2a}$:** Stock options as a component of equity compensation are likely to be negatively associated with under-investment in labour.

**$H_{2b}$:** Restricted stock as a component of equity compensation is likely to be negatively associated with under-investment in labour.

### 5.3 Conclusion

This chapter has discussed the main theory underpinning the research. Empirical research has, to date, engaged agency theory as the predominant factor in the

development of testable hypotheses in relation to suboptimal investment. Agency theory suggests that empire-building (risk-aversion) tendencies on the part of managers are likely to lead to over- and under-investment (Jensen & Meckling, 1976). In this chapter, research hypotheses have been developed to predict how stock options and restricted stock, as components of equity compensation, are associated with over- and under-investment in labour. The hypotheses predict that stock options (or restricted stock) exacerbate (or mitigates) over-investment in labour, while both stock options and restricted stock mitigate under-investment in labour.

The next chapter discusses the research methodology used to test the hypotheses developed in this chapter.

# CHAPTER 6: RESEARCH METHODOLOGY

The previous chapter outlined the theoretical framework and developed the research hypotheses to be tested in this thesis. This chapter sets out the research methodology and design that are used to test each of these hypotheses. The research design, research methods, data sources, sample selection including variable measurement and model specification are discussed.

## 6.1 Research Design

A research design is a plan, blueprint or guide for data collection and interpretation (Cohen, Manion & Morrison, 2000; Zikmund, 2003; Creswell, 2014). It enables the investigator to conceptualise the research problem and related issues (Punch, 2009; Creswell, 2014) and also provides a specific direction for the procedures in carrying out a research study (Creswell, 2014). This thesis is conducted within the positivist paradigm (i.e., the quantitative approach), with the aim of examining the associations between over- and under-investment in labour and equity compensation (i.e., stock options and restricted stock) using a regression framework.

The thesis adopts a quasi-experimental design, which is similar to an experimental design but precludes a random assignment to conditions (Zikmund, 2003; Creswell, 2014). The quasi-experiment is the most frequently used research design in accounting research because it allows the researcher to achieve acceptable levels of internal validity to satisfy the academic audience along with high enough levels of external validity to ensure that the findings are applicable to practice (Hirst & Hopkins, 1998; Gordon &

Porter, 2009).[10] The quasi-experimental design is appropriate to this thesis as it is used to examine not only the direction but also the magnitude of the associations between the dependent variables and test variables (Punch, 2009; Creswell, 2013). The test variables are stock options and restricted stock, and the dependent variables are over- and under-investment in labour. To rule out alternative explanations for the associations between the dependent variables and test variables, a number of control variables are incorporated into the regression framework (see Section 6.3).

An archival research method is used to gather the data because it allows the researcher to perform analyses and draw conclusions from objective data collected from the repositories of third parties (Gordon & Porter, 2009).

### 6.2 Data Sources and Sample Selection

Sample firms are identified from the Compustat and ExecuComp databases. The sample comprises firms listed on the New York Stock Exchange (NYSE) and National Association of Securities Dealers Automated Quotations (NASDAQ) over a 20-year sample period from 1992 to 2014.[11] The sample period commences from 1992 because that is the first year covered by the ExecuComp database, from which compensation data is sourced.

[10] While internal validity refers to how well a study tests the relationship between events described by a hypothesis, external validity refers to how well the results from a study can be applied to other settings (Gordon & Porter, 2009). A good study needs to have internal validity to show that the association being tested actually occurs and also external validity to show that the relationship being tested occurs in natural or real-world settings (Gordon & Porter, 2009).

[11] A one-year lag is used to measure all the compensation variables. Therefore, the firm-year observations commence from 1993.

Panel A of Table 6.1 below reports the sample selection procedure. The sample begins with 44,087 firm-year observations obtained from the ExecuComp database, after excluding 200 CEOs with both stock options and restricted stock. This criterion is adopted in order to capture more accurately the distinct effects that stock options and restricted stock have on labour investment efficiency. The methodological design of this thesis is to understand the distinct effect of stock options and restricted stock on investment levels in labour, so leaving CEOs with both forms of compensation is likely to confound the results. This is consistent with the formulated hypotheses of the thesis. The sample is reduced by 14,068 missing firm-years after merging with the Compustat database to estimate the dependent and control variables. The sample is reduced further by 17,901 missing firm-years after merging with the Labour Union dataset. The main dataset is merged with the labour union dataset because prior research shows that highly unionised firms are less likely to engage in suboptimal hiring decisions (Jung et al., 2014); so including labour union variable serves as a natural control. The final sample used for the thesis is 12,118 firm-years.

Panel B of Table 6.1 reports the industry and year distribution of the sample firms. The sample firms are classified into Fama and French's (1997) 48 industries (Fama & French, 2000). Notably, business services, electronic equipment, utilities, petroleum and natural gas, and machinery industries represent 10.82%, 8.14%, 7.46%, 5.37% and 4.95% of total firm-years, respectively. Of the next ten industries, the pharmaceutical products industry represents the highest (4.46%) proportion of the sample firm-years and the steel works sector represents the lowest (2.48%). The remaining 33 industries together represent approximately 28% of firm-years.

The sample is relatively evenly distributed across the years, with the minimum number of firms observed in 2006 (2.69%) and the maximum number of firms in 2008 (7.77%). All test models control for both year and industry variation, and standard errors are also clustered by firm.

## Table 6.1: Sample Selection and Distribution

| **Panel A: Sample Selection** | **Obs.** |
|---|---|
| Initial executive compensation firm-years from ExecuComp from 1993 to 2015 | 44087 |
| Less: | |
| Missing firm-years when merging with Compustat to estimate dependent and control variables | 14068 |
| Missing firm-years when merging with Labour Union dataset | 17901 |
| Final sample | 12118 |

**Panel B: Industry and Year Distribution of Sample Firms**

| *Industry Distribution* | | | *Year Distribution* | | |
|---|---|---|---|---|---|
| *Fama and French Industry Classification* | *Obs.* | *% of Sample* | *Year* | *Obs.* | *% of Sample* |
| Business services | 1311 | 10.82 | 1993 | 381 | 3.14 |
| Electronic equipment | 987 | 8.14 | 1994 | 369 | 3.05 |
| Utilities | 904 | 7.46 | 1995 | 371 | 3.06 |
| Petroleum and natural gas | 651 | 5.37 | 1996 | 373 | 3.08 |
| Machinery | 600 | 4.95 | 1997 | 367 | 3.03 |
| Pharmaceutical products | 541 | 4.46 | 1998 | 378 | 3.12 |
| Computers | 520 | 4.29 | 1999 | 350 | 2.89 |
| Medical equipment | 492 | 4.06 | 2000 | 355 | 2.93 |
| Wholesale | 491 | 4.05 | 2001 | 339 | 2.80 |
| Transportation | 461 | 3.8 | 2002 | 398 | 3.28 |
| Chemicals | 413 | 3.41 | 2004 | 439 | 3.62 |
| Measuring and control equipment | 365 | 3.01 | 2005 | 364 | 3.00 |
| Construction materials | 355 | 2.93 | 2006 | 326 | 2.69 |
| Retail | 326 | 2.69 | 2007 | 772 | 6.37 |
| Steel works etc. | 300 | 2.48 | 2008 | 941 | 7.77 |
| 15 industries | 8717 | 71.93 | 2009 | 930 | 7.67 |
| 33 other industries | 3401 | 28.07 | 2010 | 929 | 7.67 |
| Total sample | 12118 | 100.00 | 2011 | 938 | 7.74 |
| | | | 2012 | 924 | 7.63 |
| | | | 2013 | 943 | 7.78 |
| | | | 2014 | 931 | 7.69 |
| | | | | 12118 | 100.00 |

**Note**: This table presents the sample selection procedure, industry classification based on Fama & French's (1997) industry classifications, and year distribution of the final sample.

In constructing the primary variables — stock options, restricted stock and over- and under-investment measures — data is extracted from the Compustat and ExecuComp databases. In particular, ExecuComp provides detailed information on the dollar values of salaries, cash bonuses and restricted stock grants, and the modified Black–Scholes value of stock options, including stock appreciation rights. In addition, security prices and returns are obtained from the Center for Research in Security Prices (CRSP) database, which maintains the most complete collection of security prices, returns and volume data for the NYSE, AMEX and NASDAQ stock markets. Data used to measure industry unionisation is sourced from the Union Membership and Coverage database.[12] Finally, institutional shareholdings data is obtained from the Thomson Reuters' Computer Directions Advisors (CDA)/Spectrum Directory of Institutions database.

### 6.3 Model Specification

This thesis uses panel data and employs three ordinary least squares (OLS) regression models[13] — the first to determine abnormal net hiring, which is then labelled as over-investment in labour (positive abnormal net hiring) and under-investment in labour (negative abnormal net hiring) (the dependent variables; see *Model 1*), the second to test Hypotheses *1a* and *1b* (see *Model 2*) and the third to test Hypotheses *2a* and *2b* (see *Model 3*). The sample is divided into two subsamples to test the hypotheses relating to

[12] The Union Membership and Coverage database is obtained from www.unionstats.com. The website provides estimates of union membership and coverage data by industry, which, according to Jung et al. (2014), is derived from the current population survey outgoing rotation group's monthly earnings file. The current population survey is a monthly survey of rotated groups of households conducted by the Bureau of Census for the Bureau of Labor Statistics to collect information about the labour force characteristics of the population (see Hirsch & Macpherson, 2003 for in-depth explanation).

[13] The classical assumptions underpinning OLS regression are tested and verified to ensure that they are not violated in any of the models (Hair, Black, Babin & Anderson, 2014).

over-investment in labour (Hypotheses *1a* and *1b*) and under-investment in labour (Hypotheses *2a* and *2b*).

*6.3.1 Measure of Over- and Under-Investment in Labour*

An OLS regression model is employed first to capture abnormal net hiring. While positive abnormal net hiring is labelled over-investment in labour, negative abnormal net hiring is labelled under-investment in labour (Pinnuck & Lillis, 2007; Jung et al., 2014). In this model (*Model 1*), the dependent variable is net hiring — a proxy for labour investment. A firm's net hiring is the percentage change in the number of employees in the firm (Pinnuck & Lillis, 2007). [14]

$$Net\_Hire_{it} = \beta_0 + \beta_1 Sales\_Growth_{it-1} + \beta_2 Sales\_Growth_{it} + \beta_3 chROA_{it} + \beta_4 chROA_{it-1} + \beta_5 ROA_{it} + \beta_6 Return_{it} + \beta_7 Size\_R_{it-1} + \beta_8 Quick_{it-1} + \beta_9 chQuick_{it-1} + \beta_{10} chQuick_{it} + \beta_{11} Lev_{it-1} + \beta_{12} LossBin1_{it-1} + \beta_{13} LossBin2_{it-1} + \beta_{14} LossBin3_{it-1} + \beta_{15} LossBin4_{it-1} + \beta_{16} LossBin5_{it-1} + Industry\ FE + Year\ FE + \varepsilon_{it} \quad \text{[Model 1]}$$

Where:

$Net\_Hire_{it}$ is the percentage change in the number of employees (Compustat #29) from financial year $t-1$ to financial year $t$ for firm $i$.

$Sales\_Growth_{it}$ and $Sales\_Growth_{it-1}$ represent a change in sales revenue in the current financial year and previous financial year (Compustat #12). This is included because it represents a change in demand for the firm's products and services, and is considered to be the fundamental determinant of profitability and the level of investment a firm should make. Both current financial year and prior financial year sales growth are

[14] Consistent with prior research (e.g., Pinnuck & Lillis, 2007; Li, 2011; Jung et al., 2014), the number of employees includes all employees of consolidated domestic and foreign subsidiaries, all part-time and seasonal employees, full-time equivalent employees and officers. It excludes consultants, contract workers, directors and employees of unconsolidated subsidiaries as reported by shareholders.

included because of the uncertainty as to the time lag between sales growth and change in the number of employees (Pinnuck & Lillis, 2007; Li, 2011).

$ROA_{it}$ is the return on assets, computed as the level of net income in the current financial year (Compustat #172) scaled by beginning-of-year total assets (Compustat #6). This is included because the level of profitability is likely to be a fundamental determinant of the level of investment in employees (Pinnuck & Lillis, 2007). Profitable firms are more likely to increase the level of their staff compared with unprofitable ones. Jung et al. (2014) show that greater profitability is associated with greater net hiring.

$chROA_{it}$ and $chROA_{it-1}$ represent the change in return on assets in the current financial year and previous financial year, respectively. Following Jung et al. (2014), both current financial year and prior financial year change in return on assets are included because of the uncertainty as to the time lag between profitability change and change in the number of employees. Ben-Nasr and Alshwer (2016) argue that profitable firms in the previous and current year are more likely to increase hiring in the next year.

$Return_{it}$ is the total abnormal annual stock return for the financial year *t* of firm *i* and it proxies for future expected growth and for the effect of any omitted fundamental variables. Abnormal return is defined as the total return for firm *i* in financial year *t* less the return on the equally weighted market index (Pinnuck & Lillis, 2007). Firms anticipating future growth may hire more employees to fill the vacancy that will be created by such expansion. Jung et al. (2014) find a positive associaiton between return and net hiring.

*Size_R*$_{it}$ is the natural logarithm of the market value of equity at the beginning of the financial year, calculated as the firm's share price (Compustat #199) multiplied by the number of common shares outstanding (Compustat #25), and then ranked into percentiles. Firm size may influence employment growth rates and/or entry into a more mature, lower investment stage of the firm's life cycle (Jung et al., 2014). Also, firm size proxies for the likelihood of firms facing cash-flow shortages. Smaller firms are more likely to have cash-flow problems, leading them to reduce discretionary investments such as investments in hiring (Pinnuck & Lillis, 2007).

*Quick*$_{it-1}$ represents the ratio of cash and cash equivalents (Compustat #1) and receivables (Compustat #2) to current liabilities (Compustat #5) in the previous financial year. This is included to proxy for short−term liquidity and to control for changes in employment due to cash−flow shortages and short−term liquidity problems.

*chQuick*$_{it}$ and *chQuick*$_{it-1}$ reflect changes in short−term liquidity in both the current financial year (*chQuick*$_{it}$) and previous financial year (*chQuick*$_{it-1}$). The change is measured as the percentage change in the quick ratio (Jung et al., 2014). Liquid firms may find easier to hire, compared with illiquid firms, because they can pay for the additional cost that comes with new hiring. Ben-Nasr and Alshwer (2016) posit that firms with a higher quick ratio and those that increased their quick ratio in the previous year are less likely to experience liquidity problems in the current year, and thus are more likely to increase hiring.

*Lev*$_{it}$ is the ratio of long-term debt (Compustat #9) to total assets (Compustat #6) at the end of the financial year. This is included to proxy for long-term financing requirements and because reduced funds available for investment may trigger delays in hiring or

retrenchment of employees (Pinnuck & Lillis, 2007). Jung et al. (2014) and Ben-Nasr and Alshwer (2016) find that leverage decreases net hiring.

*LossBinX* represents loss bins to indicate each 0.005 interval of *ROA* from 0 to −0.025 in financial year *t−1* for firm *i*. For example, *LossBin1* is equal to 1 if prior-year *ROA* ranges from −0.005 to 0, *LossBin2* is equal to 1 if prior-year *ROA* is between −0.005 and −0.010, and so on. The loss bins are included because Pinnuck and Lillis (2007) argue that firms making losses are more likely to cut back their labour force as compared to those making profits.

*Industry FE* represents dummy variables for each industry using Fama and French's (1997) 48-industry classification code. Industry-fixed effects are included in the model to capture inter-industry differences in hiring because some industries are labour intensive and may rely more on skilled labour than others may (Ben-Nasr & Alshwer, 2016). *Year FE* represents year dummies, included to control for year effects on a firm's hiring. In periods of economic growth and downturn, for example, firms may adjust their labor force over time with some having greater adjustments than others. Therefore, it is important to include the year fixed effects to capture the differences in firms across time.

Over- and under-investment are the dependent variables in *Models 2* to *3*, which are obtained from *Model 1*. Following Jung et al. (2014), $Net\_Hire_{it}$ is expected to have a positive association with sales growth ($Sales\_Growth_{it-1}$, $Sales\_Growth_{it}$), profitability ($chROA_{it-1}$, $ROA_{it}$), stock returns ($Return_{it}$), firm size ($Size\_R_{it}$) and liquidity ($Quick_{it-1}$, $chQuick_{it-1}$). This is because a firm that records high sales, profit, liquidity, stock returns and firm size is more likely to hire more employees. $Net\_Hire_{it}$ is expected to

be negatively associated with current year changes in profitability ($chROA_{it}$) and small reported losses (all *LossBins* variables) because a firm that records losses and changes in profit in the current financial year is likely to reduce its number of employees. Owing to potentially competing effects, no prediction is made concerning current year change in liquidity ($chQuick_{it}$) or leverage ($Lev_{it}$).

Subsequent to estimating *Model 1*, the estimated coefficients are applied to each firm-year observation to determine the expected level of net hiring. The measure of over-investment (or under-investment) is the positive (or negative) values of the residuals (i.e., abnormal net hiring).

*6.3.2 Model to test Hypotheses* 1a *and* 1b

To test Hypotheses *1a* and *1b*, which predict that stock options are positively associated with over-investment in labour and restricted stock is negatively associated with over-investment in labour, *Model 2* is used.

$$\begin{aligned} Over\text{-}Investment_{it} = {} & \beta_0 + \beta_1 SOP_{it-1} + \beta_2 RSTK_{it-1} + \beta_3 MTB_{it-1} + \beta_4 FirmSize_{it-1} \\ & + \beta_5 Quick_{it-1} + \beta_6 Lev_{it-1} + \beta_7 DivDum_{it-1} + \beta_8 Std\_CFO_{it-1} + \beta_9 Std\_Sales_{it-1} \\ & + \beta_{10} Tangibles_{it-1} + \beta_{11} Loss_{it-1} + \beta_{12} Insti_{it-1} + \beta_{13} Std\_Net\_Hire_{it-1} \\ & + \beta_{14} Labour\_Intensity_{it-1} + \beta_{15} OwnCEO_{it-1} + \beta_{16} EQ_{it-1} \\ & + \beta_{17} /Ab\_Invest\_Other/_{it} + \beta_{18}\, Lab\_Union_{it-1} + Industry\ FE + Year\ FE + \varepsilon_{it} \end{aligned}$$

[Model 2]

The dependent variable $Over\_Investment_{it}$ in *Model 2* for firm *i* at the end of financial year *t* is obtained from *Model 1*. Following Jung et al., (2014), the residual values in *Model 1* are divided so that positive values represent over-investment in labour.

The test variables *in Model 2* are stock options ($SOP_{it-1}$) and restricted stock ($RSTK_{it-1}$) for firm *i* at the end of financial year *t−1*. *SOP* is defined as the natural logarithm of the dollar value of stock options granted to executives; *RSTK* is defined as the natural

logarithm of the dollar value of the restricted stock granted to executives, all in year $t-1$. The coefficient of $SOP_{it-1}$ is expected to be positive to support Hypothesis *1a*, demonstrating a positive association between stock options and over-investment in labour; the coefficient of $RSTK_{it-1}$ is expected to be negative to support Hypothesis *1b*, which predicts that restricted stock is negatively associated with over-investment in labour.

*6.3.3 Model to test Hypotheses* 2a *and* 2b

To test Hypotheses *2a* and *2b*, which predict that both stock options and restricted stock are negatively associated with under-investment in labour, *Model 3* is constructed.

$$\begin{aligned} Under\text{-}Investment_{it} = {} & \beta_0 + \beta_1 SOP_{it-1} + \beta_2 RSTK_{it-1} + \beta_3 MTB_{it-1} \\ & + \beta_4 FirmSize_{it-1} + \beta_5 Quick_{it-1} + \beta_6 Lev_{it-1} + \beta_7 DivDum_{it-1} + \beta_8 Std\_CFO_{it-1} \\ & + \beta_9 Std\_Sales_{it-1} + \beta_{10} Tangibles_{it-1} + \beta_{11} Loss_{it-1} + \beta_{12} Insti_{it-1} \\ & + \beta_{13} Std\_Net\_Hire_{it-1} + \beta_{14} Labour\_Intensity_{it-1} + \beta_{15} OwnCEO_{it-1} + \beta_{16} EQ_{it-1} \\ & + \beta_{17} /Ab\_Invest\_Other/_{it} + \beta_{18}\, Lab\_Union_{it-1} + Industry\ FE + Year\ FE + \varepsilon_{it} \end{aligned}$$

[Model 3]

The dependent variable is again obtained from *Model 1*. Following Jung et al. (2014) and in line with the methodology of Chen, Hope, Li and Wang (2011), $Under\text{-}Investment_{it}$ is constructed from the negative deviations from the predicted investment levels in *Model 1*. To simplify interpretation of the results, $Under\text{-}Investment_{it}$ is multiplied by $-1$ so that a greater value suggests a more severe level of under-investment.

The test variables in *Model 3* are stock options ($SOP_{it-1}$) and restricted stock ($RSTK_{it-1}$) for firm *i* at the end of financial year $t-1$, and all variables are as previously defined. If Hypotheses *2a* and *2b* are supported, the coefficients of $SOP_{it-1}$ and $RSTK_{it-1}$ are expected to be negative, demonstrating that stock options and restricted stock are negatively associated with under-investment in labour.

*6.3.4 Control of Variables*

The control variables for *Models 2* and *3* are presented as follows: $MTB_{it-1}$ is the ratio of market to book value of common equity at the beginning of the financial year. Market to book ratio is a comparison of market value with the book value of the firm and suggests how much investors are paying against each dollar of book value in the balance sheet. Executives have more discretion to invest in personally beneficial strategies at shareholders' expense in industries where firm value largely depends on future growth opportunities. Firms with high market-to-book ratios are more susceptible to these agency costs, hence increasing the value of monitoring and reducing non-value maximising decisions (Gompers, 1995; Năstăsescu, 2009). If so, then we expect past market to book ratio to reduce inefficient labor investment, so it is controlled.

$DivDum_{it-1}$ is represented by 1 if the firm paid dividends (Compustat #21) in the previous financial year, 0 otherwise. This is included because executives may reduce dividend payment to providers of equity capital if they want to increase firm investment (Ryan & Wiggins, 2002). Jung et al. (2014) and Ben-Nasr and Alshwer (2016) find a negative association between dividend payment and inefficient labor investment, suggesting that firms that pay dividend frequently are less likely to engage in excessive labor investment.

$Std\_CFO_{it-1}$ represents the standard deviation of cash flow from operations (Compustat #308) over years $t-5$ to $t-1$. This is included because volatility of cash flow is likely to affect executives' investment decisions in a firm (Ryan & Wiggins, 2002). Unstable cash flow will provide less incentive for executives to invest in hiring more employees. While Jung et al. (2014) find that cash flow volatility decreases inefficient labor

investment, Ben-Nasr and Alshwer (2016) concluded that it increases inefficient labor investment.

$Std\_Sales_{it-1}$ is the standard deviation of sales revenue (Compustat #12) over years $t-5$ to $t-1$. Volatility in sales revenue is likely to affect hiring decisions, and therefore investment in labor. Jung et al. (2014) find that volatility in past sales is associated with greater abnormal net hiring, a proxy for inefficient labor investment, although Ben-Nasr and Alshwer (2016) find no result. $Tangibles_{it-1}$ is the ratio of property, plant and equipment (Compustat #8) to total assets (Compustat #6) at the beginning of the year. If a firm controls many assets, then it is more likely to hire more employees, and vice versa; affecting the firm's labor investments (Jung et al., 2014). Consistent with this argument, Ha and Feng (2018) find that past tangibility is associated with lower inefficient labor investment. $Loss_{it-1}$ is equal to 1 if the firm reported a loss (Compustat #172) in the previous financial year, otherwise 0. Loss-making firms are less likely to invest in hiring more employees because executives will not have to finance such hiring (Jung et al., 2014).

$Inst_{it-1}$ represents the proportion of outstanding common shares held by institutions at the end of financial year $t-1$. Institutional investors would improve the monitoring environment of firms; therefore, executives are less likely to make inefficient labor investment decisions. Although there is an argument that institutional investors pressure executives to manage short-term earnings by limiting investments in R&D, the majority of the literature suggests that institutional investors focus on long-term results (Ryan & Wiggins, 2002). Ghaly et al. (2016) explores how the investment horizon of a firm's institutional shareholders affects the efficiency of its labor investment,

concluding that long-term investors have greater incentives to engage in effective monitoring, thus reducing agency problems that can lead to inefficient labor investments.

$Std\_Net\_Hire_{it-1}$ represents the standard deviation of the percentage change in the number of employees (Compustat #29) over years $t-5$ to $t-1$. The volatility in hiring may affect a firm's labor investment decisions (Jung et al., 2014). For example, if the number of employees change a lot in the past because of the departure of staff, executives will not have incentive to hire and that may affect the labor investment decisions of the firm. Jung et al. (2014) and find that greater volatility in net hiring is associated with greater abnormal net hiring, a proxy for inefficient labor investment. Ben-Nasr and Alshwer (2016) draw similar conclusion. $OwnCEO_{it-1}$ is the percentage of total shares owned by the CEO (SHROWN_TOT_PCT) at the end of financial $t-1$. It is likely additional stock grants to executives who already own stock may or may not provide the right incentives; see Ryan and Wiggins (2002). As executives accumulate more equity in a firm, their objectives become more aligned with those of capital providers, and thus are less likely to engage in value destroying actions such as inefficient labor investment. $Labour\_Intensity_{it-1}$ is the ratio of the number of employees (Compustat #29) to total assets (Compustat #6) at the beginning of the financial year. The number of employees, relative to the assets of a firm, may suggest whether more or less employees should be hired. This has implications for executives' investment decisions in labor, so it is controlled for. All other variables are as previously defined in *Model 1*.

Consistent with Jung et al. (2014), $Over\text{-}Investment_{it}$ and $Under\text{-}Investment_{it}$ are expected to be positively associated with market to book value of assets ($MTB_{it-1}$), liquidity ($Quick_{it-1}$); leverage ($Lev_{it-1}$) and the standard deviations of operating cash flow and sales ($Std\_CFO_{it-1}$, $Std\_Sales_{it-1}$) and loss ($Loss_{it-1}$). Both dependent variables are expected to be negatively associated with firm size ($FirmSize_{it-1}$), previous financial years' dividends, tangibles and institutional shareholdings ($DivDum_{it-1}$, $Tangibles_{it-1}$, $Inst_{it-1}$), CEO stock ownership ($OwnCEO_{it-1}$) and standard deviations of net hiring ($Std\_Net\_Hire_{it-1}$) and labour intensity ($Labour\_Intensity_{it-1}$). $Lab\_Union_{it-1}$ represents the industry-level rate of labour unionisation for financial year $t-1$.[15] This labour union measure is added because firms with stronger labour unions are likely to record lower employee attrition rates than firms without such labour unions, which may lead to over-hiring (Jung et al., 2014). Ben-Nasr and Alshwer (2016) provide support for this argument.

$/Ab\_Invest\_Other/_{it}$ is the absolute value of the residual from the following model: $Invest\_Other_{it} = \beta_0 + \beta_1 Sales\_Growth_{it-1} + \varepsilon_{it}$. This is included because it is argued that if firms increase their investment in, for example, capital expenditures, they will hire more than optimal staff to keep pace with such an increase. Jung et al. (2014) and Ben-Nasr and Alshwer (2016) show a positive association between inefficient non-labor investment and abnormal net hiring. All other variables are as previously defined. The

[15] Measuring unionisation at the industry level allows for large-scale research, such as mine, which is generally not feasible with firm-level data. This is because firms are not required to publicly disclose information about the union membership of their employees. The potential downside of using industry-level measures may be noisy proxies for firm-level unionisation. Although it is acknowledged that this is a concern, evidence from prior research suggests that firm- and industry-level data yields the same results in studies of unionisation effects on corporate policy choices (e.g., Bronars & Deere, 1991; Klasa, Maxwell & Ortiz-Molina, 2009; Matsa, 2010) and that unionisation tends to be comparatively homogenous within industries (e.g., Bova, 2012).

models are estimated with industry and year fixed effects, and all standard errors are corrected for firm-level clustering.

### 6.4 Data Analysis

The data is analysed using an ordinary least squares (OLS) regression framework. The OLS regression is a powerful statistical method of analysis that estimates the relationship between one or more explanatory variables and a criterion variable; the method estimates the relationship by minimizing the sum of the squares in the difference between the observed and predicted values of the criterion variable configured as a straight line (McClendon, 1994; Hair et al., 2014). An advantage of OLS regression framework is that it can be developed to fit any statistical dataset if the level of measurement is adequate and sufficient data points are available for the estimation (Black et al., 2013). The OLS regression analysis is executed after a model is correctly specified, ensuring that the underlying assumptions for a valid model are met. Black et al. (2013) and Hair et al. (2014) note that it is important to test the validity of a model once it is specified to ensure that it does not violate the classical assumptions. The classical assumptions underpinning the OLS regression are assessed to ensure that they are not significantly violated (McClendon, 1994; Black et al. 2013; Hair et al., 2014). These are discussed in Chapter 7.

### 6.5 Conclusion

This chapter has discussed the relevant data sources, research design and statistical method employed to examine the four research hypotheses developed in Chapter 5. A detailed description of each variable and the measures employed in testing the hypotheses have also been outlined. A justification for the use of the OLS regression

framework for the analyses is also provided. The descriptive statistics of the variables employed for the base model (*Model 1*) and testing models (*Models 2* and *3*) are presented in the next chapter. The results of the hypothesis testing are also presented.

# CHAPTER 7: RESULTS AND DISCUSSION

The previous chapter discussed the research design, data and sample selection, and the variable measures to be used to test the hypotheses. This chapter is divided into three sections — the first presents and discusses the descriptive statistics for the variables used in *Model 1* (i.e., the model used to estimate over- and under-investment in labour), together with a discussion of the regression results, the second section presents and discusses the descriptive statistics of the variables used in *Models 2* and *3*, and the third presents the main results.

## 7.1 Descriptive Statistics for the Variables in *Model 1*

To calculate the dependent variable — over- and under-investment in labour — the expected level of net hiring is estimated from *Model 1*. The difference between the expected and the actual net hiring represents over-investment (positive residual) and under-investment (negative residual). The descriptive statistics for the variables included in *Model 1* are presented in Table 7.1. Most of the statistics for the net-hiring and control variables are consistent with those of Pinnuck and Lillis (2007) and Jung et al. (2014). Notably, the mean (median) percentage change in the number of employees is 4.8% (1.7%), which is similar to the 5.9% (2.0%) reported in Jung et al. (2014). The standard deviation of approximately 22% suggests that the percentage change in the number of employees of any randomly selected firm is very different from others in the sample. This suggests that there are differences in the hiring decisions of the firms in the sample.

Turning to the distributional characteristics of the data, most of the variables are approximately normally distributed, with their skewness and kurtosis being zero. Values of zero for skewness and kurtosis suggest that there are no departures from normality, and thus normality should not be a concern (Hair et al., 2014). Those that are positively and negatively skewed are transformed using natural logarithmic and square root transformations, respectively. While an attempt is made to transform the skewed variables, it is argued that normality is generally not an issue in large samples such as the sample used in this thesis (Hair et al., 2014). Appendix 2 gives graphical portrayals of all the continuous variables.

**Table 7.1: Summary Statistics for Model Estimating Over- (Under-) Investment in Labour (*Model 1*)**

| **Distributional statistics for variables in the base model (*Model 1*)** | | | | | | |
|---|---|---|---|---|---|---|
| Variable | N | Mean | Std. Dev. | Q1 | Median | Q3 |
| $Net\_Hire_{it}$ | 12118 | 0.0479 | 0.2196 | −0.0353 | 0.0177 | 0.0909 |
| $Sales\_Growth_{it}$ | 12118 | 0.0896 | 0.2818 | −0.0143 | 0.0651 | 0.1586 |
| $Sales\_Growth_{it-1}$ | 12118 | 0.1095 | 0.3171 | −0.0051 | 0.0758 | 0.1751 |
| $chROA_{it}$ | 12118 | −0.0040 | 0.1174 | −0.0274 | 0.0000 | 0.0220 |
| $chROA_{it-1}$ | 12118 | −0.0011 | 0.1379 | −0.0273 | 0.0003 | 0.0235 |
| $ROA_{it}$ | 12118 | 0.0497 | 0.1169 | 0.0189 | 0.0527 | 0.0978 |
| $Return_{it}$ | 12118 | 0.1180 | 0.6313 | −0.1851 | 0.0497 | 0.2892 |
| $Size_{it-1}$ | 12118 | 7.2455 | 1.5958 | 6.1331 | 7.1253 | 8.2915 |
| $Quick_{it-1}$ | 12118 | 1.7518 | 1.9099 | 0.7792 | 1.2210 | 1.9843 |
| $chQuick_{it}$ | 12118 | −0.0119 | 1.0492 | −0.1960 | −0.0003 | 0.1976 |
| $chQuick_{it-1}$ | 12118 | −0.0176 | 1.0734 | −0.1971 | 0.0023 | 0.2022 |
| $Leverage_{it-1}$ | 12118 | 0.2084 | 0.1689 | 0.0457 | 0.1996 | 0.3268 |

**Note**: Variables are defined in Appendix 1.

The correlations between the dependent and independent variables are assessed to ensure that: (1) the dependent and independent variables have the predicted signs in their associations; and (2) multicollinearity is not evident. The results of Pearson (lower diagonal) and Spearman (upper diagonal) correlations are presented in Table 7.2.

Except for $chROA_{it}$, $LossBin2_{it-2,}$ $LossBin2_{it-3,}$ $LossBin2_{it-4}$ and $LossBin2_{it-5}$ all independent variables have the expected signs in their association with the dependent variable and are significant at the 5% level. Notably, the highest correlation is between $chROA_{it}$ and $ROA_{it}$ (0.4322), which is far below the threshold of 0.7 suggested by Sekaran (2000) and Hair et al. (2014) as reflecting multicollinearity. To interrogate the multicollinearity issue further, variance inflation factor (VIF) and tolerance levels are examined. The results, also presented in Table 7.2, show a VIF of 1.67 and tolerance of 0.60, which are below the threshold of 10 for VIF and greater than that of 0.10 for tolerance.

**Table 7.2: Pearson and Spearman Correlations, Variance Inflation Factors and Tolerance for Variables in *Model 1***

| **Pearson and Spearman Correlation Matrix with Variance Inflation Factors and Tolerance** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Variables | VIF | Tolerance | V1 | V2 | V3 | V4 | V5 | V6 | V7 | V8 |
| *V1:Net_Hire*$_{it}$ | | | | **0.5776** | **0.2607** | **0.0829** | **0.1312** | **0.3300** | **0.1001** | **0.0473** |
| *V2:Sales_Growth*$_{it}$ | 1.16 | 0.86 | **0.4209** | | **0.2652** | **0.2674** | **0.1273** | **0.3651** | **0.1240** | **0.0276** |
| *V3:Sales_Growth*$_{it-1}$ | 1.13 | 0.88 | **0.1236** | **0.1459** | | **−0.1342** | **0.2531** | **0.2337** | **−0.0976** | **0.0606** |
| *V4:chROA*$_{it}$ | 1.78 | 0.56 | −0.0024 | **0.2621** | **−0.0843** | | **−0.1597** | **0.3267** | **0.3015** | **−0.0405** |
| *V5:chROA*$_{it-1}$ | 1.33 | 0.75 | **0.0460** | 0.0171 | **0.2440** | **−0.3309** | | **0.1882** | **−0.0300** | **0.0474** |
| *V6:ROA*$_{it}$ | 1.67 | 0.60 | **0.1425** | **0.1557** | **0.0741** | **0.4322** | **0.1176** | | **0.1779** | **0.2355** |
| *V7:Return*$_{it}$ | 1.12 | 0.89 | **0.0419** | **0.0807** | **−0.0603** | **0.1889** | **−0.0316** | **0.0656** | | **−0.0644** |
| *V8:Size*$_{it-1}$ | 1.29 | 0.77 | **0.0259** | 0.0099 | **0.0359** | **−0.0425** | **0.0289** | **0.2422** | **−0.2214** | |
| *V9:Quick*$_{it-1}$ | 1.59 | 0.63 | **0.1630** | **0.1017** | **0.0589** | **−0.0613** | −0.0104 | 0.0079 | **−0.0165** | **−0.1513** |
| *V10:chQuick*$_{it}$ | 1.23 | 0.81 | **−0.1994** | **−0.0747** | **0.0361** | **0.0957** | **0.0248** | **0.0887** | **0.1035** | −0.0126 |
| *V11:chQuick*$_{it-1}$ | 1.16 | 0.86 | **0.0755** | −0.0013 | **−0.0726** | **−0.0477** | **0.0560** | **0.0796** | 0.0007 | **0.0352** |
| *V12:Leverage*$_{it-1}$ | 1.46 | 0.69 | **−0.1067** | **−0.0465** | **−0.0312** | **0.0526** | **−0.0244** | **−0.1284** | 0.0165 | **0.0938** |
| *V13:LossBin1*$_{it-1}$ | 1.01 | 0.99 | **−0.0276** | **−0.0178** | **−0.0248** | −0.0059 | **−0.0205** | **−0.0609** | −0.0041 | **−0.0260** |
| *V14:LossBin2*$_{it-1}$ | 1.01 | 0.99 | −0.0106 | −0.0051 | **−0.0257** | 0.0148 | −0.0147 | **−0.0370** | 0.0042 | **−0.0195** |
| *V15:LossBin3*$_{it-1}$ | 1.01 | 0.99 | −0.0146 | −0.0026 | **−0.0199** | 0.0152 | −0.0047 | **−0.0450** | 0.0110 | **−0.0438** |
| *V16:LossBin4*$_{it-1}$ | 1.01 | 0.99 | −0.0085 | −0.0117 | **−0.0296** | 0.0021 | −0.0164 | **−0.0542** | −0.002 | **−0.0205** |
| *V17:Lossbin5*$_{it-1}$ | 1.01 | 0.99 | −0.0044 | 0.0144 | **−0.0248** | **0.0311** | −0.0150 | **−0.0269** | 0.0135 | **−0.0495** |

(Table 7.2 continues on next page)

**Table 7.2 (continued)**

| Variables | V9 | V10 | V11 | V12 | V13 | V14 | V15 | V16 | V17 |
|---|---|---|---|---|---|---|---|---|---|
| *V1:Net_Hire*$_{it}$ | **0.1901** | **−0.1687** | **0.0559** | **−0.1722** | **−0.0422** | 0.0160 | **0.0198** | **−0.0384** | 0.0096 |
| *V2:Sales_Growth*$_{it}$ | **0.1068** | **−0.0700** | **−0.0327** | **−0.0821** | **−0.0306** | −0.0051 | −0.0118 | **−0.0284** | 0.0162 |
| *V3:Sales_Growth*$_{it-1}$ | **0.0964** | **0.0256** | **−0.0739** | **−0.0804** | **−0.0452** | **−0.0368** | **−0.0286** | **−0.0543** | **−0.0431** |
| *V4:chROA*$_{it}$ | **−0.0592** | **0.1159** | **−0.0283** | **0.0393** | 0.0109 | **0.0420** | **0.0517** | **0.0251** | **0.0632** |
| *V5:chROA*$_{it-1}$ | **0.0190** | 0.0121 | **0.1157** | **−0.0443** | **−0.0435** | **−0.0370** | **−0.0354** | **−0.0542** | **−0.0446** |
| *V6:ROA*$_{it}$ | **0.1557** | **0.0979** | **0.0707** | **−0.2587** | **−0.0983** | **−0.0734** | **−0.0824** | **−0.0834** | **−0.0525** |
| *V7:Return*$_{it}$ | −0.0133 | **0.1105** | **0.0260** | **0.0186** | −0.0102 | 0.0151 | 0.0081 | −0.0012 | 0.0082 |
| *V8:Size*$_{it-1}$ | **−0.1988** | −0.0072 | **0.0342** | **0.1446** | **−0.0276** | **−0.0171** | **−0.0404** | **−0.0262** | **−0.0516** |
| *V9:Quick*$_{it-1}$ | | **−0.1872** | **0.2014** | **−0.4984** | **−0.0187** | −0.0141 | −0.0009 | −0.0002 | 0.0052 |
| *V10:chQuick*$_{it}$ | **−0.3062** | | **−0.1902** | **0.0291** | −0.0148 | 0.0029 | −0.0124 | −0.0064 | 0.0018 |
| *V11:chQuick*$_{it-1}$ | **0.2346** | −0.2727 | | **−0.0179** | −0.0039 | −0.0143 | −0.0090 | −0.0017 | −0.0077 |
| *V12:Leverage*$_{it-1}$ | **−0.3398** | 0.0101 | −0.0086 | | **0.0377** | **0.0274** | **0.0291** | **0.0239** | **0.0190** |
| *V13:LossBin1*$_{it-1}$ | 0.0084 | **−0.0240** | 0.0083 | **0.0399** | | −0.0114 | −0.0122 | −0.0106 | −0.0102 |
| *V14:LossBin2*$_{it-1}$ | −0.0148 | 0.0004 | −0.0108 | **0.0275** | −0.0114 | | −0.0106 | −0.0092 | −0.0089 |
| *V15:LossBin3*$_{it-1}$ | 0.0042 | −0.0103 | −0.0154 | **0.0376** | −0.0122 | −0.0106 | | −0.0099 | −0.0095 |
| *V16:LossBin4*$_{it-1}$ | −0.0064 | −0.0007 | −0.0055 | **0.0282** | −0.0106 | −0.0092 | −0.0099 | | −0.0083 |
| *V17:Lossbin5*$_{it-1}$ | 0.0049 | −0.0036 | **−0.0212** | **0.0228** | −0.0102 | −0.0089 | −0.0095 | −0.0083 | |

**Note:** The Pearson (Spearman) correlation coefficients between the variables employed in the expected net hiring regression analyses are presented in the lower (upper) diagonal. Correlations significant at the 0.05 level (two-tailed) are in bold. The variance inflation factor (VIF) and its reciprocal, tolerance, measuring the severity of multicollinearity for the independent variables, are also presented in the first two columns. See Appendix 1 for definitions of all variables.

The results for estimating *Model 1* are presented in Table 7.3. They are generally consistent with those of Jung et al. (2014). In particular, the magnitude and direction of the coefficient of $Sales\_Growth_{it}$ suggests that a 10% increase in sales leads, on average, to an approximately 3.2% increase in $Net\_Hire_{it}$, all else being equal. This compares to 3.6% in Jung et al. (2014). Except for $LossBin1_{it-1}$, all the $LossBins_{it-1}$ are statistically insignificant (Pinnuck & Lillis, 2007). Taken together, the model appears to be well specified with an adjusted $R^2$ of approximately 26%, which is very close to that of Jung et al. (2014) (27.20%). Therefore, the model provides a reasonable benchmark to estimate the expected net hiring. The residuals from this model (the absolute difference between the actual and the expected net hiring) are then captured as over- and under-investment in labour, used as the dependent variables in *Models 2* and *3*.

**Table 7.3: Regression Results for Estimating Over- and Under-Investment in Labour (*Model 1*)**

| Regression Results for Estimating Over- and Under-Investment in Labour (Dependent Variable = Net Hire) | | |
|---|---|---|
| Variable | Predicted Sign | Net-Hire Model |
| *Intercept* | (?) | 0.0020 |
| | | (−0.05) |
| $Sales\_Growth_{it}$ | (+) | 0.3190 |
| | | (8.76)*** |
| $Sales\_Growth_{it-1}$ | (+) | 0.0394 |
| | | (2.34)** |
| $chROA_{it}$ | (−) | −0.3450 |
| | | (−7.56)*** |
| $chROA_{it-1}$ | (+) | −0.0835 |
| | | (−4.24)*** |
| $ROA_{it}$ | (+) | 0.3029 |
| | | (6.82)*** |
| $Return_{it}$ | (+) | 0.0156 |
| | | (3.67)*** |
| $Size\_R_{it-1}$ | (+) | −0.0002 |
| | | (−0.97) |
| $Quick_{it-1}$ | (+) | 0.0054 |
| | | (3.34)*** |
| $chQuick_{it}$ | (+) | −0.0319 |
| | | (−7.13)*** |
| $chQuick_{it-1}$ | (+/−) | 0.0015 |
| | | (0.53) |
| $Leverage_{it-1}$ | (+/−) | −0.0489 |
| | | (−3.08)*** |
| $LossBin1_{it-1}$ | (−) | −0.0286 |
| | | (−2.72)*** |
| $LossBin2_{it-1}$ | (−) | 0.0043 |
| | | (0.34) |
| $LossBin3_{it-1}$ | (−) | −0.0122 |
| | | (−0.93) |
| $LossBin4_{it-1}$ | (−) | 0.0190 |
| | | (0.66) |
| $lossbin5_{it-1}$ | (−) | −0.0035 |
| | | (−0.16) |
| *Industry Fixed Effects* | | YES |
| *Year Fixed Effects* | | YES |
| *Adj.* $R^2$ | | 25.99% |
| *N* | | 12118 |

**Note:** *** and ** denote significance at 1% and 5% levels, respectively. Variables are defined in Appendix 1. *P*-values are based on two-tailed tests. T-statistics are shown below each estimate. Panel C presents the regression results for estimating over- (under-) investment in labour, which are the dependent variables in the models used to test the hypotheses of the thesis.

### 7.2 Descriptive Statistics for Variables in *Models 2* and *3*

The descriptive statistics for the variables in *Models 2 and 3* are presented in Table 7.4. Notably, the means (medians) of $SOPit_{-1}$ and $RSTK_{it-1}$ are $360,000 (0) and $40,662 (0), respectively. The high values of the standard deviation for $SOP_{it-1}$ ($1,919,459) and $RSTK_{it-1}$ ($513,893) demonstrate a high level of disparity in executives' stock options and restricted stock compensation. These results are comparable to those of Ryan and Wiggins (2002) and Năstăsescu (2009), who find a high level of variability in executives' equity compensation. Also, the means (medians) of $/Ab\_Invest\_Other/_{it}$, $Quick_{it-1}$ and $Tangibles_{it-1}$ are 0.0935 (0.0695), 1.7518 (1.2210) and 0.3072 (0.2334), respectively. These are all comparable to those reported by Jung et al. (2014) (i.e., 0.0935 (0.0799) for $/Ab\_Invest\_Other/_{it,}$ 1.7169 (1.1417) for $Quick_{it-1}$ and 0.3362 (0.2773) for $Tangibles_{it-1}$). Turning to the distributional characteristics of the variables, the variables that are non-normally distributed or positively and negatively skewed, are transformed using logarithmic and square root transformations (see Appendix 2 for histograms of the original variables). The transformed variables are then used for the analysis. Therefore, none of the values of the variables used in the main analysis deviates from zero, suggesting that there are no issues of normality (Hair et al., 2014).

## Table 7.4: Descriptive Statistics for Variables in Testing Models^

| **Distributional Statistics** | | | | | | |
|---|---|---|---|---|---|---|
| Variable | N | Mean | Std. Dev. | Q1 | Median | Q3 |
| $SOP_{it-1}$ | 12118 | 1.1340 | 2.4233 | 0.0000 | 0.0000 | 0.0000 |
| $SOP_{it-1}$ *(dollar value ($))* | 12118 | 360,000 | 1919459 | 0 | 0 | 0 |
| $RSTK_{it-1}$ | 12118 | 0.1011 | 0.6447 | 0.0000 | 0.0000 | 0.0000 |
| $RSTK_{it-1}$ *(dollar value($))* | 12118 | 40662 | 513893 | 0 | 0 | 0 |
| $MTB_{it-1}$ | 12118 | 0.8356 | 0.6933 | 0.3774 | 0.7748 | 1.2335 |
| $FirmSize_{it-1}$ | 12118 | 7.2455 | 1.5958 | 6.1331 | 7.1253 | 8.2915 |
| $Quick_{it-1}$ | 12118 | 1.7518 | 1.9099 | 0.7792 | 1.2210 | 1.9843 |
| $Lev_{it-1}$ | 12118 | 0.2084 | 0.1689 | 0.0457 | 0.1996 | 0.3268 |
| $DivDum_{it-1}$ | 12118 | 0.5307^ | 0.4991 | 0.0000 | 1.0000 | 1.0000 |
| $Std\_CFO_{it-1}$ | 12118 | 0.0442 | 0.0467 | 0.0186 | 0.0321 | 0.0540 |
| $Std\_Sales_{it-1}$ | 12118 | 0.1234 | 0.1278 | 0.0471 | 0.0865 | 0.1545 |
| $Tangibles_{it-1}$ | 12118 | 0.3072 | 0.2407 | 0.1090 | 0.2334 | 0.4644 |
| $Loss_{it-1}$ | 12118 | 0.1678^ | 0.3737 | 0.0000 | 0.0000 | 0.0000 |
| $Insti_{it-1}$ | 12118 | 0.6888 | 0.2295 | 0.5463 | 0.7224 | 0.8579 |
| $Std\_Net\_Hire_{it-1}$ | 12118 | 0.1623 | 0.2504 | 0.0518 | 0.0958 | 0.1804 |
| $Labour\_Intensity_{it-1}$ | 12118 | 0.0063 | 0.0085 | 0.0017 | 0.0037 | 0.0072 |
| $EQ_{it-1}$ | 12118 | −0.0414 | 0.0347 | −0.0511 | −0.0328 | −0.0205 |
| $/Ab\_Invest\_Other/_{it}$ | 12118 | 0.0935 | 0.1029 | 0.0337 | 0.0695 | 0.1184 |
| $Lab\_Union_{it-1}$ | 12118 | 14.0692 | 9.4743 | 8.1909 | 12.3100 | 16.2000 |
| $OwnCEO_{it-1}$ | 12118 | −0.2400 | 1.2900 | −0.4900 | 0.0000 | 0.0000 |
| $Inefficient\_Investment_{it}$ | 12118 | 0.1126 | 0.1643 | 0.0375 | 0.0763 | 0.1302 |
| $Over\_Investment_{it}$ | 3718 | 0.1428 | 0.2357 | 0.0286 | 0.0680 | 0.1495 |
| $Under\_Investment_{it}$ | 8400 | 0.0970 | 0.0853 | 0.0413 | 0.0783 | 0.1255 |

**Note:** This table presents the descriptive statistics of the variables used in the testing models. The testing models are used to test the hypotheses. The definitions of the variables are in Appendix 1. $^{}DivDum_{it-1}$ and $Loss_{it-1}$ represent the percentage of firm-year observations.

The Pearson (lower diagonal) and Spearman (upper diagonal) correlations for the over-investment model (i.e., *Model 2*) are presented in Table 7.5. Consistent with the predictions of Hypotheses *1a* and *1b*, $SOP_{it-1}$ and $RSTK_{it-1}$ show positive and negative signs on their coefficients, respectively, providing initial empirical evidence that stock options exacerbate over-investment in labour while restricted stock mitigates over-investment in labour. Notably and as expected, $Std\_CFO_{it-1}$, $Std\_Sales_{it-1}$ and $Std\_Net\_Hire_{it-1}$ are significantly positively correlated with over-investment in labour, suggesting that a greater deviation of cash flow from operations, sales and net hiring above the mean is associated with a larger over-investment in labour.

In addition, $/Ab\_Invest\_Other/_{it}$ is found to be significant and positively correlated with over-investment in labour, suggesting that a higher deviation from non-labour investments such as capital, R&D and acquisition is associated with a greater over-investment in labour.[16] Similar to Jung et al.'s (2014) findings, the initial correlation evidence shows a significant negative association between $EQ_{it-1}$ and over-investment in labour. There are no incidences of high correlations between and among all the independent variables, implying that there are no issues of multicollinearity.

[16] This provides an initial suggestion that investments in labour and other non-labour investments are complementary (not substitutes), confirming the findings of Ben-Nasr and Alshwer (2016) and Jung et al. (2014).

**Table 7.5: Pearson and Spearman Correlations, Variance Inflation Factors and Tolerance for Variables in Over-Investment Model (*Model 2*)**

| **Pearson and Spearman Correlation Matrix with Variance Inflation Factor and Tolerance** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Variables* | VIF | Tolerance | *V1* | *V2* | *V3* | *V4* | *V5* | *V6* | *V7* | *V8* | *V9* |
| *V1:Over-Investment$_{it}$* | | | | **0.1476** | 0.0143 | **0.0669** | **−0.1253** | **0.1413** | **−0.0671** | **−0.1322** | **0.0926** |
| *V2:SOP$_{it-1}$* | 1.39 | 0.72 | **0.0823** | | **0.1577** | **−0.0556** | **−0.2236** | **−0.0320** | **0.0472** | **0.0675** | 0.0177 |
| *V3RSTK$_{it-1}$* | 1.07 | 0.93 | −0.0069 | **0.1429** | | **−0.0592** | **−0.0763** | −0.0042 | 0.0306 | **0.0337** | 0.0178 |
| *V4:MTB$_{it-1}$* | 1.76 | 0.57 | **0.0388** | **0.0292** | **−0.0391** | | **0.3125** | **0.1467** | **−0.1839** | **−0.0964** | **0.0743** |
| *V5:FirmSize$_{it-1}$* | 2.42 | 0.41 | **−0.0989** | **−0.0404** | **−0.0651** | **0.3608** | | **−0.1818** | **0.1777** | **0.2420** | **−0.3030** |
| *V6:Quick$_{it-1}$* | 1.40 | 0.71 | **0.1478** | **−0.0447** | **−0.0243** | **0.0501** | **−0.1680** | | **−0.5294** | **−0.3163** | **0.2549** |
| *V7:Lev$_{it-1}$* | 1.56 | 0.64 | **−0.0378** | **0.0395** | **0.0509** | **−0.0776** | **0.0966** | **−0.3398** | | **0.2060** | **−0.2318** |
| *V8:DivDum$_{it-1}$* | 1.51 | 0.66 | **−0.0812** | **0.0595** | **0.0524** | 0.008 | **0.3162** | **−0.2326** | **0.1385** | | **−0.2400** |
| *V9:Std_CFO$_{it-1}$* | 1.66 | 0.60 | **0.0884** | 0.0066 | −0.0146 | **0.1041** | **−0.2637** | **0.1704** | **−0.1824** | **−0.2203** | |
| *V10:Std_Sales$_{it-1}$* | 1.37 | 0.73 | **0.0799** | −0.0130 | **−0.0194** | 0.0004 | **−0.1754** | 0.0025 | **−0.0879** | **−0.1131** | **0.3128** |
| *V11:Tangibles$_{it-1}$* | 3.32 | 0.30 | **−0.0545** | **0.0697** | **0.0766** | **−0.1815** | **0.0723** | **−0.2789** | **0.3646** | **0.2239** | **−0.1808** |
| *V12:Loss$_{it-1}$* | 1.26 | 0.79 | 0.0241 | **0.0244** | −0.0056 | **−0.1907** | **−0.2920** | **0.0409** | **0.0712** | **−0.2088** | **0.1682** |
| *V13:Insti$_{it-1}$* | 1.92 | 0.52 | **−0.0488** | **−0.1939** | **−0.0670** | **0.0948** | **0.2896** | **0.0245** | **−0.0197** | **−0.1242** | **−0.0912** |
| *V14:Std_Net_Hire$_{it-1}$* | 1.13 | 0.88 | **0.1198** | **0.0198** | **−0.0194** | **−0.0207** | **−0.0853** | **0.0555** | **0.0238** | **−0.1779** | **0.1328** |
| *V15:Labour_Intensity$_{it-1}$* | 2.13 | 0.47 | −0.0078 | **0.0642** | 0.0099 | **0.0568** | **−0.2208** | **−0.0698** | **−0.1195** | **−0.0654** | −0.0024 |
| *V16:EQ$_{it-1}$* | 1.66 | 0.60 | **−0.1096** | **−0.0257** | **0.0195** | **−0.0893** | **0.2739** | **−0.0919** | **0.1688** | **0.2310** | **−0.4943** |
| *V17:/Ab_Invest_Other/* | 1.16 | 0.86 | **0.4132** | **−0.0188** | **−0.0294** | **0.1034** | **−0.0232** | **0.0956** | **−0.0686** | **−0.1101** | **0.0862** |
| *V18:Lab_Union$_{it-1}$* | 3.47 | 0.28 | **−0.0340** | **0.1160** | **0.0979** | **−0.1535** | **0.0353** | **−0.1354** | **0.1908** | **0.2356** | **−0.0855** |
| *V19:OwnCEO$_{it-1}$* | 1.28 | 0.78 | 0.0233 | **0.1042** | **0.0346** | −0.0157 | **−0.3067** | **0.0652** | **−0.0648** | **−0.1204** | **0.0812** |

(Table 7.5 continues on next page)

**Table 7.5 (continued)**

| *Variables* | *V10* | *V11* | *V12* | *V13* | *V14* | *V15* | *V16* | *V17* | *V18* | *V19* |
|---|---|---|---|---|---|---|---|---|---|---|
| *V1:Over-Investment*$_{it}$ | **0.0838** | **−0.0772** | 0.0275 | **−0.0383** | **0.1564** | 0.0299 | **−0.1047** | **0.2331** | **−0.0640** | **0.0544** |
| *V2:SOP*$_{it-1}$ | 0.0193 | **0.1061** | **0.0505** | **−0.2460** | **0.0266** | **0.1543** | −0.0057 | 0.0163 | **0.1462** | **0.0512** |
| *V3:RSTK*$_{it-1}$ | −0.0125 | **0.0561** | 0.0216 | −0.0544 | 0.0049 | 0.0260 | 0.0096 | 0.0202 | **0.0381** | 0.0246 |
| *V4:MTB*$_{it-1}$ | **0.0381** | **−0.2279** | **−0.1925** | 0.1046 | −0.0252 | **0.1849** | **−0.1458** | **0.1391** | −0.2272 | 0.0343 |
| *V5:FirmSize*$_{it-1}$ | **−0.2287** | **0.0756** | **−0.2664** | **0.3464** | **−0.1631** | **−0.3358** | **0.2282** | **−0.0597** | **0.0739** | **−0.2748** |
| *V6:Quick*$_{it-1}$ | **0.1229** | **−0.4987** | **0.0417** | **0.0969** | **0.1827** | **0.0644** | **−0.2298** | **0.1662** | **−0.1969** | **0.1278** |
| *V7:Lev*$_{it-1}$ | **−0.1639** | **0.4219** | **0.0421** | **−0.0254** | **−0.0781** | **−0.2241** | **0.2367** | **−0.1057** | **0.2197** | **−0.1018** |
| *V8:DivDum*$_{it-1}$ | **−0.1470** | **0.2969** | **−0.1638** | **−0.1817** | **−0.2774** | **−0.1062** | **0.2409** | **−0.1391** | **0.2441** | **−0.1453** |
| *V9:Std_CFO*$_{it-1}$ | **0.4456** | **−0.2031** | **0.1078** | **−0.0397** | **0.2431** | **0.0794** | **−0.4898** | **0.1183** | **−0.0929** | **0.1296** |
| *V10:Std_Sales*$_{it-1}$ | | **−0.2052** | 0.0307 | −0.0042 | **0.2715** | **0.2330** | **−0.3675** | **0.0822** | **−0.1519** | **0.0767** |
| *V11:Tangibles*$_{it-1}$ | **−0.1780** | | −0.0033 | **−0.2029** | **−0.1615** | **−0.1001** | **0.2942** | **−0.1299** | **0.3844** | **−0.1077** |
| *V12:Loss*$_{it-1}$ | **0.0620** | **−0.0336** | | **−0.0930** | **0.1238** | **−0.0638** | **−0.1560** | **0.0443** | 0.0287 | **0.0329** |
| *V13:Insti*$_{it-1}$ | −0.0062 | **−0.1813** | **−0.1021** | | **0.0401** | **−0.1386** | 0.0135 | 0.0176 | **−0.1644** | **−0.0498** |
| *V14:Std_Net_Hire*$_{it-1}$ | **0.2127** | **−0.0730** | **0.0853** | −0.0006 | | **0.0426** | **−0.2127** | **0.1082** | **−0.1015** | **0.0603** |
| *V15:Labour_Intensity*$_{it-1}$ | **0.1086** | −0.0036 | **−0.0457** | **−0.0939** | **0.0392** | | **−0.2136** | **0.0410** | **−0.2839** | **0.2112** |
| *V16:EQ*$_{it-1}$ | **−0.3516** | **0.2652** | **−0.1956** | **0.0700** | **−0.1449** | **−0.0404** | | **−0.1564** | **0.1829** | **−0.1563** |
| *V17:/Ab_Invest_Other/* | **0.0422** | **−0.1077** | **0.0269** | 0.0162 | **0.0681** | 0.0018 | **−0.0940** | | **−0.1420** | **0.0466** |
| *V18:Lab_Union*$_{it-1}$ | **−0.1373** | **0.4466** | **−0.0340** | **−0.2397** | **−0.0726** | **−0.2122** | **0.1743** | **−0.1301** | | **−0.1000** |
| *V19:OwnCEO*$_{it-1}$ | **0.0554** | **−0.0550** | **0.0306** | **−0.0833** | **0.0372** | **0.1532** | **−0.0826** | −0.0053 | **−0.0719** | |

**Note:** The Pearson (Spearman) correlation coefficients between the variables employed in the over-investment regression analyses are presented in the lower (upper) diagonal. Correlations significant at the 0.05 level (two-tailed) are in bold. The variance inflation factor (VIF) and its reciprocal, tolerance, measuring the severity of multicollinearity for the independent variables, are also presented in the first two columns. See Appendix 1 for definitions of all variables.

The Pearson (lower diagonal) and Spearman (upper diagonal) correlations for the under-investment model (*Model 3*) are presented in Table 7.6. The initial correlation evidence shows no association between $SOP_{it-1}$, $RSTK_{it-1}$ and under-investment in labour.[17] In particular, while there is a positive and significant association between $Std\_CFO_{it-1}$, $Std\_Sales_{it-1}$, $Std\_Net\_Hire_{it-1}$, /Ab_Invest_Other/$_{it}$ and under-investment, $EQ_{it-1}$ is negatively correlated with under-investment in labour. These results are comparable to those of Jung et al. (2014), who also find that the standard deviations of cash flow from operations, sales, net hiring and inefficient investments in other non-labour projects are positively correlated with under-investment in labour, and earnings quality is negatively correlated with under-investment in labour.

In terms of the correlations between the independent variables, all (except for the correlation between $Lab\_Union_{it-1}$ and $Tangibles_{it-1}$) have a correlation coefficient below 0.4, a value far below the threshold of 0.7 (Sekaran, 2000) for multicollinearity. A further assessment of the multicollinearity issue between $Lab\_Union_{it-1}$ and $Tangibles_{it-1}$ shows that these two constructs are not highly correlated, as the VIF (tolerance) values for $Lab\_Union_{it-1}$ and $Tangibles_{it-1}$ are 3.43 (0.29) and 3.07 (0.33), respectively.

[17] However, my subsequent regression results show that the relation is negative.

**Table 7.6: Pearson and Spearman Correlations, Variance Inflation Factors and Tolerance for Variables in Under-Investment Model (*Model 3*)**

| **Pearson and Spearman Correlation Matrix with Variance Inflation Factor and Tolerance** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| *Variables* | VIF | Tolerance | V1 | V2 | V3 | V4 | V5 | V6 | V7 | V8 |
| *V1:Under-Investment$_{it}$* | | | | **0.1384** | 0.0020 | **−0.0747** | **−0.0993** | **0.0239** | 0.0030 | **−0.0625** |
| *V2:SOP$_{it-1}$* | 1.67 | 0.60 | 0.0447 | | **0.1534** | **0.0624** | **−0.0594** | **−0.0710** | **0.0373** | **0.0387** |
| *V3:RSTK$_{it-1}$* | 1.07 | 0.94 | −0.0125 | **0.1429** | | **−0.0409** | **−0.0771** | **−0.0386** | **0.0580** | **0.0495** |
| *V4:MTB$_{it-1}$* | 1.53 | 0.65 | **−0.0694** | **0.0292** | **−0.0391** | | **0.3858** | **0.0672** | **−0.1102** | **0.0762** |
| *V5:FirmSize$_{it-1}$* | 2.22 | 0.45 | **−0.1402** | **−0.0404** | **−0.0651** | **0.3608** | | **−0.2034** | **0.1229** | **0.3275** |
| *V6:Quick$_{it-1}$* | 1.38 | 0.73 | **0.0743** | **−0.0447** | **−0.0243** | **0.0501** | **−0.1680** | | **−04750** | **−0.3044** |
| *V7:Lev$_{it-1}$* | 1.52 | 0.66 | 0.0066 | **0.0395** | **0.0509** | **−0.0776** | **0.0966** | **−0.3398** | | **0.1485** |
| *V8:DivDum$_{it-1}$* | 1.49 | 0.67 | **−0.0934** | **0.0595** | **0.0524** | 0.0080 | **0.3162** | **−0.2326** | **0.1385** | |
| *V9:Std_CFO$_{it-1}$* | 1.50 | 0.67 | **0.1481** | 0.0066 | −0.0146 | **0.1041** | **−0.2637** | **0.1704** | **−0.1824** | **−0.2203** |
| *V10:Std_Sales$_{it-1}$* | 1.36 | 0.73 | **0.0791** | −0.0130 | **−0.0194** | 0.0004 | **−0.1754** | 0.0025 | **−0.0879** | **−0.1131** |
| *V11:Tangibles$_{it-1}$* | 3.07 | 0.33 | −0.0060 | **0.0697** | **0.0766** | **−0.1815** | **0.0723** | **−0.2789** | **0.3646** | **0.2239** |
| *V12:Loss$_{it-1}$* | 1.29 | 0.77 | **0.1858** | **0.0244** | −0.0056 | **−0.1907** | **−0.2920** | **0.0409** | **0.0712** | **−0.2088** |
| *V13:Insti$_{it-1}$* | 1.88 | 0.53 | **−0.1208** | **−0.1939** | **−0.0670** | **0.0948** | **0.2896** | **0.0245** | **−0.0197** | **−0.1242** |
| *V14:Std_Net_Hire$_{it-1}$* | 1.15 | 0.87 | **0.1067** | **0.0198** | **−0.0194** | **−0.0207** | **−0.0853** | **0.0555** | **0.0238** | **−0.1779** |
| *V15:Labour_Intensity$_{it-1}$* | 1.77 | 0.57 | **0.0504** | **0.0642** | 0.0099 | **0.0568** | **−0.2208** | **−0.0698** | **−0.1195** | **−0.0654** |
| *V16:EQ$_{it-1}$* | 1.60 | 0.62 | **−0.1478** | **−0.0257** | **0.0195** | **−0.0893** | **0.2739** | **−0.0919** | **0.1688** | **0.2310** |
| *V17:/Ab_Invest_Other/* | 1.53 | 0.66 | **0.0969** | **−0.0188** | **−0.0294** | **0.1034** | **−0.0232** | **0.0956** | **−0.0686** | **−0.1101** |
| *V18:Lab_Union$_{it-1}$* | 3.43 | 0.29 | **−0.0214** | **0.1160** | **0.0979** | **−0.1535** | **0.0353** | **−0.1354** | **0.1908** | **0.2356** |
| *V19:OwnCEO$_{it-1}$* | 1.27 | 0.79 | **0.0430** | **0.1042** | **0.0346** | −0.0157 | **−0.3067** | **0.0652** | **−0.0648** | **−0.1204** |

(Table 7.6 continues on next page)

**Table 7.6 (continued)**

| *Variables* | *V9* | *V10* | *V11* | *V12* | *V13* | *V14* | *V15* | *V16* | *V17* | *V18* | *V19* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *V1:Under-Investment*$_{it}$ | **0.0844** | 0.0457 | 0.0070 | **0.1495** | **−0.1039** | **0.0922** | **0.0796** | **−0.1240** | **0.0952** | **−0.0236** | **0.0511** |
| *V2:SOP*$_{it-1}$ | **0.0352** | −0.041 | **0.1084** | 0.0147 | **−0.2324** | **0.0240** | **0.1451** | **−0.0412** | **−0.0235** | **0.1358** | **0.1066** |
| *V3:RSTK*$_{it-1}$ | −0.0066 | −0.0201 | **0.0878** | −0.0117 | **−0.0790** | **−0.0283** | 0.0189 | 0.0195 | **−0.0499** | **0.0927** | **0.0320** |
| *V4:MTB*$_{it-1}$ | **0.0298** | 0.0036 | **−0.1426** | **−0.2023** | **0.0572** | **−0.0708** | **0.0960** | **−0.0318** | **0.0450** | **−0.1015** | **−0.0021** |
| *V5:FirmSize*$_{it-1}$ | **−0.3007** | **−0.2011** | **0.0687** | **0.2911** | **0.2491** | **−0.1957** | **−0.3066** | **0.2922** | 0.0002 | **0.0502** | **−0.2715** |
| *V6:Quick*$_{it-1}$ | **0.2439** | **0.0973** | **−0.3983** | **0.0350** | **0.1003** | **0.1609** | 0.0099 | **−0.2157** | **0.1432** | **−0.1134** | **0.0733** |
| *V7:Lev*$_{it-1}$ | **−0.2346** | **−0.1377** | **0.3565** | **0.0447** | −0.0190 | **−0.0570** | **−0.1473** | **0.2293** | **−0.0517** | **0.1069** | **−0.0763** |
| *V8:DivDum*$_{it-1}$ | **−0.2513** | **−0.1542** | **0.2456** | **−0.2370** | **−0.1467** | **−0.2768** | **−0.0341** | **0.2578** | **−0.1150** | **0.1741** | **−0.1315** |
| *V9:Std_CFO*$_{it-1}$ | | **0.4364** | **−0.1816** | **0.1676** | −0.0110 | **0.2868** | **0.0908** | **−0.4884** | **0.0398** | **−0.0743** | **0.0890** |
| *V10:Std_Sales*$_{it-1}$ | **0.3128** | | **−0.2090** | **0.0929** | **0.0541** | **0.3343** | **0.1892** | **−0.3876** | **0.0360** | **−0.1254** | **0.0552** |
| *V11:Tangibles*$_{it-1}$ | **−0.1808** | **−0.1780** | | **−0.0559** | **−0.2262** | **−0.1853** | **−0.0570** | **0.2976** | **−0.2331** | **0.3703** | **−0.0436** |
| *V12:Loss*$_{it-1}$ | **0.1682** | **0.0620** | **−0.0336** | | **−0.0758** | **0.1640** | **−0.0563** | **−0.2139** | **0.0762** | −0.0129 | 0.0160 |
| *V13:Insti*$_{it-1}$ | **−0.0912** | −0.0062 | **−0.1813** | **−0.1021** | | **0.0406** | **−0.0860** | **−0.0147** | **0.0407** | **−0.1872** | **−0.0458** |
| *V14:Std_Net_Hire*$_{it-1}$ | **0.1328** | **0.2127** | **−0.0730** | **0.0853** | −0.0006 | | 0.0205 | **−0.2801** | **0.1066** | **−0.1035** | **0.0669** |
| *V15:Labour_Intensity*$_{it-1}$ | −0.0024 | **0.1086** | −0.0036 | **−0.0457** | **−0.0939** | **0.0392** | | **−0.1567** | **−0.0392** | **−0.2137** | **0.2021** |
| *V16:EQ*$_{it-1}$ | **−0.4943** | **−0.3516** | **0.2652** | **−0.1956** | **0.0700** | **−0.1449** | **−0.0404** | | **−0.0845** | **0.1535** | **−0.0990** |
| *V17:/Ab_Invest_Other/* | **0.0862** | **0.0422** | **−0.1077** | **0.0269** | 0.0162 | **0.0681** | 0.0018 | **−0.0940** | | **−0.1594** | **−0.0262** |
| *V18:Lab_Union*$_{it-1}$ | **−0.0855** | **−0.1373** | **0.4466** | **−0.0340** | **−0.2397** | **−0.0726** | **−0.2122** | **0.1743** | **−0.1301** | | **−0.0505** |
| *V19:OwnCEO*$_{it-1}$ | **0.0812** | **0.0554** | **−0.0550** | **0.0306** | **−0.0833** | **0.0372** | **0.1532** | **−0.0826** | −0.0053 | **−0.0719** | |

**Note:** The Pearson (Spearman) correlation coefficients between the variables employed in the under-investment regression analyses are presented in the lower (upper) diagonal. Correlations significant at the 0.05 level (two-tailed) are in bold. The variance inflation factor (VIF) and its reciprocal, tolerance, measuring the severity of multicollinearity for the independent variables are also presented in the first two columns. See Appendix 1 for definitions of all variables.

## 7.3 Main Empirical Results

The previous section provided a descriptive analysis of the variables contained in *Models 2* and *3*. This section presents the results of the hypothesis tests. Subsections 7.3.1 and 7.3.2 discuss the main results relating to *H1* and *H2*, respectively. Section 8.3 in Chapter 8 presents the sensitivity analysis.

### *7.3.1 Stock Options, Restricted Stock and Over-Investment*

The results reported in Table 7.7 Column 2 provide evidence that supports Hypotheses *1a* and *1b*, suggesting that stock options (or restricted stock) granted to executives exacerbate (or mitigates) over-investment in labour. Specifically, while the estimated coefficient of stock options (*SOP*) is positive and significant at the 5% level (0.0073; t=2.04), the coefficient of restricted stock (*RSTK*) is negative and significant at the 5% level (−0.0176; t=−2.33). In addition, other firm fundamentals appear to affect over-investment in labour. Notably, and consistent with Jung et al. (2014), firms with higher leverage (*Lev*), more liquidity (*Quick*) and greater inefficient investment in other non-labour projects tend to over-invest in labour. Greater variation in operating cash flows, sales and net hiring (*Std_CFO*, *Std_Sales* and *Std_Net_Hire*) are all also associated with greater over-investment in labour. Earnings quality (*EQ*) is negatively and significantly (−0.329; t=−2.14) associated with over-investment in labour; this result lends support to Jung et al.'s (2014) finding that higher earnings quality mitigates over-investment in labour. CEO ownership (*OwnCEO*) is statistically insignificant in its association with over-investment in labour.

The economic significance of the relationship is such that an increase of one standard deviation in stock options is associated with a 12.39% increase in labour over-

investment. Conversely, an increase of one standard deviation in restricted stock is associated with an 87.95% decrease in labour over-investment.[18]

*7.3.2 Stock Options, Restricted Stock and Under-Investment*

Stock options and restricted stock granted to executives are both found to mitigate under-investment in labour (see Table 7.7, Column 3). The coefficients of stock options (*SOP*) (−0.0009; t=−2.12) and restricted stock (*RSTK*) (−0.0028; t=−2.66) are negative and significant at the 5% and 1% levels, respectively. Further, most control variables are significant and are in the predicted direction. For example, consistent with the correlation analysis presented in Table 7.6, firms with lower profitability (*Loss*) tend to under-invest in labour; firms that experience greater volatility in their operating cash flows, sales and past net hiring (*Std_CFO*, *Std_Sales* and *Std_Net_Hire*) also tend to under-invest in labour. Consistent with Jung et al. (2014), earnings quality (*EQ*) is negatively associated with under-investment. While labour union (*Lab_Union*) is found to be statistically insignificant, non-labour investment (/Ab_Invest_Other/) is positive and statistically significant at the 1% level. This finding shows that labour investment complements other forms of investment, supporting the argument advanced and tested by Jung et al. (2014) in their study. Finally, CEO ownership (*OwnCEO*) is negative and statistically significant at the 10% level, suggesting that CEOs who already own stock before they are granted stock options or restricted stock are less likely to engage in under-investment activities. Turning to the economic significance, a change of one

[18] To calculate the economic significance, the standard deviation of stock options (2.4233) is multiplied by its beta coefficient (0.0073) and the resultant value is divided by the mean of over-investment in labour (0.1428). This results in a value of 12.39% (2.4233*0.0073/0.1428). A similar approach is adopted for restricted stock in the over-investment model.

standard deviation in the value of stock options or restricted stock is associated with decreases in under-investment in labour by 2.25% or 1.86%, respectively.

So far the above analyses have been conducted on the association between stock options, restricted stock and over- (under-) investment in labour. That approach is adopted because theory has ambiguous predictions (Ross, 1973; Murphy, 1999) with regards to both under-investment and over-investment, and Baxamusa (2012) concludes that agency cost could be under-investment or over-investment and these should be analysed separately when examining the effects of incentive pay on them. However, in this thesis in addition to analysing the separate effects of stock options and restricted stock on over- (under-) investment in labour, the effect of the same components of equity compensation on inefficient labour investment is explored because, as argued earlier, managers' labour investment decisions is different from other forms of investment. The results for the full sample (inefficient labour investment) show that both stock options and restricted stock granted to executives mitigate inefficient labour investments. The results are presented in Column 1 of Table 7.7. The estimated coefficient for stock options is negative and significant at the 10% level (-0.0013; t=-1.85) while that of restricted stock is negative significant at 1% level (-0.0043; t=-3.07), implying that restricted stock might have the greatest impact on inefficient labour investment.

**Table 7.7: Relationships between Inefficient Labour Investment, Over-Investment, Under-Investment, Stock Options and Restricted Stock**

| Variable | Predicted Sign | Inefficient Labour Investments (Abnormal Net Hiring) | Over-Investment (Positive Abnormal Net Hiring Subsample) | Under-Investments (Negative Abnormal Net Hiring Subsample) |
|---|---|---|---|---|
| | | (1) | (2) | (3) |
| *Intercept* | (?) | 0.0396 | 0.0059 | 0.0718 |
| | | (1.81)* | (0.10) | (5.45)*** |
| $SOP_{it-1}$ | (+/−) | −0.0013 | 0.0073 | −0.0009 |
| | | (−1.85)* | (2.04)** | (−2.12)** |
| $RSTK_{it-1}$ | (−) | −0.0043 | −0.0176 | −0.0028 |
| | | (−3.07)*** | (−2.33)** | (−2.66)*** |
| $MTB_{it-1}$ | (+) | −0.0009 | −0.0011 | −0.0103 |
| | | (−0.32) | (−0.16) | (−5.62)*** |
| $FirmSize_{it-1}$ | (+/−) | −0.0002 | 0.0003 | 0.0000 |
| | | (−1.13) | (−0.84) | (0.25) |
| $Quick_{it-1}$ | (+) | 0.0090 | 0.0151 | 0.0032 |
| | | (5.88)*** | (5.05)*** | (4.35)*** |
| $Lev_{it-1}$ | (+) | −0.0011 | 0.0214 | 0.0149 |
| | | (−0.09) | (0.68) | (2.12)** |
| $DivDum_{it-1}$ | (−) | −0.0056 | −0.0013 | 0.0007 |
| | | (−1.40) | (−0.14) | (0.32) |
| $Std\_CFO_{it-1}$ | (+) | 0.1842 | 0.0354 | 0.1383 |
| | | (2.38)** | (0.39) | (2.07)** |
| $Std\_Sales_{it-1}$ | (+) | 0.0147 | 0.0185 | 0.0140 |
| | | (0.90) | (0.55) | (1.23) |
| $Tangibles_{it-1}$ | (−) | −0.0079 | −0.0493 | −0.0100 |
| | | (−0.74) | (−1.89)* | (−1.30) |
| $Loss_{it-1}$ | (−) | 0.0199 | −0.0013 | 0.0290 |
| | | (3.93)*** | (−0.10) | (9.48)*** |
| $Insti_{it-1}$ | (−) | −0.0070 | −0.0012 | −0.0165 |
| | | (−0.72) | (−0.05) | (−2.68)*** |
| $Std\_Net\_Hire_{it-1}$ | (+) | 0.0302 | 0.0716 | 0.0121 |
| | | (3.01)*** | (3.38)*** | (2.26)** |
| $Labour\_Intensity_{it-1}$ | (−) | −0.6098 | −2.0881 | 0.1738 |
| | | (−2.61)*** | (−3.75)*** | (0.99) |
| $EQ_{it-1}$ | (−) | −0.1678 | −0.3291 | −0.1666 |
| | | (−2.24) | (−2.14)** | (−3.55)*** |
| $/Ab\_Invest\_Other/_{it}$ | (+) | 0.5398 | 0.6449 | 0.0586 |
| | | (10.96)*** | (12.5)*** | (2.73)*** |
| $Lab\_Union_{it-1}$ | (−) | 0.0005 | 0.0005 | 0.0003 |
| | | (1.45) | (0.54) | (1.50) |
| $OwnCEO_{it}$ | (−) | −0.0017 | −0.0039 | −0.0017 |
| | | (−1.37) | (−1.46) | (−1.94)* |
| *Year fixed effects* | | YES | YES | YES |
| *Industry fixed effects* | | YES | YES | YES |
| *(Adj.)* $R^2$ | | 15.78% | 23.88% | 13.00% |
| *N* | | 12188 | 3734 | 8384 |

**Note:** ***, ** and * denote significance at 1%, 5% and 10% levels, respectively. This table presents the results of associations between inefficient labour investment, stock options and restricted stock. Variables are defined in Appendix 1. *P*-values are based on two-tailed tests, with standard errors clustered by firm. T-statistics are shown below each estimate (in parentheses).

## 7.4 Conclusion

The results support Hypotheses *1a, 1b, 2a* and *2b* of the thesis. Stock options as a component of equity compensation are positively (or negatively) associated with over-investment (or under-investment), while restricted stock is negatively associated with both over-investment and under-investment in labour. These results remain qualitatively the same after: using alternative proxies such as industry median of net hiring, lagged sales growth and industry trends to capture over- and under-investment in labour; including additional controls such as managerial ability, corporate governance, cash bonuses and salary, and stock price informativeness; and addressing endogeneity concerns using two-stage least squares (2SLS), firm fixed effects regression, PSM technique, difference-in-differences and change specification regression. The results of these additional analyses are presented in Chapter 8.

# CHAPTER 8: ADDITIONAL ANALYSES

The previous chapter presented and discussed the main results reported in the thesis. This chapter presents and discusses the results of a series of additional analyses performed in the research. In section 8.1, the robustness of the main results to the use of alternative measures for over- and under-investment in labour is explored. The influence of adding additional control variables is assessed in Section 8.2, and endogeneity concerns are addressed in Section 8.3. Finally, the competing effects of stock options and restricted stock on under-investment in labour are assessed in Section 8.4.

## 8.1 Robustness Checks

A number of additional tests are conducted in order to rule out alternative explanations for the main results. First, alternative measures for the dependent variables — over- and under-investment in labour — are used. These measures are: (1) the use of an industry median to compute over- and under-investment; (2) one-year-lagged sales growth as the sole independent variable in *Model 1*; and (3) the ratio between the current year's investment in labour and the average of the prior 3 years' investments minus 1 (Biddle et al., 2009; Cella, 2010; Jung et al., 2014).

Second, managerial ability and board monitoring as additional controls are included. More able managers have been shown in prior research to be less likely to engage in value-destroying activities such as over- and under-investment (Kor, 2003; Jung et al., 2014). Strong corporate governance ensures better monitoring, leading to reduced amounts of opportunistic behaviour by executives (Ferreira, Ferreira & Raposo, 2011).

Finally, in periods of economic contraction the fundamental economic characteristics of a firm may suggest that it should fire employees. However, self-serving executives are likely to over-fire, leading to under-investment in labour. Also, during periods of economic expansion the fundamental economic characteristics of a firm may suggest additional hiring but, if executives are self-serving, they may over-hire employees, leading to over-investment in labour. Whether the use of stock options and restricted stock can still have the expected influences on over- and under-investment in labour in such settings, is explored.

### *8.1.1 Using Industry Median of Net Hiring*

Corporate managers often behave like their industry peers when it comes to making investment decisions (Scharfstein & Stein, 1990) and thus corporate investment decisions made by industry peers may be a fundamental benchmark. If so, then any deviation from the industry median in relation to labour investment can be captured as inefficient labour investment. The use of this methodology was initiated by Harvey, Lins and Roper (2003), who identified firms' over- and under-investment with respect to their industry peers, and also applied by Cella (2010) in her study examining the link between institutional investors' ownership and corporate investment efficiency. The industry median level of net hiring in a firm's industry for the specific year in question is used as a benchmark, from which the actual net hiring for each firm-year observation is subtracted. The more a firm's net hiring deviates from that of its industry peers, the larger the measure of inefficient investment in labour. A positive deviation captures over-investment, while a negative deviation captures under-investment.

Table 8.1 reports these results. Column 1 of Table 8.1, which reports the associations between stock options and restricted stock and over-investment, shows that the coefficients of stock options and restricted stock are positive for stock options (0.0049) and negative for restricted stock (−0.0154), statistically significant at the 5% and 1% levels, respectively. Therefore, Hypotheses *1a* and *1b* still hold. Column 2 of Table 8.1, reporting the associations between stock options and restricted stock and under-investment, shows that the coefficients of stock options and restricted stock are negative and statistically significant at the 1% and 10% levels, respectively. Again, the main results remain qualitatively unchanged.

**Table 8.1: Over- and Under-Investment (by Industry Median), Stock Options and Restricted Stock**

| Variable | Predicted Sign | Over-Investment | Predicted Sign | Under-Investment |
|---|---|---|---|---|
| | | (1) | | (2) |
| *Intercept* | (?) | 0.0426 | (?) | −0.0119 |
| | | (0.60) | | (−0.67) |
| $SOP_{it-1}$ | (+) | 0.0049 | (−) | −0.0039 |
| | | (2.37)** | | (−7.92)*** |
| $RSTK_{it-1}$ | (−) | −0.0154 | (−) | −0.0027 |
| | | (−5.19)*** | | (−1.91)* |
| Controls | | YES | | YES |
| *Year fixed effects* | | YES | | YES |
| *Industry fixed effects* | | YES | | YES |
| *(Adj.)* $R^2$ | | 26.02% | | 13.26% |
| *N* | | 5363 | | 6363 |

**Note:** ***, ** and * denote significance at 1%, 5% and 10% levels, respectively. The dependent variables, over- and under-investment, are calculated based on the industry median of net hiring of employees in a firm's industry for the specific year in question. The positive (or negative) deviation from the industry median of net hiring capture over-investment (or under-investment) in labour. Variables are defined in Appendix 1. *P*-values are based on two-tailed tests, with standard errors clustered by firm. T-statistics are shown below each estimate (in parentheses).

### *8.1.2 Using Lagged Sales Growth as a Sole Independent Variable in* Model 1

Sales growth has been established in prior research to be a good measure of growth opportunities (Biddle et al., 2009; Chen, Hope, Li & Wang, 2011). Firms recording greater sales growth are more likely to hire employees to increase their production or

service provision. In contrast, firms recording lower sales growth are less likely to hire employees. Following Biddle et al. (2009), therefore, one-year-lagged sales growth is used as the sole independent variable in *Model 1* to estimate over- and under-investment in labour. Both under-investment in labour (negative deviation from expected net hiring) and over-investment in labour (positive deviation from expected net hiring) are considered inefficient investments.

The results, presented in Table 8.2, are still strong and qualitatively the same as in the main results. For the association between stock options and over-investment, the coefficient of stock options remains positive (0.0045) and significant at the 10% level, while for the association between restricted stock and under-investment, the coefficient of restricted stock is negative (−0.0143) and statistically significant at the 1% level (see Column 1 of Table 8.2). In addition, the result for the association between stock options and restricted stock reported in Column 2 of Table 8.2 remains qualitatively unchanged. Notably, the coefficients of stock options (−0.0020) and restricted stock (−0.0033) are negative and significant at the 1% level.

**Table 8.2: Over- and Under-Investment (by Lagged Sales Growth), Stock Options and Restricted Stock**

| Variable | Predicted Sign | Over-Investment | Predicted Sign | Under-Investment |
|---|---|---|---|---|
| | | (1) | | (2) |
| *Intercept* | (?) | 0.0675 | (?) | 0.0203 |
| | | (1.07) | | (1.35) |
| $SOP_{it-1}$ | (+) | 0.0045 | (−) | −0.0020 |
| | | (1.80)* | | (−4.59)*** |
| $RSTK_{it-1}$ | (−) | −0.0143 | (−) | −0.0033 |
| | | (−3.95)*** | | (−2.85)*** |
| *Controls* | | YES | | YES |
| *Year fixed effects* | | YES | | YES |
| *Industry fixed effects* | | YES | | YES |
| *(Adj.)* $R^2$ | | 26.45% | | 15.52% |
| *N* | | 4379 | | 7739 |

**Note:** ***, ** and * denote significance at 1%, 5% and 10% levels, respectively. Following Jung et al. (2014) and Biddle et al. (2009), the dependent variables, over- and under-investment, are obtained by regressing net hiring on only lagged sales growth. The positive (or negative) difference between the actual and expected net hiring capture over-investment (or under-investment) in labour. Variables are defined in Appendix 1. *P*-values are based on two-tailed tests, with standard errors clustered by firm. T-statistics are shown below each estimate (in parentheses).

### *8.1.3 Current versus Prior Three Years Average Investment in Labour*

It is likely that over- and under-investment in labour comes about as a result of executives' incentives to follow investment trends in their respective industries. Following Titman, John and Xie (2004) and Cella (2010), current investment in labour is compared to the average investment over the prior three years. This provides an opportunity to assess the extent to which current hiring deviates from investment trends, as an alternative measure of abnormal investment. To determine where the current year's net hiring equates to average historical hiring, 1 is subtracted from the ratio of current investment to the average of the three-year investments. A result of zero indicates that the current year's investment in labour is the same as the prior three years' average; values that are greater or less than zero capture over-investment and under-investment, respectively.

Consistent with the main empirical findings, stock options are found to exacerbate over-investment (1.4891) while restricted stock mitigates over-investment (−2.0834) (see Column 1 of Table 8.3). Further, and as expected, the associations between stock options and restricted stock, and under-investment are both negative and statistically significant (see Column 2 of Table 8.3). Specifically, the estimated coefficients of stock options (−0.2023) and restricted stock (−1.1859) are negative and statistically significant at the 10% and 5% levels, respectively. The results of this further analysis remain qualitatively the same as the main empirical results.

**Table 8.3: Over- and Under-Investment (by Ratio of Current to Average of Prior 3-Year Investment Minus 1), Stock Options and Restricted Stock**

| **Variable** | **Predicted Sign** | **Over-Investment** | **Predicted Sign** | **Under-Investment** |
|---|---|---|---|---|
| | | (1) | | (2) |
| *Intercept* | (?) | 4.1260 | (?) | 7.3659 |
| | | (0.55) | | (1.20) |
| $SOP_{it-1}$ | (+) | 1.4891 | (−) | −0.2023 |
| | | (1.79)* | | (−1.66)* |
| $RSTK_{it-1}$ | (−) | −2.0834 | (−) | −1.1859 |
| | | (−2.33)** | | (−2.31)** |
| *Controls* | | YES | | YES |
| *Year fixed effects* | | YES | | YES |
| *Industry fixed effects* | | YES | | YES |
| *(Adj.)* $R^2$ | | 5.03% | | 6.67% |
| *N* | | 1672 | | 3463 |

**Note:** ***, ** and * denote significance at 1%, 5% and 10% levels, respectively. Following Cella (2010), the dependent variables, over- and under-investment, are obtained by dividing the current net hiring by the average prior 3 years' net hiring and subtracting 1 from the results. The positive (or negative) difference capture over-investment (or under-investment) in labour. Variables are defined in Appendix 1. *P*-values are based on two-tailed tests, with standard errors clustered by firm. T-statistics are shown below each estimate (in parentheses).

### *8.1.4 Augmenting the First-Stage Model with Additional Control Variables*

Ben-Nasr and Alshwer (2016) propose a range of alternative factors that could affect a firm's hiring decisions. In particular, if the firm size increases following acquisition and/or an increase in capital expenditure, the labour force is likely to also increase. Further, if a firm spends on R&D and there is a breakthrough, executives are likely to

hire more employees to develop the prototypes, increasing the size of the labour force. Further, an increase in GDP is an indication of economic wellbeing and, therefore, firms are likely to step up production as the demand for goods and services is also likely to surge. As the demand for goods and services increases, executives are likely to hire more employees, leading to an increase in the labour force. However, firms are less likely to hire employees if there is a decrease in GDP, leading to a reduction in the labour force.

The first-stage model (*Model 1*) is augmented with the following additional control variables: capital expenditure; R&D expenses; acquisition expenditure; labour union; and GDP. The results of the univariate analyses are comparable to those of Ben-Nasr and Alshwer (2016) (see Panel A of Table 8.4). The abnormal net hiring is then recalculated as the difference between expected and actual net hiring (see Panel B of Table 8.4). Next, the roles of stock options and restricted stock in mitigating and/or exacerbating over- and under-investment in labour are examined. As expected, stock options are still found to exacerbate over-investment, while restricted stock is still found to mitigate over-investment; both stock options and restricted stock are found to mitigate under-investment (see Panel C of Table 8.4).

**Table 8.4: Summary Statistics for Augmented Model Estimating Over- and Under-Investment in Labour (*Model 1*)**

**Panel A: Distributional statistics for variables in base model (*Model 1*)**

| Variable | N | Mean | Std. Dev. | Q1 | Median | Q3 |
|---|---|---|---|---|---|---|
| $Net\_Hire_{it}$ | 12118 | 0.0491 | 0.2233 | −0.0357 | 0.0185 | 0.0938 |
| $Sales\_Growth_{it}$ | 12118 | 0.0905 | 0.2848 | −0.0144 | 0.0660 | 0.1600 |
| $Sales\_Growth_{it-1}$ | 12118 | 0.1108 | 0.3210 | −0.0050 | 0.0762 | 0.1764 |
| $chROA_{it}$ | 12118 | −0.0042 | 0.1187 | −0.0277 | 0.0000 | 0.0219 |
| $chROA_{it-1}$ | 12,118 | −0.0011 | 0.1395 | −0.0275 | 0.0003 | 0.0236 |
| $ROA_{it}$ | 12118 | 0.0500 | 0.1177 | 0.0191 | 0.0530 | 0.0984 |
| $Return_{it}$ | 12118 | 0.1208 | 0.6378 | −0.1838 | 0.0521 | 0.2922 |
| $Size_{it-1}$ | 12118 | 7.2508 | 1.6008 | 6.1344 | 7.1322 | 8.2984 |
| $Quick_{it-1}$ | 12118 | 1.7672 | 1.9213 | 0.7870 | 1.2309 | 2.0124 |
| $chQuick_{it}$ | 12118 | −0.0143 | 1.0607 | −0.2001 | −0.0012 | 0.1991 |
| $chQuick_{it-1}$ | 12118 | −0.0170 | 1.0841 | −0.1984 | 0.0024 | 0.2050 |
| $Leverage_{it-1}$ | 12118 | 0.2075 | 0.1696 | 0.0429 | 0.1981 | 0.3254 |
| $Lab\_Union_{it-1}$ | 12118 | 13.5375 | 9.1504 | 7.8909 | 11.8368 | 15.2500 |
| $CAPX_{it}$ | 12118 | 4.0477 | 1.9181 | 2.7179 | 3.9704 | 5.3263 |
| $R\&D_{it}$ | 12118 | 2.0163 | 2.2899 | 0.0000 | 1.0647 | 3.8437 |
| $ACQ_{it}$ | 12118 | 1.7251 | 2.3098 | 0.0000 | 0.0000 | 3.5783 |
| $GDP_{it}$ | 12118 | 10.7538 | 0.0876 | 10.7157 | 10.7946 | 10.8113 |

**Note**: Variables are defined in Appendix 1. The additional variables are $Lab\_Union_{it-1}$ $CAPX_{it}$, $R\&D_{it}$, $ACQ_{it}$ *and* $GDP_{it}$, which are labour union, capital expenditure, R&D expense, acquisition expenditure and GDP per capita, respectively.

(Table 8.4 continues on next page)

**Table 8.4 (continued)**

**Panel B: Regression Results for Estimating Over- and Under-Investment in Labour (Dependent Variable = Net Hire): Augmented Model**

| Variable | Predicted Sign | Net-Hire Model |
|---|---|---|
| *Intercept* | (?) | −2.0958 |
| | | (−1.11) |
| $Sales\_Growth_{it}$ | (+) | 0.3037 |
| | | (8.55)*** |
| $Sales\_Growth_{it-1}$ | (+) | 0.0391 |
| | | (2.40)** |
| $chROA_{it}$ | (−) | −0.3237 |
| | | (−7.20)*** |
| $chROA_{it-1}$ | (+) | −0.0792 |
| | | (−4.07)*** |
| $ROA_{it}$ | (+) | 0.2884 |
| | | (6.43)*** |
| $Return_{it}$ | (+) | 0.0152 |
| | | (3.56)*** |
| $Size\_R_{it-1}$ | (+) | −0.0007 |
| | | (−2.33)** |
| $Quick_{it-1}$ | (+) | 0.0072 |
| | | (4.19)*** |
| $chQuick_{it}$ | (+) | −0.0265 |
| | | (−6.20)*** |
| $chQuick_{it-1}$ | (+/−) | 0.0009 |
| | | (0.30) |
| $Leverage_{it-1}$ | (+/−) | −0.0609 |
| | | (−3.79)*** |
| $Lab\_Union_{it-1}$ | (+/−) | 0.0003 |
| | | (0.75) |
| $CAPX_{it}$ | (+/−) | −0.0032 |
| | | (−1.36) |
| $R\&D_{it}$ | (+/−) | −0.0036 |
| | | (−2.75)*** |
| $ACQ_{it}$ | (+) | 0.0210 |
| | | (16.85)*** |
| $GDP_{it}$ | (+) | 0.2018 |
| | | (1.12) |
| $LossBin1_{it-1}$ | (−) | −0.0220 |
| | | (−2.01)** |
| $LossBin2_{it-1}$ | (−) | 0.0111 |
| | | (0.90) |
| $LossBin3_{it-1}$ | (−) | −0.0096 |
| | | (−0.72) |
| $LossBin4_{it-1}$ | (−) | 0.0264 |
| | | (0.85) |
| $lossbin5_{it-1}$ | (−) | 0.0090 |
| | | (0.40) |
| *Industry fixed effects* | | YES |
| *Year fixed effects* | | YES |
| *Adj.* $R^2$ | | 29.36% |
| *N* | | 12118 |

**Note:** *** and ** denote significance at 1% and 5% levels, respectively. *P*-values are based on two-tailed tests. T-statistics are shown below each estimate. The additional variables are $Lab\_Union_{it-1}$ $CAPX_{it}$, $R\&D_{it}$, $ACQ_{it}$ *and* $GDP_{it}$, which are labour union, capital expenditure, R&D expense, acquisition expenditure and GDP per capita, respectively. Panel B presents the regression results for estimating over- and under-investment in labour using the augmented model.

**Table 8.4 (continued)**

**Panel C: Relationships between Over- and Under-Investment, Stock Options and Restricted Stock: Augmented Model**

| Variable | Predicted Sign | Over-Investment (1) | Predicted Sign | Under-Investment (2) |
|---|---|---|---|---|
| *Intercept* | (?) | 0.0801 | (?) | 0.1114 |
| | | (1.79)* | | (2.46)** |
| $SOP_{it-1}$ | (+) | 0.0032 | (−) | −0.0020 |
| | | (2.10)** | | (−4.30)*** |
| $RSTK_{it-1}$ | (−) | −0.0088 | (−) | −0.0029 |
| | | (−2.25)** | | (−2.07)** |
| $MTB_{it-1}$ | (+) | 0.0155 | (+) | −0.0043 |
| | | (3.85)*** | | (−2.04)** |
| $FirmSize_{it-1}$ | (+/−) | −0.0007 | (+/−) | 0.0000 |
| | | (−3.24)*** | | (−0.45) |
| $Quick_{it-1}$ | (+) | 0.0096 | (+) | 0.0073 |
| | | (4.82)*** | | (8.90)*** |
| $Lev_{it-1}$ | (+) | −0.0270 | (+) | 0.0198 |
| | | (−1.60) | | (2.45)** |
| $DivDum_{it-1}$ | (−) | −0.0135 | (−) | −0.0001 |
| | | (−2.59)*** | | (−0.03) |
| $Std\_CFO_{it-1}$ | (+) | 0.1120 | (+) | 0.1271 |
| | | (1.61) | | (2.53)** |
| $Std\_Sales_{it-1}$ | (+) | 0.0230 | (+) | 0.0198 |
| | | (0.97) | | (1.79)* |
| $Tangibles_{it-1}$ | (−) | −0.0090 | (−) | −0.0214 |
| | | (−0.56) | | (−2.53) |
| $Loss_{it-1}$ | (−) | 0.0090 | (−) | 0.0133 |
| | | (1.30) | | (3.79)*** |
| $Insti_{it-1}$ | (−) | 0.0039 | (−) | −0.0228 |
| | | (0.30) | | (−3.34)*** |
| $Std\_Net\_Hire_{it-1}$ | (+) | 0.0391 | (+) | 0.0195 |
| | | (2.86)*** | | (3.97)*** |
| $Labour\_Intensity_{it-1}$ | (−) | −1.3419 | (−) | 0.5516 |
| | | (−4.29)*** | | (2.94)*** |
| $EQ_{it-1}$ | (−) | −0.1743 | (−) | −0.1025 |
| | | (−1.75)* | | (−2.20)** |
| */Ab_Invest_Other/* | (+) | 0.4429 | (+) | 0.0655 |
| | | (14.11)*** | | (3.13)*** |
| $Lab\_Union_{it-1}$ | (−) | 0.0007 | (−) | 0.0000 |
| | | (1.25) | | (0.22) |
| $OwnCEO_{it}$ | (−) | −0.0001 | (−) | −0.0027 |
| | | (−0.05) | | (−2.98)*** |
| *Year fixed effects* | | YES | | YES |
| *Industry fixed effects* | | YES | | YES |
| *(Adj.)* $R^2$ | | 23.24% | | 12.19% |
| *N* | | 4859 | | 6783 |

**Note:** ***, ** and * denote significance at 1%, 5% and 10% levels, respectively. This table presents the results of associations between over- and under- investment, stock options and restricted stock using the augmented model. Variables are defined in Appendix 1. *P*-values are based on two-tailed tests, with standard errors clustered by firm. T-statistics are shown below each estimate (in parentheses).

*8.1.5 Economic Expansion (or Growth) and Contraction (or Downturn)*

During conditions of economic growth, firms are more likely to hire employees because there is likely to be more demand for goods and services, while during conditions of economic downturn, firms are less likely to hire because there may be less demand for goods and services (George, 2005; Ouyang, 2009; Ahmed, Kristal & Pagell, 2014). Economic downturns are characterised by falling demand and reduced purchasing power of consumers, making efficiency and cost management crucial for firms (Ang, Leong & Kotler, 2000). This has implications for hiring decisions. Therefore, following Jung et al. (2014), the sample is divided into four subsamples — over-hiring, under-firing, under-hiring and over-firing — based on the prevailing economic conditions.[19] This is because, during such periods, firms are likely to respond to the economic conditions by increasing production (i.e., expansion) or reducing production (i.e., contraction) and therefore hiring or firing employees. Campello et al. (2010) argue that the salient difference in a firm's operations during periods of economic growth and of economic downturn is the use of available resources such as the labour force.

Although economic conditions may suggest an increase in the labour force of a firm, executives may increase the labour force above the levels suggested by the firm's economic fundamentals, leading to over-hiring (and under-firing) of employees (Jung et al., 2014). Also, while economic conditions may suggest a decrease in the labour force of a firm, executives may reduce the labour force below the expected levels,

[19] Over-hiring is when the actual increase is greater than the expected increase in labour; under-firing is when the actual decrease is lower than the expected decrease in labour; under-hiring is when the actual increase is lower than the expected increase in labour; and over-firing is when the actual decrease is greater than the expected decrease in labour (Jung et al., 2014).

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leading to under-hiring (and over-firing) (Jung et al., 2014). Therefore, this section explores whether stock options and restricted stock still have influence in such scenarios.

The results are presented in Table 8.5. As expected, the coefficient of stock options is positive and significant at the 10% level, while the coefficient of restricted stock is negative and significant at 5% (Column 1), implying that stock options exacerbate over-hiring and restricted stock mitigates over-hiring. The results in Column 2 in Table 8.5 show a positive and significant coefficient of stock options (0.0185) and a negative and significant coefficient of restricted stock (−0.0174), suggesting that stock options encourage under-firing and restricted stock discourages under-firing. In Column 3 of Table 8.5, which reports the results for under-hiring, the coefficients of stock options and restricted stock are negative and significant at the 10% and 1% levels, respectively. Finally, when over-firing is assessed, the coefficients of stock options (−0.0045) and restricted stock (−0.0028) are negative and significant at the 1% and 10% levels, respectively (Column 4 of Table 8.5). Taken together, while stock options encourage over-hiring and under-firing, they discourage under-hiring and over-firing, and restricted stock discourages both over- and under-hiring and over- and under-firing.

**Table 8.5: Effects of Stock Options and Restricted Stock on Over- and Under-hiring (and Firing)**

| Variable | Predicted Sign | Over-Investment | | Predicted Sign | Under-Investment | |
|---|---|---|---|---|---|---|
| | | Over-Hiring | Under-Firing | | Under-Hiring | Over-Firing |
| | | (1) | (2) | | (3) | (4) |
| *Intercept* | (?) | −0.0788 | 0.1441 | (?) | 0.1238 | 0.0354 |
| | | (−1.05) | (2.36)* | | (3.57)*** | (1.17) |
| $SOP_{it-1}$ | (+) | 0.0083 | 0.0185 | (−) | −0.0008 | −0.0045 |
| | | (1.78)* | (3.27)*** | | (−1.80)* | (−5.35)*** |
| $RSTK_{it-1}$ | (−) | −0.0259 | −0.0174 | (−) | −0.0037 | −0.0028 |
| | | (−2.33)** | (−2.25)** | | (−3.81)*** | (−1.67)* |
| *Controls* | | YES | YES | | YES | YES |
| *Year fixed effects* | | YES | YES | | YES | YES |
| *Industry fixed effects* | | YES | YES | | YES | YES |
| *(Adj.)* $R^2$ | | 25.98% | 16.82% | | 15.22% | 15.55% |
| *N* | | 2843 | 894 | | 5879 | 2502 |

**Note:** ***, ** and * denote significance at 1%, 5% and 10% levels, respectively. This table presents the results of estimating *Models 2* and *3* on various subsets of the sample. Over-hiring is actual net hiring that exceeds the expected amount (based on *Model 1*) when expected net hiring is positive. Under-firing is actual net hiring that exceeds the expected amount when expected net hiring is negative. Under-hiring is actual net hiring that is less than the expected amount when the expected amount is positive. Over-firing is actual net hiring that is less than the expected amount when the expected amount is negative. Variables are defined in Appendix 1. *P*-values are based on two-tailed tests, with standard errors clustered by firm. T-statistics are shown below each estimate (in parentheses).

## 8.2 Addressing Endogeneity Concerns

Endogeneity occurs when a variable of interest is correlated with the error term in a regression model (Lacker & Rusticus, 2010). The three common sources of endogeneity are simultaneity (or reverse causality), omitted variables and measurement error (Larcker & Rusticus, 2010). Endogeneity is resolved here by using a number of techniques including a 2SLS model, propensity score matching, firm fixed effects and change specification (Lacker & Rusticus, 2010). The justifications for the use of these techniques to address endogeneity concerns in this research are outlined in the following sections.

### *8.2.1 Using Two-Stage Least Squares*

The tests so far do not account for the possibility that stock options and restricted stock and over- and under-investment in labour are endogenously related. For example, much as the components of equity compensation paid to executives can determine over- and under-investment in labour, over- and under-investment in labour can also determine the components of equity compensation to be paid to executives. Ryan and Wiggins (2002, p.7) argue:

> although investment decisions and compensation policy are endogenous, the studies discussed above all model compensation as a function of investment opportunity. In fact, as suggested by theory, if incentive compensation aligns the interests of managers and investors, the investment decision will also be influenced by the compensation plan.

Given this, it is important to conduct additional testing to mitigate endogeneity concerns associated with correlated omitted variables and simultaneity, and to further enhance the robustness and reliability of the findings. Although the use of lagged regressors may

resolve the issue of reverse causality, it is still possible that omitted variables captured by the error terms may be correlated with the test variable (i.e., correlated omitted variable bias), hence the need for endogeneity testing.

To formally address these endogeneity concerns, the two-stage instrumental variable approach is employed (Larcker & Rusticus, 2010) to reassess the main hypothesis results reported in Table 7.7. In order to identify the instrumental variables for stock options and restricted stock, the literature on executive compensation is reviewed, and constructs related to stock options and restricted stock but with little or no relation to investment levels are selected (Krishnan, Wen & Zhao, 2011). CEO age and R&D are selected to serve as viable instruments because prior research shows that they are correlated with equity compensation (Ryan & Wiggins, 2002; Năstăsescu, 2009). If so, then these omitted variables may be capturing the true effects of stock options and restricted stock on over- and under-investment in labour. Also, growth firms derive their value from future investment and, therefore, may rely heavily on equity compensation, which makes pay sensitive to stock price performance, thus providing executives with incentive to make value-maximising decisions (Ryan & Wiggins, 2002).

Therefore, using the two instrumental variables, the 2SLS model is estimated. The main sample drops to 7954 firm-year observations after including the instrumental variables. In the first stage, stock options and restricted stock are regressed on CEO age, R&D and control variables, which include all of the variables in Tables 7.7 and 7.8. While positive associations are expected between R&D and stock options and restricted stock, negative associations are expected between age and stock options and restricted stock.

The coefficients of CEO age and R&D have the predicted signs and are significant (see Table 8.6), indicating that CEO age and R&D are significant determinants of stock options and restricted stock. The predicted values are then obtained for stock options and restricted stock from the first-stage equation.

In the second stage, the main regression *Models 2* and *3* are estimated with the predicted values of stock options and restricted stock from the first-stage equation. The results are reported in Table 8.6. These results show that, after controlling for endogeneity, the relationship between stock options and over-investment is still positive and significant, while the relationship between restricted stock and over-investment is still negative and significant. The associations between stock options and restricted stock, and under-investment are also found to be negative and significant. Overall, the results are qualitatively similar to the main findings.

**Table 8.6: Effects of Stock Options and Restricted Stock on Over- and Under-Investment — Endogeneity Testing using 2SLS**

| Variable | Stock Options and Over-Investment | | Restricted Stock and Over-Investment | | Stock options and Under-Investment | | Restricted Stock and Under-Investment | |
|---|---|---|---|---|---|---|---|---|
| | 2SLS | | 2SLS | | 2SLS | | 2SLS | |
| | First stage | Second stage | First stage | Second stage | First stage | Second stage | First stage | Second stage |
| | (1) | (2) | (3) | (4) | | | | |
| *Intercept* | 0.7337 | 0.0845 | 0.2632 | 0.1448 | 18.8878 | 0.1326 | 0.9619 | 1.1441 |
| | (2.23)** | (0.60) | (1.97)** | (1.27) | (13.24)*** | (3.52)*** | (3.38)*** | (3.79)*** |
| $SOP_{it-1}$ | | 0.1203 | | | | −0.0067 | | |
| | | (2.05)** | | | | (−2.15)** | | |
| $RSTK_{it-1}$ | | | | −0.7404 | | | | −0.0475 |
| | | | | (1.65)* | | | | (−2.00)* |
| **Instruments:** | | | | | | | | |
| $Age_{it-1}$ | −0.1134 | | −0.0545 | | −4.7995 | | −0.1896 | |
| | (−1.69)* | | (1.80)* | | (−15.42)*** | | (−2.97)*** | |
| $R\&D_{it-1}$ | 0.0111 | | 0.0030 | | −0.1849 | | −0.0104 | |
| | (2.95)*** | | (1.84)* | | (−8.53)*** | | (−2.26)** | |
| *Controls* | YES | YES | YES | YES | YES | YES | YES | YES |
| *Year fixed effects* | YES | YES | YES | YES | YES | YES | YES | YES |
| *Industry fixed effects* | YES | YES | YES | YES | YES | YES | YES | YES |
| *Hausman statistic* | (2.72)* | | (3.15)* | | (4.32)* | | (4.57)** | |
| *Hansen's J-statistic* | (0.32) | | (0.42) | | (1.12) | | (0.14) | |
| *(Adj.)* $R^2$ | 4.74% | 21.82% | 1.11% | 15.12% | 16.74% | 7.48% | 2.87% | 8.13% |
| *N* | 2422 | 2422 | 2422 | 2422 | 5532 | 5532 | 5532 | 5532 |

**Note**: *, ** and *** denote significant at 10%, 5% and 1% levels, respectively. This table reports results from 2SLS regressions relating to stock options and restricted stock and over- and under-investment using instrumental variables such as CEO age and R&D to proxy investment opportunities. While the first section reports the results for the first-stage regression, the second section reports the results for the second-stage regression. I use the predicted values from the first stage in the second-stage regressions. The Hausman endogeneity test (for the null hypothesis that stock options and restricted stock can be treated as exogenous) is significant, suggesting the existence of endogeneity. The Hansen J-statistic (which tests for over-identification) is insignificant, implying the absence of over-identification. Variables are defined in Appendix 1. *P*-values are based on two-tailed tests, with standard errors clustered by firm. T-statistics are shown below each estimate (in parentheses).

*8.2.2 Using Propensity Score Matching*

Propensity score matching (PSM) is conditional probability assignment to a particular treatment, given a vector of observed covariates, in order to reduce estimation bias resulting from model misspecification (Rosenbaum & Rubin, 1983; Shipman, Swanquist & Whited, 2017). As a further cross-check of the main results, the PSM approach is adopted to more effectively control for possible variations in relevant dimensions between CEOs with stock options and those without, and CEOs with restricted stock and those without (Naiker, Navissi & Truong, 2013). This test is particularly relevant in this current thesis, as most CEOs in the sample do not have stock options or restricted stock. Armstrong, Jagolinzer and Larcker (2010) assert that the PSM approach should be applied when the hypothesised causal variable is an endogenous choice of board of directors. Since the grant of equity compensation, in particular stock options and restricted stock, is unlikely to be random, the potential self-selection bias is controlled using PSM (Ha & Feng, 2018).

If the variations in the outcome variable (over- and under-investment in labour) between CEOs with stock options and those without, and between CEOs with restricted stock and those without, are due to observable reasons other than stock options and restricted stock, then the coefficients of stock options and restricted stock will be statistically insignificant in the matched sample. However, if stock options and restricted stock do play roles in determining over- and under-investment in labour, then firms with restricted stock and stock options and their matched pairs should show different labour investment behaviours.

To execute PSM, a logistic regression technique with the same set of control variables that are employed in the main regression models is used. Dummy variables are constructed for both stock options and restricted stock — equal to 1 if CEOs have stock options or restricted stock, and zero otherwise. These variables are then used as criterion variables in the logistic regression to compute the propensity scores. Each treatment firm (with stock options or restricted stock) is matched to a control firm (without stock options or restricted stock) that has the closest score in the same year within a distance of 0.05 (without replacement) from the treatment firm's propensity score. This reduces the sample to 2680 firm-year observations. If the propensity score match is successful, then it can be assumed that firms whose CEOs have stock options and/or restricted stock and their matching control firms are similar on all observable dimensions except for the extent to which stock options and restricted stock affect over- and under-investment in labour (see Panels A to F of Table 8.7 for the results).

The regression results for PSM are presented in Panel G of Table 8.7. The regression coefficients of stock options and restricted stock for the over- and under-investment models are significant and in the right directions. Notably, while stock options are significant and positively associated with over-investment in labour (0.0487; t=2.14), restricted stock is significant and negatively associated with over-investment in labour (−0.1534; t=−1.82). Also, it is found that both stock options (−0.0114; t=−3.14) and restricted stock (−0.0141; t=−2.24) are significantly negatively associated with under-investment in labour. Overall, the PSM results are qualitatively similar to the main regression results, indicating that there is no self-selection bias.

## Table 8.7: Comparison of Over- and Under- Investment across PSM Options and Non-Options; RSTK and Non-RSTK

| **Panel A: Results for Over-Investment in Labour for Stock Options Sample** | | | | |
|---|---|---|---|---|
| N | Non-option firms | Option firms | Difference | t-statistic |
| 484 | 0.1460 | 0.2087 | −0.0627 | −2.37** |
| **Panel B: Results for Under-Investment in Labour for Stock Options Sample** | | | | |
| N | Non-option firms | Option firms | Difference | t-statistic |
| 1724 | 0.1083 | 0.1058 | 0.0025 | 1.67* |
| **Panel C: Control Variables for Stock Options Sample** | | | | |
| $MTB_{it-1}$ | 0.8289 | 0.7983 | 0.0306 | 1.06 |
| $FirmSize_{it-1}$ | 75.4819 | 75.3016 | 0.1803 | 0.26 |
| $Quick_{it-1}$ | 1.6253 | 1.5657 | 0.0596 | 0.86 |
| $Lev_{it-1}$ | 0.2145 | 0.2205 | −0.0060 | −0.85 |
| $DivDum_{it-1}$ | 0.5589 | 0.5625 | −0.0036 | −0.17 |
| $Std\_CFO_{it-1}$ | 0.0459 | 0.0445 | 0.0014 | 0.75 |
| $Std\_Sales_{it-1}$ | 0.1232 | 0.1252 | −0.0020 | −0.35 |
| $Tangibles_{it-1}$ | 0.3452 | 0.3570 | −0.0118 | −1.18 |
| $Loss_{it-1}$ | 0.1784 | 0.1784 | 0.0000 | 0.00 |
| $Insti_{it-1}$ | 0.5638 | 0.5697 | −0.0059 | −0.65 |
| $Std\_Net\_Hire_{it-1}$ | 0.1729 | 0.1577 | 0.0152 | 1.47 |
| $Labour\_Intensity_{it-1}$ | 0.0080 | 0.0080 | 0.0000 | 0.05 |
| $EQ_{it-1}$ | −0.0435 | −0.0438 | 0.0003 | 1.32 |
| $/Ab\_Invest\_Other/_{it}$ | 0.0891 | 0.0860 | 0.0031 | 1.32 |
| $Lab\_Union_{it-1}$ | 16.3686 | 16.4780 | −0.1094 | −0.23 |
| $OwnCEO_{it}$ | 0.0577 | 0.0680 | −0.0104 | −0.69 |
| **Panel D: Results for Over-Investment in Labour for Restricted Stock Sample** | | | | |
| N | Non-RSTK firms | RSTK firms | Difference | t-statistic |
| 88 | 0.2079 | 0.1561 | 0.0518 | 1.78* |
| **Panel E: Results for Under-Investment in Labour for Restricted Stock Sample** | | | | |
| N | Non-RSTK firms | RSTK firms | Difference | t-statistic |
| 404 | 0.1026 | 0.0907 | 0.0119 | 1.66* |
| **Panel F: Control Variables for Restricted Stock Sample** | | | | |
| $MTB_{it-1}$ | 0.6707 | 0.6916 | −0.0209 | −0.37 |
| $FirmSize_{it-1}$ | 73.7968 | 73.7371 | 0.0598 | 0.04 |
| $Quick_{it-1}$ | 1.8135 | 1.3440 | 0.4694 | 0.24 |
| $Lev_{it-1}$ | 0.2488 | 0.2500 | −0.0012 | −0.08 |
| $DivDum_{it-1}$ | 0.7012 | 0.6932 | 0.0080 | 0.19 |
| $Std\_CFO_{it-1}$ | 0.0418 | 0.0404 | 0.0014 | 0.45 |
| $Std\_Sales_{it-1}$ | 0.1174 | 0.1095 | 0.0080 | 0.75 |
| $Tangibles_{it-1}$ | 0.4007 | 0.4113 | −0.0106 | −0.49 |
| $Loss_{it-1}$ | 0.1474 | 0.1514 | −0.0040 | −0.12 |
| $Insti_{it-1}$ | 0.5580 | 0.5679 | −0.0099 | −0.53 |
| $Std\_Net\_Hire_{it-1}$ | 0.1512 | 0.1373 | 0.0138 | 0.93 |
| $Labour\_Intensity_{it-1}$ | 0.0076 | 0.0074 | 0.0002 | 0.24 |
| $EQ_{it-1}$ | −0.0384 | −0.0390 | 0.0006 | 0.23 |
| $/Ab\_Invest\_Other/_{it}$ | 0.0761 | 0.0782 | −0.0021 | −0.25 |
| $Lab\_Union_{it-1}$ | 19.1799 | 19.0769 | 0.1030 | 0.10 |
| $OwnCEO_{it}$ | 0.0678 | 0.0594 | 0.0083 | 0.26 |

**Note:** ***, ** and * denote significance at 1%, 5% and 10% levels, respectively. This table reports the results from comparison of means of over- and under-investment between PSM options and non-options, and restricted stock and non-restricted stock. Panels A and B show whether there are significant differences between options and non-options firms, while Panels D and E report the same results for restricted stock; Panels C and F report the results for the control variables.

(Table 8.7 continues on next page)

**Table 8.7 (continued)**

| **Panel G: Over- and Under-Investment, Stock Options and Restricted Stock: PSM** | | | | |
|---|---|---|---|---|
| Variable | Over-investment and stock options | Over-investment and restricted stock | Under-investment and stock options | Under-investment and restricted stock |
| | (1) | (2) | (3) | (4) |
| *Intercept* | −0.1766 | 0.2330 | 0.1113 | 0.0919 |
| | (−0.93) | (0.98) | (2.84)*** | (2.07)** |
| $SOP_{it-1}$ | 0.0487 | | −0.0071 | |
| | (2.14)** | | (−1.97)** | |
| $RSTK_{it-1}$ | | −0.1534 | | −0.0141 |
| | | (−1.82)* | | (−2.24)** |
| $MTB_{it-1}$ | 0.0074 | −0.0524 | −0.0114 | −0.0177 |
| | (0.40) | (−0.83) | (−3.16)*** | (−2.57)** |
| $FirmSize_{it-1}$ | 0.0001 | 0.0025 | 0.0004 | 0.0002 |
| | (0.08) | (0.74) | (2.13)** | (0.40) |
| $Quick_{it-1}$ | 0.0266 | 0.0204 | 0.0051 | 0.0020 |
| | (1.92)* | (1.24) | (2.52)** | (0.75) |
| $Lev_{it-1}$ | 0.0381 | −0.1817 | 0.0139 | 0.0352 |
| | (0.38) | (−0.87) | (0.87) | (1.47) |
| $DivDum_{it-1}$ | 0.0222 | −0.0714 | −0.0001 | 0.0033 |
| | (0.97) | (−0.74) | (−0.02) | (0.36) |
| $Std\_CFO_{it-1}$ | 0.2694 | 0.1879 | 0.1936 | 0.0151 |
| | (0.74) | (0.25) | (1.91)* | (0.13) |
| $Std\_Sales_{it-1}$ | 0.0011 | −0.0815 | 0.0225 | 0.0350 |
| | (0.01) | (−0.25) | (1.39) | (0.86) |
| $Tangibles_{it-1}$ | −0.0598 | −0.1804 | 0.0110 | 0.0290 |
| | (−0.75) | (−0.76) | (0.90) | (1.39) |
| $Loss_{it-1}$ | 0.0372 | 0.0460 | 0.0265 | −0.0159 |
| | (0.70) | (0.34) | (4.44)*** | (−1.18) |
| $Insti_{it-1}$ | 0.0061 | −0.3184 | −0.0221 | −0.0258 |
| | (0.08) | (−1.58) | (−1.90)* | (−1.31) |
| $Std\_Net\_Hire_{it-1}$ | 0.1137 | 0.0212 | −0.0046 | 0.0076 |
| | (2.05)** | (0.10) | (−0.63) | (0.40) |
| $Labour\_Intensity_{it-1}$ | −4.2396 | −3.3609 | 0.0158 | 0.5651 |
| | (−2.91)*** | (−1.40) | (0.05) | (1.05) |
| $EQ_{it-1}$ | −0.3199 | 0.2353 | −0.0493 | −0.1619 |
| | (−0.92) | (0.16) | (−0.70) | (−1.06) |
| */Ab_Invest_Other/* | 0.7800 | 0.5414 | 0.0093 | −0.0769 |
| | (6.66)*** | (3.14)*** | (0.27) | (−1.24) |
| $Lab\_Union_{it-1}$ | −0.0006 | 0.0009 | 0.0005 | −0.0007 |
| | (−0.33) | (0.19) | (1.66)* | (−1.15) |
| $OwnCEO_{it}$ | 0.0301 | −0.0008 | −0.0206 | −0.0135 |
| | (1.69)* | (−0.02) | (−4.03)*** | (−1.72)* |
| *Year fixed effects* | YES | YES | YES | YES |
| *Industry fixed effects* | YES | YES | YES | YES |
| *(Adj.)* $R^2$ | 25.71% | 41.14% | 9.58% | 3.99% |
| *N* | 484 | 88 | 1704 | 404 |

**Note:** ***, ** and * denote significance at 1%, 5% and 10% levels, respectively. This table presents the results for associations between over- and under-investment, stock options and restricted stock using PSM samples. Variables are defined in Appendix 1. *P*-values are based on two-tailed tests, with standard errors clustered by firm. T-statistics are shown below each estimate (in parentheses).

*8.2.3 Using Firm Fixed Effects*

Although the research controls for year and industry fixed effects, it is possible that omitted unobservable time-invariant firm-specific characteristics are driving the main empirical results (Berry, 2010; Salomon & Wu, 2012). That is, unobserved firm heterogeneity over the time period of the thesis may be confounding the main empirical results (Berry, 2010). For example, omitted variables that affect both stock options and restricted stock and over- and under-investment in labour could result in spurious correlations between stock options and/or restricted stock and over-investment and/or under-investment in labour.

*Models 2* and *3* are re-estimated by applying a fixed-effects panel regression procedure with firm-level fixed effects to address the influence of any time-invariant firm characteristics in the main empirical results. The firm fixed-effects regressions include year dummies, but exclude industry dummies. The results are reported in Table 8.8 and show that stock options are significantly positively (t=2.29) associated with over-investment, while restricted stock is significantly negatively (t=−1.66) associated with over-investment. Further, both stock options and restricted stock are significantly negatively associated with under-investment at the 10% and 1% levels, respectively. These results are qualitatively similar to the main results.

**Table 8.8: Effects of Stock Options and Restricted Stock on Over- and Under-Investment — Endogeneity Testing using Firm Fixed Effects**

| Variable | Predicted Sign | Over-Investment (2) | Predicted Sign | Under-Investment |
|---|---|---|---|---|
| *Intercept* | (?) | 0.3215 | (?) | 0.1174 |
| | | (4.52)*** | | (6.70)*** |
| $SOP_{it-1}$ | (+) | 0.0087 | (−) | −0.0007 |
| | | (2.29)** | | (1.77)* |
| $RSTK_{it-1}$ | (−) | −0.0146 | (−) | −0.0043 |
| | | (−1.66)* | | (−2.93)*** |
| $MTB_{it-1}$ | (+) | 0.0420 | (+) | −0.0194 |
| | | (3.61)*** | | (−7.41)*** |
| $FirmSize_{it-1}$ | (+/−) | −0.0022 | (+/−) | −0.0002 |
| | | (−2.67)*** | | (−1.06) |
| $Quick_{it-1}$ | (+) | 0.0179 | (+) | 0.0011 |
| | | (5.89)*** | | (1.10) |
| $Lev_{it-1}$ | (+) | −0.0103 | (+) | 0.0131 |
| | | (−0.22) | | (1.16) |
| $DivDum_{it-1}$ | (−) | 0.0312 | (−) | −0.0050 |
| | | (1.77)* | | (−1.22) |
| $Std\_CFO_{it-1}$ | (+) | 0.0199 | (+) | 0.0142 |
| | | (0.19) | | (0.43) |
| $Std\_Sales_{it-1}$ | (+) | 0.0470 | (+) | −0.0056 |
| | | (1.12) | | (−0.50) |
| $Tangibles_{it-1}$ | (−) | −0.1633 | (−) | −0.0328 |
| | | (−2.55)** | | (−1.96)** |
| $Loss_{it-1}$ | (−) | −0.0019 | (−) | 0.0179 |
| | | (−0.14) | | (5.94)*** |
| $Insti_{it-1}$ | (−) | 0.0770 | (−) | −0.0105 |
| | | (1.96)* | | (−1.10) |
| $Std\_Net\_Hire_{it-1}$ | (+) | −0.1524 | (+) | −0.0188 |
| | | (−6.93)*** | | (−3.85)*** |
| $Labour\_Intensity_{it-1}$ | (−) | −10.4671 | (−) | 2.3448 |
| | | (−6.06)*** | | (6.99)*** |
| $EQ_{it-1}$ | (−) | 0.1967 | (−) | −0.0385 |
| | | (1.16) | | (−0.88) |
| $/Ab\_Invest\_Other/_{it}$ | (+) | 0.6608 | (+) | 0.0654 |
| | | (22.84)*** | | (3.78)*** |
| $Lab\_Union_{it-1}$ | (−) | −0.0011 | (−) | −0.0003 |
| | | (−0.92) | | (−0.99) |
| $OwnCEO_{it}$ | (−) | 0.0012 | (−) | −0.0022 |
| | | (0.27) | | (−2.02)** |
| *Year fixed effects* | | YES | | YES |
| *(Adj.)* $R^2$ | | 10.75% | | 4.37% |
| *N* | | 3734 | | 8384 |

**Note:** ***, ** and * denote significance at 1%, 5% and 10% levels, respectively. This table presents the results for associations between over- and under-investment and stock options and restricted stock. Variables are defined in Appendix 1. *P*-values are based on two-tailed tests, with standard errors clustered by firm. T-statistics are shown below each estimate (in parentheses).

*8.2.4 Using Change Specification*

To further address any endogeneity concerns, a change specification regression is employed. The main advantage of employing a change specification is that it uses the firm as its own control, alleviating the potential for any correlated omitted variable problems (Krishnan et al., 2011; Naiker et al., 2013). This is because, if the unobservable omitted variables are assumed to remain constant over time, then the annual change in the omitted variables would equal zero in a change model (Naiker et al., 2013). A limitation with using the change specification, however, is that it leads to a reduction in the main sample because it requires two consecutive periods of data to construct the change variables (Naiker et al., 2013). After determining the change variables, the main sample drops to 5596 firm-year observations.

To reduce the concerns of correlated omitted variable bias, as discussed earlier in this section, a change specification regression, which is a regression of change in over- and under-investment (*ΔUnder-Investment* and *ΔOver-Investment*) on change in stock options (*ΔSOP*) and restricted stock (*ΔRSTK*) and change in control variables, is estimated. Table 8.9 reports the change specification results, which show a significant positive association between stock options and over-investment, and a significant negative association between restricted stock and over-investment. Also, both stock options and restricted stock show significant results negative in their associations with under-investment. These results are still similar to the main results.

**Table 8.9: Effects of Stock Options and Restricted Stock on Over- and Under-Investment — Endogeneity Testing using Change Specification**

| Variable | Predicted Sign | ΔOver-Investment | Predicted Sign | ΔUnder-Investment |
|---|---|---|---|---|
| | | (2) | | |
| *Intercept* | (?) | 0.1483 | (?) | 0.3607 |
| | | (2.29)** | | (0.68) |
| $\Delta SOP_{it-1}$ | (+) | 0.0063 | (−) | −0.0008 |
| | | (1.78)* | | (−1.81)* |
| $\Delta RSTK_{it-1}$ | (−) | −0.0364 | (−) | −0.0246 |
| | | (1.66)* | | (−1.69)* |
| $\Delta MTB_{it-1}$ | (+) | 0.0508 | (+) | −0.0388 |
| | | (2.20)** | | (−6.69)*** |
| $\Delta FirmSize_{it-1}$ | (+/−) | −0.0042 | (+/−) | −0.0009 |
| | | (−2.10)** | | (−1.79)* |
| $\Delta Quick_{it-1}$ | (+) | 0.0157 | (+) | 0.0022 |
| | | (2.58)*** | | (0.90) |
| $\Delta Lev_{it-1}$ | (+) | −0.1213 | (+) | 0.0810 |
| | | (−1.39) | | (3.04)*** |
| $\Delta DivDum_{it-1}$ | (−) | 0.0043 | (−) | −0.0008 |
| | | (0.13) | | (−0.11) |
| $\Delta Std\_CFO_{it-1}$ | (+) | −0.2194 | (+) | −0.0229 |
| | | (−0.81) | | (−0.28) |
| $\Delta Std\_Sales_{it-1}$ | (+) | −0.0089 | (+) | −0.0072 |
| | | (−0.09) | | (−0.32) |
| $\Delta Tangibles_{it-1}$ | (−) | −0.4817 | (−) | −0.0782 |
| | | (−3.04)*** | | (−1.74)* |
| $\Delta Loss_{it-1}$ | (−) | 0.0013 | (−) | 0.0093 |
| | | (0.08) | | (2.61)*** |
| $\Delta Insti_{it-1}$ | (−) | 0.0405 | (−) | 0.0015 |
| | | (0.57) | | (0.08) |
| $\Delta Std\_Net\_Hire_{it-1}$ | (+) | −0.0085 | (+) | 0.0098 |
| | | (−0.12) | | (0.53) |
| $\Delta Labour\_Intensity_{it-1}$ | (−) | −39.3864 | (−) | 18.2683 |
| | | (−7.3864)*** | | (16.92)*** |
| $\Delta EQ_{it-1}$ | (−) | 0.0777 | (−) | 0.0100 |
| | | (0.18) | | (0.93) |
| $\Delta Ab\_Invest\_Other_{it}$ | (+) | 0.5285 | (+) | 0.0827 |
| | | (11.09)*** | | (3.47)*** |
| $\Delta Lab\_Union_{it-1}$ | (−) | 0.0002 | (−) | −0.0010 |
| | | (0.06) | | (−1.25) |
| $\Delta OwnCEO_{it}$ | (−) | 0.0043 | (−) | −0.0236 |
| | | (1.11) | | (−1.23) |
| *Year fixed effects* | | YES | | YES |
| *Industry fixed effects* | | YES | | YES |
| *(Adj.)* $R^2$ | | 17.60% | | 9.17% |
| *N* | | 1228 | | 4368 |

**Note:** ***, ** and * denote significance at 1%, 5% and 10% levels, respectively. This table presents the results for associations between ΔOver- and ΔUnder-investment and stock options and restricted stock. Variables are defined in Appendix 1. *P*-values are based on two-tailed tests, with standard errors clustered by firm. T-statistics are shown below each estimate (in parentheses)

*8.2.6 Using Difference-in-Differences*

The passing of the Dodd–Frank Wall Street Reform and Consumer Protection Act of 2010 (Dodd–Frank Act) (Dimitrov, Palia & Tang, 2015) is likely to affect firm performance and executive investment decision-making. That is, the requirement for public companies to disclose executive equity pay will trigger effective monitoring as providers of capital will be able to match executive pay to firm performance. Section 953 requires the SEC to direct publicly listed companies to report on the ratio of CEO compensation to the median pay for all other company employees, and the relationships between realised compensation and the firm's financial performance, including stock-price performance (Dodd–Frank Act, 2010; Thatcher, 2012; Murphy, 2013). In addition, Section 954 requires the SEC to direct the stock exchanges to require listed companies to develop and implement compensation clawback policies, enabling the recovery of incentive-based compensation from current and former executives following a restatement of financial results (Dodd–Frank Act, 2010; Ades-Laurent, 2017). To avoid this, executives may not engage in actions, including inappropriate investment decisions that are likely to destroy firm value in the long run.

To assess whether or not this regulatory change has an impact on firms' labour investment decisions, a quasi-experimental design (i.e., difference-in-differences (DID)) is employed in which the sample is split into pre- and post-implementation of the Act. The Act is considered as an exogenous shock and, if it is effective, then it should affect the labour investment behaviour of executives. To implement the DID, the difference between the variables of interest (i.e., stock options and restricted stock) before and after the regulatory change is computed. Since other factors may also change as well during the period, another set of firms that are not affected by the regulatory change is used as a

control group (Reeb, Sakakibara, & Mahmood, 2012). The difference in the two groups (affected vs. unaffected) is compared over the same time period, and provides a robust environment for evaluating cause and effect relationships. The DID approach results in the sample reduction to 11,170 firm-year observations because firm-year observations for 2010 are dropped. $SOP_{it-1}$ and RSTK are dummy variables that equals one (1) if an executive has restricted stock or stock options and zero (0) otherwise. Post is a dummy variable that equals one (1) if year is greater than 2010 and zero (0) otherwise. If the regulatory change is effective, then the interaction terms (i.e., $SOP_{it-1}$* *Post and* $RSTK_{it-1}$ * *Post)* should be significant. Below are the models used for the DID analyses. Table 8.10 reports the results. The results show that the introduction of the Act does not have any effect on the labour investment decisions of executives. The coefficient for the interaction terms $SOP_{it-1}$* *Post and* $RSTK_{it-1}$ * *Post* although have their predicted signs, are statically insignificant in both the over-investment and under-investment subsamples.

$$Over\text{-}Investment_{it} = \beta_0 + \beta_1 SOP_{it-1} + \beta_2 RSTK_{it-1} + Post + \beta_1 SOP_{it-1} * Post + \beta_2 RSTK_{it-1} * Post + Controls + Industry\ FE + Year\ FE + \varepsilon_{it}$$

[Model 4]

$$Under\text{-}Investment_{it} = \beta_0 + \beta_1 SOP_{it-1} + \beta_2 RSTK_{it-1} + Post + \beta_1 SOP_{it-1} * Post + \beta_2 RSTK_{it-1} * Post + Controls + Industry\ FE + Year\ FE + \varepsilon_{it}$$

[Model 5]

**Table 8. 10: Effects of Stock Options and Restricted Stock on Over- and Under-Investment — Endogeneity Testing using Difference-In-Differences**

| | Predicted Sign | Over-investment | Predicted Sign | Under-investment |
|---|---|---|---|---|
| *Intercept* | (?) | 0.0112 | (?) | 0.0757 |
| | | (0.19) | | (5.48)*** |
| $SOP_{it-1}$ | (+) | 0.0243 | (−) | -0.0054 |
| | | (1.66)* | | (-1.86)* |
| $RSTK_{it-1}$ | (−) | -0.0470 | (−) | -0.0111 |
| | | (1.68)* | | (-2.32)** |
| $SOP_{it-1}$*Post* | (+) | 0.0036 | (−) | -0.0033 |
| | | (0.68) | | (-1.63) |
| $RSTK_{it-1}$*Post* | (−) | -0.0035 | (−) | -0.0011 |
| | | (-0.66) | | (-1.23) |
| $MTB_{it-1}$ | (−) | -0.0037 | (−) | -0.0111 |
| | | (-0.54) | | (-5.96)*** |
| $FirmSize_{it-1}$ | (+/−) | -0.0003 | (+/−) | 0.0000 |
| | | (-0.73) | | (0.22) |
| $Quick_{it-1}$ | (+) | 0.0151 | (+) | 0.0027 |
| | | (4.93)*** | | (3.45)*** |
| $Lev_{it-1}$ | (+) | 0.0158 | (+) | 0.0131 |
| | | (0.50) | | (1.81)** |
| $DivDum_{it-1}$ | (−) | -0.0020 | (−) | 0.0005 |
| | | (-0.21) | | (0.20) |
| $Std\_CFO_{it-1}$ | (+) | -0.0162 | (+) | 0.1575 |
| | | (-0.20) | | (2.20) |
| $Std\_Sales_{it-1}$ | (+) | 0.0223 | (+) | 0.0161 |
| | | (0.67) | | (1.38) |
| $Tangibles_{it-1}$ | (−) | -0.0558 | (−) | -0.0130 |
| | | (-2.08)** | | (-1.60) |
| $Loss_{it-1}$ | (−) | 0.0054 | (−) | 0.0289 |
| | | (0.39) | | (8.81)*** |
| $Insti_{it-1}$ | (−) | -0.0040 | (−) | -0.0173 |
| | | (-0.18) | | (-2.69)*** |
| $Std\_Net\_Hire_{it-1}$ | (+) | 0.0643 | (+) | 0.0092 |
| | | (2.95)*** | | (1.73)* |
| $Labour\_Intensity_{it-1}$ | (−) | -2.0693 | (−) | 0.2335 |
| | | (-3.48)*** | | (1.28) |
| $EQ_{it-1}$ | (−) | -0.3672 | (−) | -0.1498 |
| | | (-2.58)*** | | (-3.16)*** |
| $/Ab\_Invest\_Other/_{it}$ | (+) | 0.6605 | (+) | 0.0575 |
| | | (12.31)*** | | (2.61)*** |
| $Lab\_Union_{it-1}$ | (−) | 0.0003 | (−) | 0.0003 |
| | | (0.28) | | (1.36) |
| $OwnCEO_{it}$ | (−) | -0.0045 | (−) | -0.0016 |
| | | (-1.62) | | (-1.61) |
| *Year fixed effects* | | YES | | YES |
| *Industry fixed effects* | | YES | | YES |
| *(Adj.)* $R^2$ | | 25.81% | | 12.99% |
| *N* | | 3426 | | 7744 |

**Note:** ***, ** and * denote significance at 1%, 5% and 10% levels, respectively. This table presents the results for associations between over- and under-investment and stock options and restricted stock. Variables are defined in Appendix 1. *P*-values are based on two-tailed tests, with standard errors clustered by firm. T-statistics are shown below each estimate (in parentheses).

## 8.3 Additional Controls

As further robustness checks, the research controls for several variables that are not included in the main regression models (*Models 2* and *3*). These variables are: managerial ability; corporate governance; stock price informativeness; cash bonuses and salary; and the exogenous effects of the FAS 123R.

### *8.3.1 Controlling for Managerial Ability and Corporate Governance*

Managerial ability and corporate governance (in particular board monitoring) are included as additional controls in the main regression models (i.e., *Models 2* and *3*). This is because the literature suggests that more able managers do not engage in value-destroying activities (Demerjian, Lev & McVay, 2012) and that good corporate governance is an indication of better monitoring (Larcker, Richardson & Tuna, 2007). Therefore, executives in firms with good corporate governance are less likely to behave in an opportunistic manner.

Managerial ability refers to the knowledge, skills and experience of managers which enable them to efficiently convert firm resources into productive use (Kor, 2003; Holcomb, Holmes & Connelly, 2009). Demerjian et al. (2012, p.1229) propose: 'We expect more able managers to better understand technology and industry trends, reliably predict product demand, invest in higher value projects, and manage their employees more efficiently than less able managers'. Habib and Hassan (2017), in their study examining managerial ability, investment efficiency and stock price crash risk, show that managerial ability is associated with investment efficiency. Therefore, following Jung et al. (2014), managerial ability is controlled for in the robustness checks because it is likely to offer alternative explanation to my results.

Demerjian et al.'s (2012) measure is used to proxy for managerial ability. Demerjian et al. (2012) use data envelopment analysis (DEA) to assess managers' efficiency in transforming firm resources[20] into revenues compared to that of their industry peers, and conclude that their measure is stronger than other proxies for managerial ability used in the past such as firm size, past abnormal performance, compensation, tenure, media mention, education and manager fixed effects. Using an optimisation procedure to incorporate these variables, firm efficiency is calculated and then regressed on six firm characteristics that affect firm efficiency: firm size; firm market share; cash availability; life cycle; operational complexity; and foreign operations. The residual term obtained from this regression is the component reflecting managerial ability.[21]

The sample used to conduct these analyses is 9,952 firm-year observations. As expected, there is a significant negative association between managerial ability and over-investment in labour, but the main result still holds (see Table 8.11). Notably, the coefficient of stock options is positive and significant at the 10% level, while the coefficient of restricted stock is negative and significant at the 1% level (see Column 1, Table 8.11). Moreover, in its association with under-investment in labour, managerial ability is found to be negative and statistically significant at the 5% level. Stock options and restricted stock are still found to have mitigating effects on under-investment in labour even after the inclusion of the managerial ability construct in *Model 3* (see Column 2, Table 8.11). Taken together, these results show that, although managerial

[20] These include a multitude of revenue-generating resources: cost of inventory, general and administrative expenses, fixed assets, operating leases, past R&D expenditure and intangible assets (Demerjian et al., 2012).

[21] See Demerjian et al. (2012, pp.1235–1238) for a detailed explanation of how to measure managerial ability.

ability has an influence in curbing over- and under-investment in labour, stock options and restricted stock are equally important.

Corporate governance refers to the set of mechanisms that influence the decisions made by firms' executives when there is a separation of ownership and control (Larcker et al., 2007). These monitoring mechanisms include: the board of directors; institutional investors; and operation of the market for corporate control (Larcker et al., 2007). The more effective the monitoring mechanisms, the better the governance environment and so firm executives are less likely to engage in value-destroying activities such as over- and under-investment in labour (Larcker et al., 2007; Jung et al., 2014). Therefore, following Jung et al. (2014), I include corporate governance as an additional control in the main model.

Following Guldiken and Darendeli (2016), specific board-monitoring measures such as CEO duality, board size and proportions of independent and female directors are used as proxies for corporate governance. This is because these measures relate to the effectiveness of the board, an important monitoring mechanism (Larcker et al., 2007; Ferreira et al., 2011).

**Table 8. 11: Roles of Managerial Ability and Corporate Governance in Over- and Under-Investment Models**

| | | Managerial Ability | | Corporate Governance | |
|---|---|---|---|---|---|
| Variable | Predicted Sign | Over-Investment | Under-Investment | Over-Investment | Under-Investment |
| | | (1) | (2) | (3) | (4) |
| *Intercept* | (?) | 0.0379 | 0.0766 | 0.0690 | 0.1232 |
| | | (0.61) | (5.16)*** | (0.82) | (7.24)*** |
| $SOP_{it-1}$ | (+/−) | 0.0071 | −0.0009 | 0.0126 | −0.0001 |
| | | (1.99)* | (−1.93)* | (1.95)* | (−1.65)* |
| $RSTK_{it-1}$ | (−) | −0.0227 | −0.0028 | −0.0060 | −0.0039 |
| | | (−3.35)*** | (−2.10)** | (−1.67)* | (−2.63)*** |
| $MA_{it-1}$ | (−) | −0.1068 | −0.0329 | | |
| | | (−4.28)*** | (−2.14)** | | |
| $BSize_{it-1}$ | (−) | | | −0.0005 | 0.0000 |
| | | | | (−0.22) | (0.01) |
| $CEODual_{it-1}$ | (−) | | | −0.0161 | 0.0020 |
| | | | | (−192)* | (0.84) |
| $PFDir_{it-1}$ | (−) | | | −0.0276 | 0.0003 |
| | | | | (−0.50) | (0.02 |
| $PINDir_{it-1}$ | (−) | | | 0.0024 | 0.0251 |
| | | | | (0.05) | (2.62)*** |
| *Controls* | | YES | YES | YES | YES |
| *Year fixed effects* | | YES | YES | YES | YES |
| *Industry fixed effects* | | YES | YES | YES | YES |
| *(Adj.)* $R^2$ | | 22.19% | 11.96% | 25.49% | 10.14% |
| *N* | | 3232 | 6720 | 2448 | 5539 |

**Note:** ***, ** and * denote significance at 1%, 5% and 10% levels, respectively. Variables are defined in Appendix 1. Following Jung et al. (2014), managerial ability and corporate governance are added as additional controls. $BSize_{it-1}$ represents board size for firm *i* in year *t−1*; $CEODual_{it-i}$ in year *t−1*; $PFDir_{it-1}$ represents the percentage of female directors on the board for firm *i* in year *t−1* and $PINDir_{it-1}$ represents the percentage of independent directors for firm *i* in year *t−1*. All other variables are as defined in Appendix 1. *P*-values are based on two-tailed tests, with standard errors clustered by firm. T-statistics are shown below each estimate (in parentheses).

The results for controlling for corporate governance in *Models 2* and *3* are reported in Table 8.11. After the inclusion of the corporate governance metrics in the models, the sample size drops from 12118 to 7987. Although the sample size is reduced, the main results remain qualitatively the same, suggesting that, in a setting where corporate governance is effective, stock options can exacerbate (or mitigate) over-investment (or under-investment) in labour, while restricted stock mitigates both over- and under-investment in labour (see Columns 3 and 4 of Table 8.11).

### *8.3.2 Controlling for Stock Price Informativeness*

Stock price informativeness is also used as a control. This is because stock prices may include information that managers do not possess, such as information about future investment or future demand for goods and services, which can affect labour investment decisions. Plus, more informative stock prices can trigger better external and/or internal monitoring of executives (Ferreira et al., 2011) and help to mitigate their empire-building and risk-aversion incentives. Consistent with these arguments, Ben-Nasr and Alshwer (2016) find that higher stock price informativeness is associated with greater labour investment efficiency. Therefore, to show that stock price informativeness is not confounding the associations between stock options, restricted stock and over- and under-investment in labour, it is added as a control in the main models.

Stock price informativeness is proxied by the probability of informed trading (PIN). Data on the PIN comes from Brown et al.'s (2004) continuously updated database of PIN estimates. Data on the PIN is available up to 2012 so, when it is merged with the main dataset, the sample drops to 6,358 firm-year observations. After including stock

price informativeness in the main models, they are estimated and the results remain qualitatively the same as the main results (see Table 8.12).

**Table 8. 12: Role of Stock Price Informativeness in Over- and Under-Investment Models**

| Variable | Predicted Sign | Over-Investment | Predicted Sign | Under-Investment |
|---|---|---|---|---|
| | | (1) | | (2) |
| *Intercept* | (?) | 0.1468 | (?) | 0.1192 |
| | | (1.61) | | (5.39)*** |
| $SOP_{it-1}$ | (+) | 0.0164 | (−) | −0.0009 |
| | | (3.21)*** | | (−2.09)** |
| $RSTK_{it-1}$ | (−) | −0.0160 | (−) | −0.0037 |
| | | (−1.75)* | | (−3.27)*** |
| | | (−1.20) | | (−2.17)** |
| $PIN_{it-1}$ | | −0.3824 | | −0.0657 |
| | | (−2.32)** | | (−1.66)* |
| *Controls* | | YES | | YES |
| *Year fixed effects* | | YES | | YES |
| *Industry fixed effects* | | YES | | YES |
| *(Adj.)* $R^2$ | | 28.28% | | 13.22% |
| *N* | | 1,785 | | 4,573 |

**Note:** ***, ** and * denote significance at 1%, 5% and 10% levels, respectively. Variables are defined in Appendix 1. *P*-values are based on two-tailed tests, with standard errors clustered by firm. T-statistics are shown below each estimate (in parentheses). $PIN_{it-1}$ represents lagged PIN as a proxy for stock price informativeness.

### *8.3.3 Controlling for Cash Bonuses and Salary*

The unique effects of stock options and restricted stock on over- and under-investment in labour are also examined in this research by including cash bonuses and salary in the specified models. While cash bonuses provide executives with incentive to increase performance, salary does not provide such incentive (Murphy, 2013; Ades-Laurent, 2017). Therefore, cash bonuses could have a competing influence on executive investment behaviour in relation to stock options and restricted stock, because cash bonuses focus on the short term while stock options and restricted stock are more likely to influence longer term investment decisions (Murphy, 2013; Ades-Laurent, 2017). The results still hold even in the presence of cash bonuses and salary (see Table 8.13).

**Table 8. 13: Roles of Salary and Cash Bonuses in Over- and Under-Investment Models**

| Variable | Predicted Sign | Over-Investment | Predicted Sign | Under-Investment |
|---|---|---|---|---|
| | | (1) | | (2) |
| *Intercept* | (?) | 0.0487 | (?) | 0.0746 |
| | | (0.75) | | (4.96)*** |
| $SOP_{it-1}$ | (+) | 0.0068 | (−) | −0.0010 |
| | | (1.90)* | | (−2.36)** |
| $RSTK_{it-1}$ | (−) | −0.0178 | (−) | −0.0029 |
| | | (−2.36)** | | (−2.71)*** |
| $CBonuses_{it-1}$ | (+/−) | 0.0025 | (+/−) | 0.0005 |
| | | (1.44) | | (1.14) |
| $Salary_{it-1}$ | (+/−) | −0.0120 | (+/−) | −0.0003 |
| | | (−1.53) | | (−0.15) |
| *Controls* | | YES | | YES |
| *Year fixed effects* | | YES | | YES |
| *Industry fixed effects* | | YES | | YES |
| *(Adj.)* $R^2$ | | 24.08% | | 13.06% |
| *N* | | 3,758 | | 8,360 |

**Note:** ***, ** and * denote significance at 1%, 5% and 10% levels, respectively. Variables are defined in Appendix 1. *P*-values are based on two-tailed tests, with standard errors clustered by firm. T-statistics are shown below each estimate (in parentheses).

### *8.3.4 Controlling for FAS 123R*

The implementation of the FAS 123R in December 2005 represents an exogenous change in the accounting benefits of stock options, as firms are now required to expense stock options on their income statements. This change in the accounting treatment of stock options has resulted in a dramatic decrease in the usage of stock options compared to restricted stock (Hayes et al., 2012). This reduction in the use of stock options as a component of equity compensation is likely to reduce managerial risk-taking incentives, thus affecting executives' investment decision-making. If so, then executives' investment decisions in labour may vary between pre and post FAS 123R periods.

To rule out the effects of this exogenous event on the main results, a dummy variable for the FAS 123R — the dummy equals 1 for the period after 2005 and zero otherwise — is included and the main models (*Models 2* and *3*) are re-estimated. The models include industry dummies, but exclude year dummies. The main results do not change

(see Table 8.14), although *FAS123Dummy* is statistically significant, suggesting that the regulatory requirement for stock options to be expensed does not have any influence on the results reported in this thesis.

**Table 8. 14: Role of FAS 123R in Over- and Under-Investment Models**

| Variable | Predicted Sign | Over-Investment (1) | Predicted Sign | Under-Investment (2) |
|---|---|---|---|---|
| *Intercept* | (?) | 0.0324 | (?) | 0.0823 |
| | | (0.62) | | (6.68)*** |
| $SOP_{it-1}$ | (+) | 0.0070 | (−) | −0.0007 |
| | | (1.98)** | | (−1.85)* |
| $RSTK_{it-1}$ | (−) | −0.0177 | (−) | −0.0025 |
| | | (−2.47)** | | (−2.37)** |
| $FAS123Dummy_{it}$ | ? | −0.0290 | ? | −0.0207 |
| | | (−2.39)** | | (−6.61)*** |
| *Controls* | | YES | | YES |
| *Year fixed effects* | | YES | | YES |
| *Industry fixed effects* | | YES | | YES |
| *(Adj.)* $R^2$ | | 23.01% | | 11.84% |
| *N* | | 3,734 | | 8,384 |

**Note:** ***, ** and * denote significance at 1%, 5% and 10% levels, respectively. *FAS123Dummy* equals 1 for periods after 2005 and zero otherwise. Variables are defined in Appendix 1. *P*-values are based on two-tailed tests, with standard errors clustered by firm. T-statistics are shown below each estimate (in parentheses).

## 8.4 Competing Effects of Stock Options and Restricted Stock on Under-Investment in Labour: Further Assessment

Recall that stock options are contracts giving the purchaser the right, but no obligation, to buy or sell a share at a fixed price, known as the exercise or strike price, within a specific period of time (SEC, 2016). The strike price of executive stock options is almost always a fixed price quantified at grant date. Accordingly, the defining characteristic of a stock option is that the payoff is based on the positive difference, if any, between the share price at exercise or settlement and the strike price of the instrument (Walker, 2009).

Executive stock options are likely to encourage executive risk-taking and overcome the problem of under-investment in labour because they do not expose executives to the risks of their investments (Smith & Stulz, 1985; Smith & Watts, 1992). Wright et al. (2002) show that risky investments are positively associated with stock options pay, suggesting that stock options granted to executives are likely to encourage them to make risky investment decisions, such as the decision to hire employees (Becker, 1962b). Evidence from the literature on labour economics suggests that investment in hiring is risky because an employee can leave their job at any time for a more well-paid one (Becker, 1962a; Nandy & Mahapatra, 2010). If this happens, then the business process of the firm is likely to be disrupted. Given the unique features of stock options, if granted to executives these may encourage them to increase the investment in labour, thus mitigating the under-investment problem.

Restricted stock, however, is stock that is awarded to an executive usually without cost or for a nominal price (Thatcher, 2005). Although the shares belong to the executive, they cannot take them until specified restrictions are met. These restrictions could be time- or performance-based (Ofek & Yermack, 2000; Thatcher, 2005). If they are time-based, then the restrictions may lapse all at once or gradually. However, if they are performance-based, then the firm could, for instance, restrict the shares until the executive meets certain performance goals or targets (Năstăsescu, 2009; Murphy, 2013). During the restriction period, the shares are not transferable and are subject to a substantial risk of forfeiture (Landsberg, 2004). For instance, the restricted stock may be forfeited if the executive terminates employment with the firm during a specified period of time (Thatcher, 2005).

Baker and McKenzie (2011) argue that one important advantage of holding restricted stock is that, upon the grant of the restricted stock, the executive becomes the immediate owner of the stock and is entitled to dividends and voting rights. These rights, especially the right to partake in the dividends of the firm, are likely to serve as an incentive for the executive to avoid actions that could adversely affect the firm's earnings — actions such as engaging in under-investment in labour. Fama (1980) and Lambert (1986) both argue that executives with restricted stock bear more financial risk and therefore may avoid decisions that are likely to destroy value — such as the decision to under-invest in labour.

Intuitively, taken together, although both stock options and restricted stock may mitigate under-investment in labour, stock options are likely to have a more negative effect than restricted stock because they encourage executives to take more risk — such as the risk of investing in labour. To assess these competing effects statistically, the unstandardised coefficients of stock options and restricted stock are standardised, and the standardised beta coefficients are then compared. The standardised beta coefficient is used because it helps to compare the strength of the effect of each test variable (stock options and restricted stock) on under-investment in labour (Hair et al., 2014). The greater the absolute value of the beta coefficient, the stronger the effect (Hair et al., 2014). The results are reported in Table 8.15 and support my intuition and the theoretical arguments. The standardised beta coefficients indicate that a change of one

standard deviation in stock options has the highest effect on under-investment, followed by that in restricted stock (−0.0282 versus −0.0245).[22]

**Table 8. 15: Competing Effects of Stock Options and Restricted Stock on Under-Investment in Labour**

| | | Under-Investment | |
|---|---|---|---|
| Variable | Predicted Sign | Unstandardised Coefficients | Standardised Coefficients |
| | | (1) | (2) |
| *Intercept* | (?) | 0.0718 | ——— |
| | | (5.45)*** | |
| $SOP_{it-1}$ | (−) | −0.0009 | −0.0282 |
| | | (−2.12)** | |
| $RSTK_{it-1}$ | (−) | −0.0028 | −0.0245 |
| | | (−2.66)*** | |
| $MTB_{it-1}$ | (+) | −0.0103 | −0.0829 |
| | | (−5.62)*** | |
| *Controls* | | YES | |
| *Year fixed effects* | | YES | |
| *Industry fixed effects* | | YES | |
| *(Adj.)* $R^2$ | | 13.00% | |
| *N* | | 8,384 | |

**Note:** ***, ** and * denote significance at 1%, 5% and 10% levels, respectively. This table presents the results for the competing effects of stock options and restricted stock on under-investment in labour. Columns 1 and 2 are the unstandardised and standardised coefficients, respectively. *P*-values are based on two-tailed tests, with standard errors clustered by firm. T-statistics are shown below each estimate (in parentheses).

## 8.5 Conclusion

This chapter has presented the results for a number of additional tests. The main results for the associations between stock options, restricted stock and over- and under-investment in labour remain qualitatively the same after: using alternative measures for over- and under-investment in labour; controlling for managerial ability, corporate governance, cash bonuses and salary, stock price informativeness and the FAS 123R;

[22] Standardisation of coefficients is usually conducted to determine which independent variables have greater effects on the dependent variable in a multiple regression analysis when the variables are measured in the same or different units of measurement. Standardised coefficients refer to how many standard deviations a dependent variable will change by per standard deviation increase in the predictor variable (Shroeder, Sjoquist & Stephan, 1986).

and addressing endogeneity concerns using 2SLS, PSM, fixed effects regression and change specification. Also, when the competing effects of stock options and restricted stock on under-investment in labour were assessed, stock options were found to have greater mitigating effects on under-investment in labour.

The next chapter presents the summary and conclusion of the thesis, as well as its implications and limitations, and a potential future research agenda.

# CHAPTER 9: SUMMARY AND CONCLUSIONS

The previous chapter presented the results of the additional analyses. This chapter presents the summary and conclusions of the thesis. Section 9.1 summarises the thesis. The penultimate section provides a discussion of the implications of the results, with Section 9.3 presenting limitations and opportunities for future research.

## 9.1 Summary of the Thesis

This thesis examines the associations between stock options, restricted stock and over- and under-investment in labour. Prior research has examined conditional conservatism (Ha & Feng, 2018), stock price informativeness (Ben-Nasr & Alshwer, 2016), institutional investment horizons (Ghaly et al., 2016) and financial reporting quality (Jung et al., 2014) as determinants of efficient labour investments. Although equity compensation, in particular stock options and restricted stock, is likely to be another determinant of efficient labour investment, it has not been explored to date. Theory suggests that equity compensation aligns executives with shareholders' interests (Jensen & Meckling, 1976). If so, then stock options and restricted stock, as components of equity compensation granted to executives, should align their interests with those of shareholders, thus reducing inefficient investment in labour.

Inefficient investment in labour comes in two forms — over-investment and under-investment. Over-investment can occur when empire-building incentives drive executives to hire more employees than the optimal level — the level suggested by the firm's fundamental economic variables. In contrast, under-investment can occur when a tendency towards risk aversion leads executives to avoid hiring additional employees

when the firm's economic fundamentals suggest such hiring. Prior research has established that hiring new staff is risky because not only is their productivity is unknown, but their mobility cannot be controlled (Hansson et al., 2004; Donangelo, 2014). Both over- and under-investment are found to be non-value-maximising because they are likely to impact on earnings and subsequently affect the share price of a firm (Ben-Nasr & Alshwer, 2016).

Based on a sample of 12,118 firm-year observations from 1992 to 2014 identified mainly from the Compustat and ExecuComp databases, stock options are found to exacerbate over-investment in labour, while restricted stock mitigates over-investment in labour. Further, both stock options and restricted stock are observed to mitigate under-investment in labour. These findings support Hypotheses *1a*, *1b*, *2a* and *2b* and are consistent with the theoretical argument that stock options granted to executives encourage risk-taking because they do not expose executives to the risks of such action, while restricted stock granted to executives discourages risk-taking because it exposes them to both benefits and risks (Ryan & Wiggins, 2002).

These findings are robust to: using alternative measures to capture the dependent variables (i.e., over- and under-investment in labour); controlling for managerial ability, corporate governance, stock price informativeness and the FAS 123R; and addressing endogeneity issues using two-stage least squares, propensity score matching, change specification and firm fixed effects regressions. In these additional analyses, the competing effects of stock options and restricted stock on under-investment are assessed. The results show that the mitigating effect of stock options on under-investment is stronger than with restricted stock.

## 9.2 Implications of the Findings

The thesis shows how the two studied components of equity compensation — stock options and restricted stock — have evolved over the last decade and the potential impact they may have on investment decisions, particularly investment in labour. The results are relevant given that firms in the U.S.A. are mandated to expense stock options over the vesting period (by the FAS 123R) and the fact that this may have a consequential effect on not only the amount of stock options that firms are likely to grant their executives, but also the effect of stock options on executive decision-making. The results may also be relevant to countries such as Australia and the U.K., which have similar pay structures for top executives, as they may also want to follow the same line.

The research results offer support for agency theory. Agency theory proposes that the empire-building and risk-aversion tendencies of executives may lead to inefficient investments in labour. Equity compensation (stock options and restricted stock) granted to executives aligns them with the firm's goals and therefore executives are likely to reduce such investment inefficiencies when they are given equity compensation in the forms of stock options and restricted stock. The results show that (except for the relationship between stock options and over-investment in labour) stock options and restricted stock granted to executives discourages them from over- and/or under-investing in labour, therefore lending support to agency theory.

These findings indicate that stock options and restricted stock are an effective governance mechanism for monitoring of executive decisions in relation to labour investment. Boards of directors can rely on separate or a mix of stock options and

restricted stock in the design of executive equity compensation. This is relevant more broadly because the monitoring cost incurred by shareholders would be reduced.

The findings of this thesis could benefit investors, who ostensibly evaluate the performance of firms based on their investment decisions. For instance, the results from this thesis would help investors to make better informed decisions, in particular by observing the size and/or the labour turnover of a firm in the years before investing their hard-earned savings in the firm.

These results have also implications for the SEC in its assessment of the success of increased regulation of remuneration practices and disclosure, especially the mandatory expensing of stock options over the vesting period. The results show that, even after the introduction of the FAS 123R, the incentive provided by stock options to executives in terms of their investment decisions has not changed. For example, it still finds (compared to Ryan & Wiggins, 2002)[23] that stock options increase over-investment while restricted stock decreases over-investment.

### 9.3 Limitations and Opportunities for Future Research

Like all studies, this thesis is subject to a number of limitations that create opportunities for future research. First, the use of U.S. data has the potential to limit the applicability of the results to other contexts. In particular, the results of this research cannot be applied to countries with different institutional settings, cultures and corporate investment models. Therefore, future research could re-examine the effects of stock options and restricted stock on over- and under-investment in labour in settings where

[23] That study was conducted before the adoption of the FAS 123R in December 2004.

compensation and corporate investment models are different. By so doing, the effects of total compensation on over- and under-investment in labour could also be assessed.

Second, labour cost is arguably a better proxy for labour investment (Li, 2011). However, most firms do not report labour costs, so its use would reduce the number of available firm-year observations by 95%. Most firms in the U.S.A. do not report the wages and salaries of their employees. Given this issue, following prior research such as that of Ben-Nasr and Alshwer (2016) and Jung et al. (2014), net hiring has been used as a proxy for labour investment. While it is acknowledged that net hiring may not be a robust proxy, it is widely used in studies examining labour investment efficiency. It may be that, in the future, more firms will begin to report the wages and salaries of their employees along with other labour costs such as the costs of training and hiring. If so, then labour cost could be used as a proxy for labour investment.

Third, the components of compensation are not limited to cash (salary and bonuses) and equity (stock options and restricted stock). They include other long-term incentives such as deferred compensation components. Therefore, limiting the analysis to only some of the compensation components may not comprehensively capture the desired influence of total compensation on executive behaviour. In addition to equity compensation, deferred compensation might have the potential to increase executives' incentive to invest in long-term projects, because such payments are made in the future.

Fourth, the dollar values of stock options and restricted stock are used for the analyses in this thesis. In the case of stock options, alternative measures such as vega (the sensitivity of stock options to stock return volatiltity) and delta (the sensitivity of stock options to stock price) could be used. These measures are also assumed to provide

incentives to executives to alter their firms' risk profile (Armstrong & Vashishtha, 2012; Hayes et al., 2012). Although these measures capture executives' risk-taking incentive and are likely to affect their investment decision-making, this thesis research uses the dollar value of stock options — an approach adopted in prior studies such as those of Ryan and Wiggins (2002) and Năstăsescu (2009). Future research, therefore, should examine the risk-taking incentives of executives — measured as vega and delta — and their effects on over- and under-investment in labour.

Finally, as this thesis is limited to the labour investment behaviour of the CEOs of the sampled firms and does not include other executives such as CFOs and other top executives, future research could offer additional insights into the roles of CFOs and other top executives in reducing labour investment inefficiency. Specifically, a study could be commissioned to examine whether CFOs and CEOs in a co-opted relationship engage more in over- and under-investment in labour.

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# APPENDICES

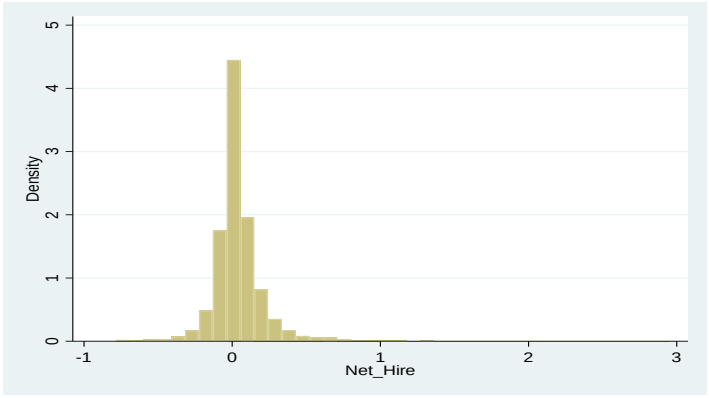
## Appendix 1: Variable Description

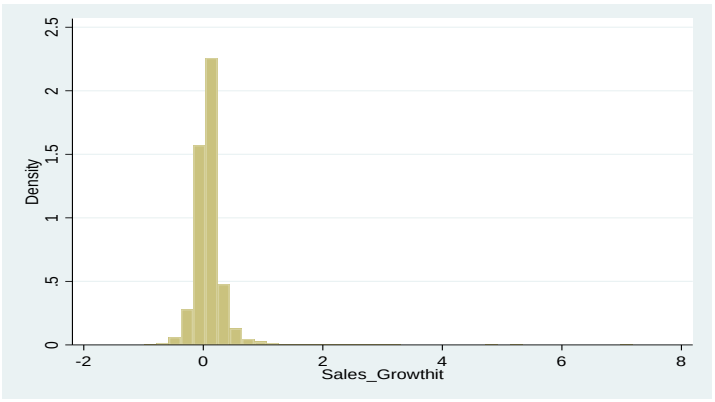
| Variable | Predicted Sign | Description (CompuStat data items in parentheses) |
|---|---|---|
| ***Model 1* variables** | | |
| $Net\_Hire_{it}$ | | Percentage change in the number of employees (EMP) from financial year *t−1* to financial year *t* for firm *i*. |
| $Sales\_Growth_{it-1}$ | + | Percentage change in sales (REVT) in financial year *t−1*for firm *i*. |
| $Sales\_Growth_{it}$ | + | Percentage change in sales (REVT) in financial year *t* for firm *i*. |
| $chROA_{it}$ | + | Change in return on assets in financial year *t* for firm *i*. |
| $chROA_{it-1}$ | + | Change in return on assets in financial year *t*−1 for firm *i* |
| $ROA_{it}$ | − | Return on assets (NI/lag (AT)) in financial year *t* for firm *i*. |
| $Return_{it}$ | + | Total stock return during financial year *t* for firm *i*. |
| $Size_{it-1}$ | + | Natural logarithm of market value (common shares outstanding at the beginning of the year * current share price (CSHO*PRCC_F)) at the end of financial year *t−1* for firm *i*. |
| $Size\_R_{it-1}$ | + | Percentile rank of $Size_{it-1.}$ |
| $Quick_{it-1}$ | + | Quick ratio ((CHE + RECT)/LCT) at the end of financial year *t−1* for firm *i.* |
| $chQuick_{it-1}$ | +/− | Percentage change in the quick ratio in financial year *t−1* for firm *i.* |
| $chQuick_{it}$ | + | Percentage change in the quick ratio in financial year *t* for firm *i.* |
| $Lev_{it-1}$ | +/− | Leverage for firm *i*, measured as the sum of debt in current liabilities and total long-term debt (DLC+DLTT) at the end of financial year *t−1*, divided by financial year *t−1* total assets (AT) for firm *i*. |
| $LossBinX_{it-1}$ | − | Five separate loss bins to indicate each 0.005 interval of ROA from 0 to −0.025 in period *t−1* for firm *i*. LossBin1 is equal to 1 if ROA ranges from −0.005 to 0. LossBin2 is equal to 2 if ROA is between −0.005 and −0.010. LossBin3 is equal to 3 if ROA is between −0.010 and −0.015. LossBin4 is equal to 4 if |

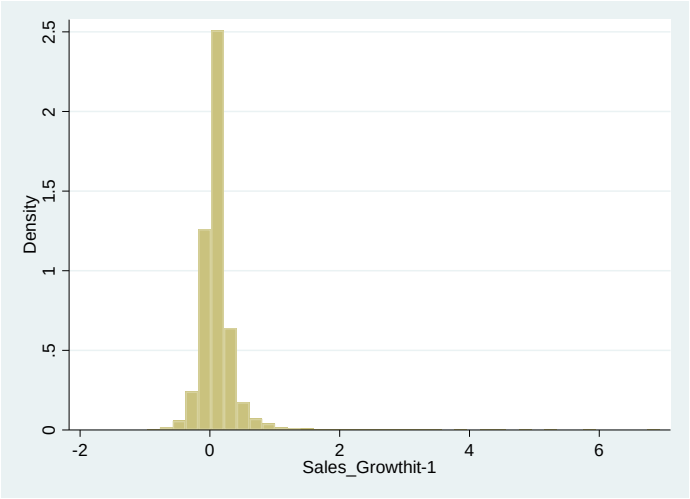
| | | |
|---|---|---|
| | | ROA is between −0.015 and −0.020, and LossBin5 is equal to 5 if ROA is between −0.020 and −0.025. |
| $Lab\_Union_{it-1}$ | − | Industry-level rate of labour unionisation for financial year *t−1*. This is obtained from www.unionstats.com. It is an estimate of industry-level union membership and coverage. |
| ***Models 2* and *3* variables** | | |
| $Over\text{-}Investment_{it}$ | | The proxy for the dependent variable in *Model 2*. It is the positive residuals from *Model 1* for firm *i* in financial year *t.* |
| $Under\text{-}Investment_{it}$ | | The proxy for the dependent variable in *Model 3*. It is the negative residuals from *Model 1* for firm *i* in financial year *t* and represents under-hiring (i.e., under-investment). To aid explanation, the variable is multiplied by −1 so that the highest value represents more severe under-investment (see Chen et al., 2011). |
| $EBC_{it-1}$ | − | The natural logarithm of the dollar value of equity compensation for firm *i* for the financial year *t−1*, which is made up of restricted stock and stock options grants. |
| $Stock\ options_{it-1}$ | +/− | The natural logarithm of the dollar value of stock options value for firm *i* at the end of financial year *t−1*, computed based on the Black−Scholes formula ($) and as captured by the ExecuComp database. |
| $Restricted\ stocks_{it-1}$ | +/− | The natural logarithm of the dollar value of restricted stock fair value for firm *i* at the end of financial year *t−1* as captured by the ExecuComp database. |
| $Cash\ bonuses_{it-1}$ | +/− | The natural logarithm of executives' annual cash bonus ($) as captured by the ExecuComp database. |
| $Salary_{it-1}$ | +/− | The natural logarithm of executives' annual salary as captured by the ExecuComp database. |
| $MTB_{it-1}$ | +/− | It is the ratio of market to book value of common equity at the beginning of the financial year *t-1*. |
| $Quick_{it-1}$ | + | Quick ratio ((CHE+RECT)/LCT) at the end of financial year *t−1* for firm *i.* |
| $Lev_{it-1}$ | + | Leverage for firm *i*, measured as the sum of debt in current liabilities and total long-term debt (DLC + DLTT) at the end of financial year *t−1*, divided by financial year *t−1* total assets. |
| $DivDum_{it-1}$ | − | Indicator variable coded as 1 if firm *i* paid dividends (DVPSP_F) in financial year *t−1* for firm *i.* |
| $Std\_CFO_{it-1}$ | + | Standard deviation of firm *i*'s cash flows from operations (OANCF) from financial year *t−5* to *t−1*. |
| $Std\_Sales_{it-1}$ | + | Standard deviation of firm *i*'s sales from year *t−5* to *t−1*. |

| | | |
|---|---|---|
| $Tangibles_{it-1}$ | − | Property, plant and equipment (PPENT) at the end of financial year *t−1*, divided by total assets at the end of financial year *t−1*, for firm *i*. |
| $Loss_{it-1}$ | + | Indicator variable coded as 1 if firm *i* had negative ROA for financial year *t−1*. |
| $Inst_{it-1}$ | − | Institutional shareholdings at the end of financial year *t−1* for firm *i*. |
| $Std\_Net\_Hire_{it-1}$ | + | Standard deviation of firm *i's* change in the number of employees from financial year *t−5* to *t−1* for firm *i*. |
| $Labour\_Intensity_{it-1}$ | − | The number of employees divided by total assets at the end of financial year *t−1* for firm *i*. |
| $OwnCEO_{it-1}$ | − | The percentage of total shares owned by the CEO (SHROWN_TOT_PCT) at the end of financial year *t−1*. |
| $AQ_{it-1}$ | − | Accounting quality measure based on Dechow and Dichev (2002) model as modified by McNichols (2002) and Francis, Lafond, Olsson and Schipper (2005). The model is a regression of working capital accruals on one-year-lagged, current and one-year-ahead cash flows from operations, and the changes in revenue and in property, plant and equipment. The model is estimated cross-sectionally by industry-year and the residuals are collected. The standard deviation of firm *i*'s residuals over the years *t−5* to *t−1* is then computed. Finally, the standard deviation is multiplied by −1 (so that it increases with accounting quality) the resulting measure is ranked into deciles by year. |
| $Ab\_Invest\_Other_{it}$ | | Abnormal other (non-labour) investments, defined as the absolute magnitude of the residual from the following model: $Invest\_Other_{it} = \beta_0+\beta_1 Sales\_Growth_{it-1}+\varepsilon_{it}$ where *Invest_Other* is the sum of capital expenditure (CAPEX) and R&D expenditures (XRD), less cash receipts from the sale of property, plant and equipment (SPPE), all scaled by lagged total assets. |

## Appendix 2: Normality Diagnostics

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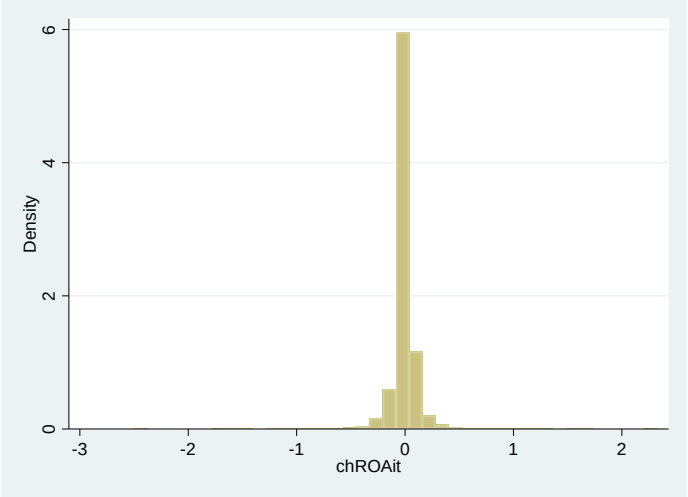
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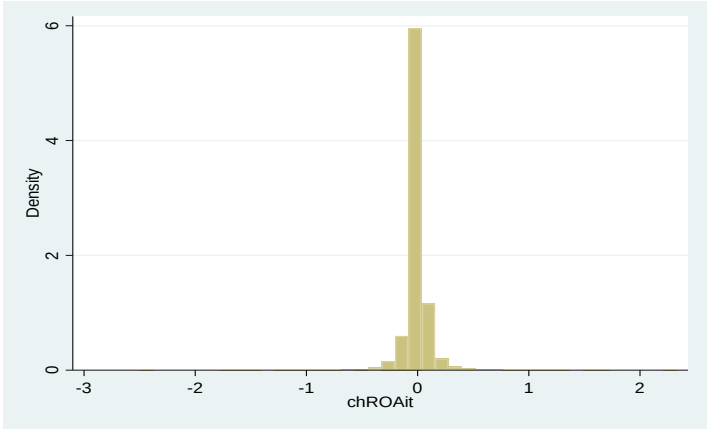
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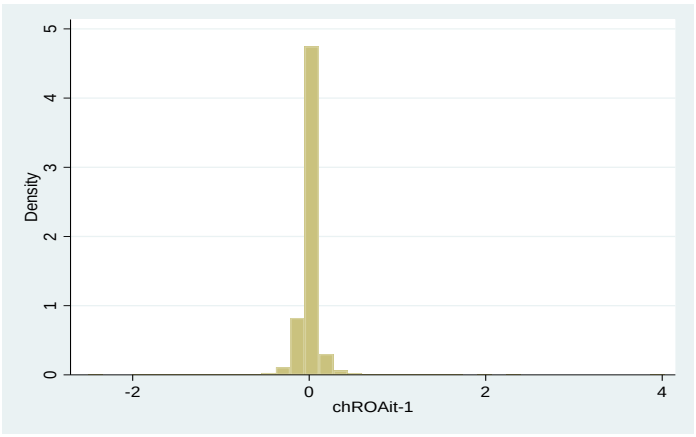
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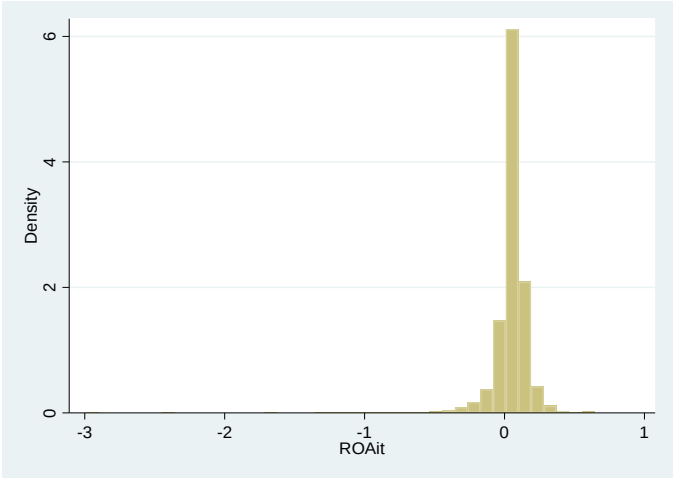
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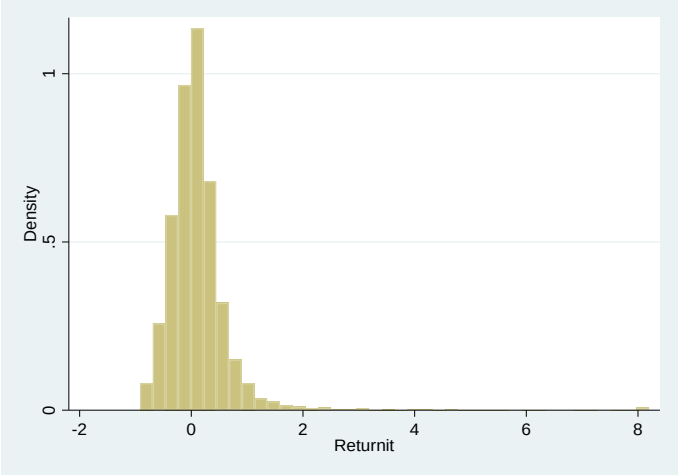
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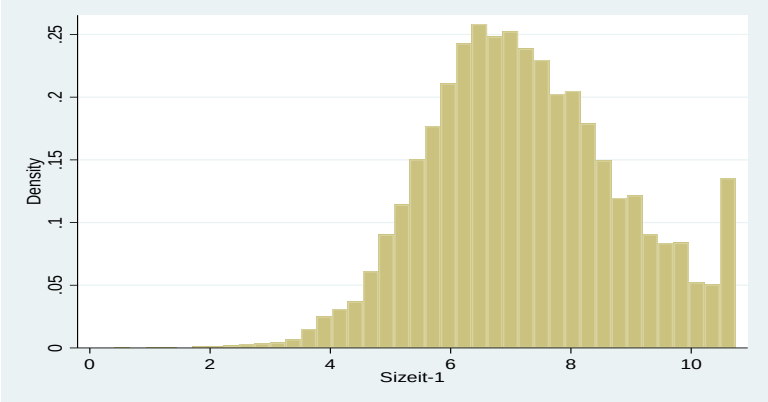
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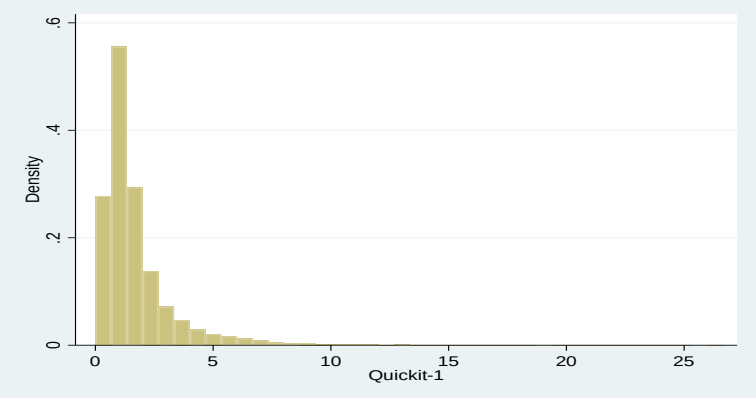
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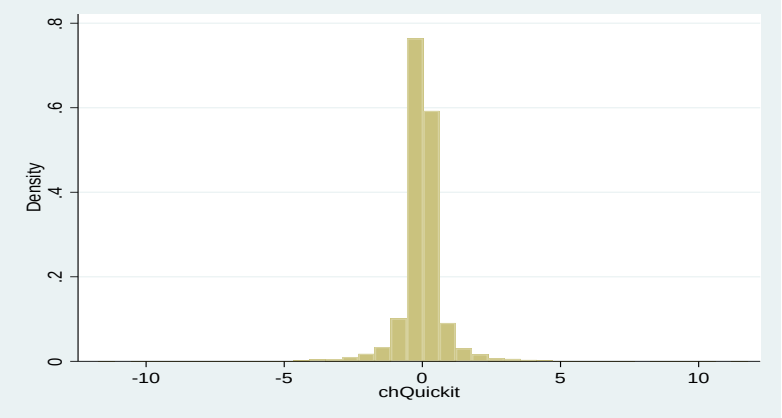
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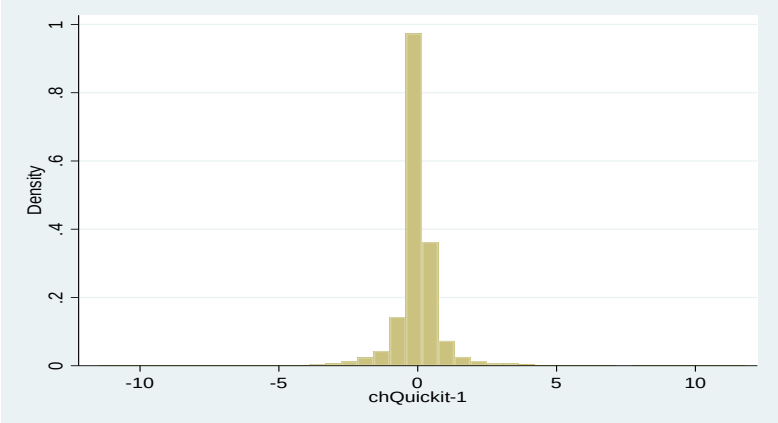
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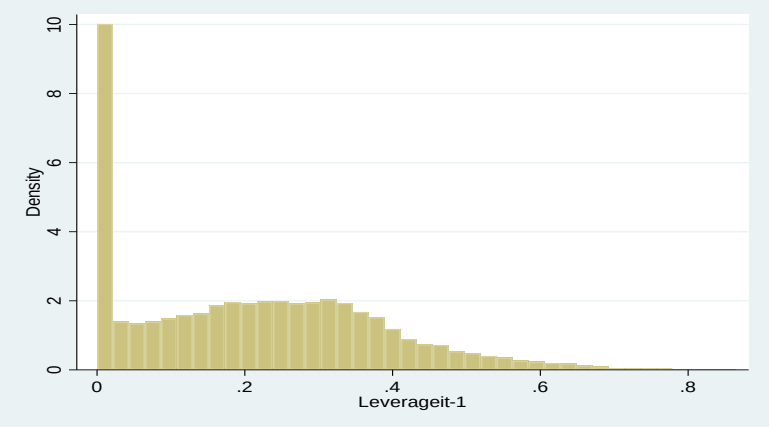
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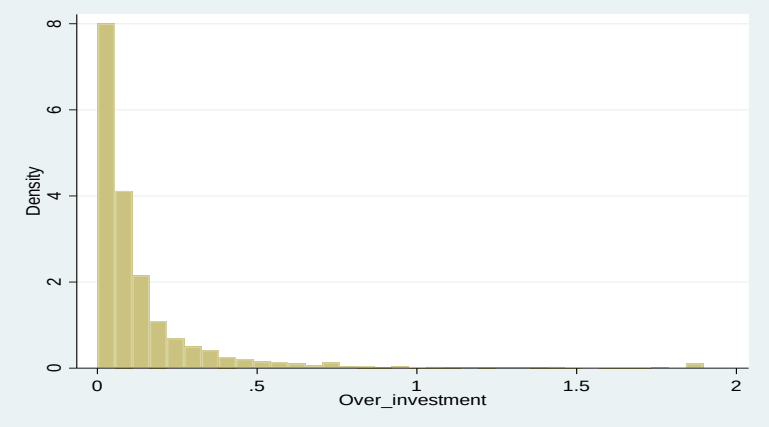
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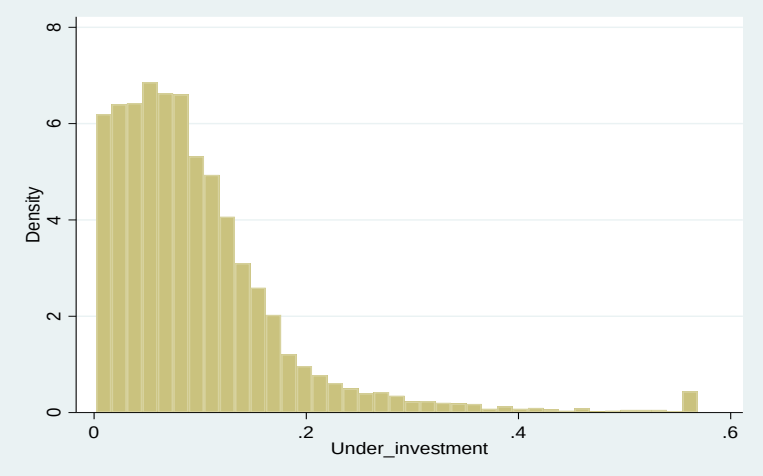
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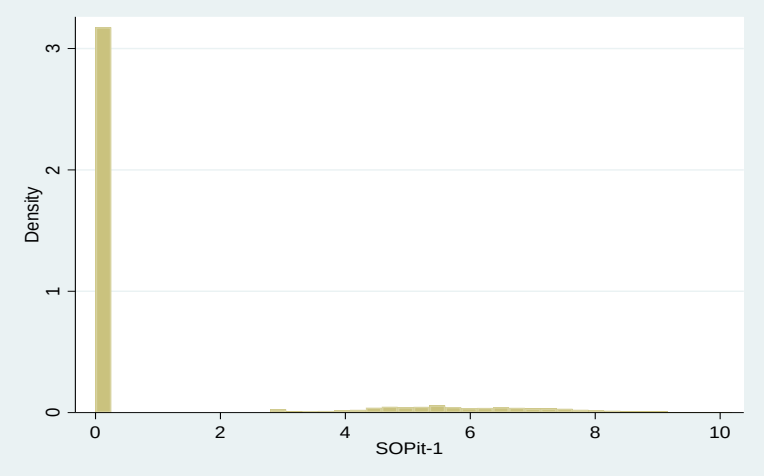
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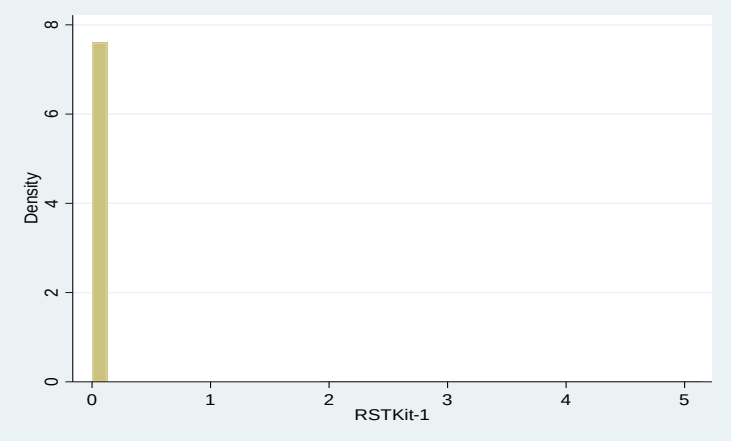
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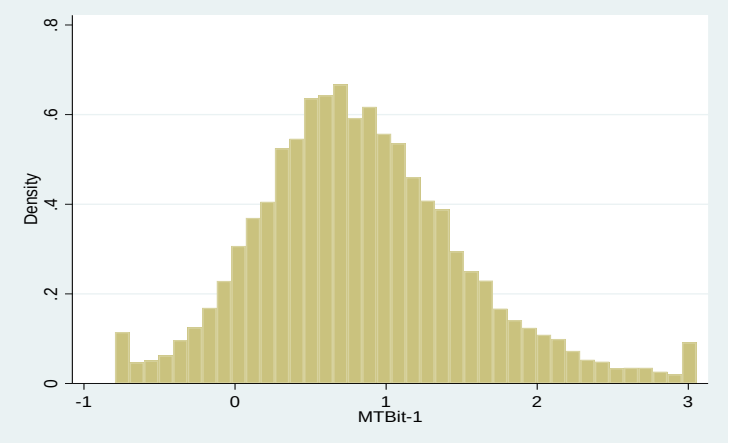
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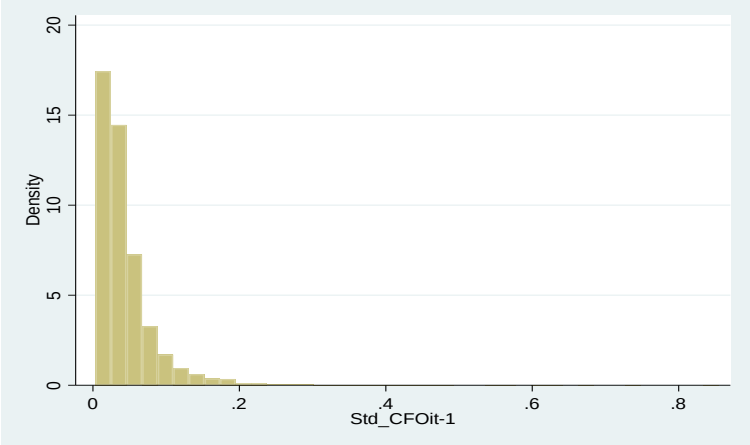
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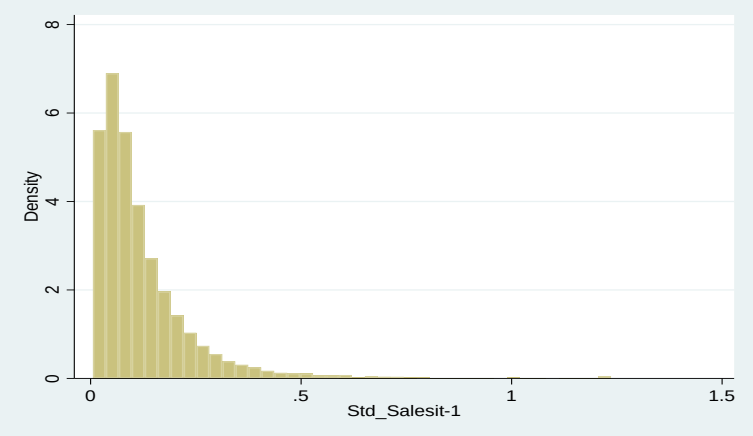
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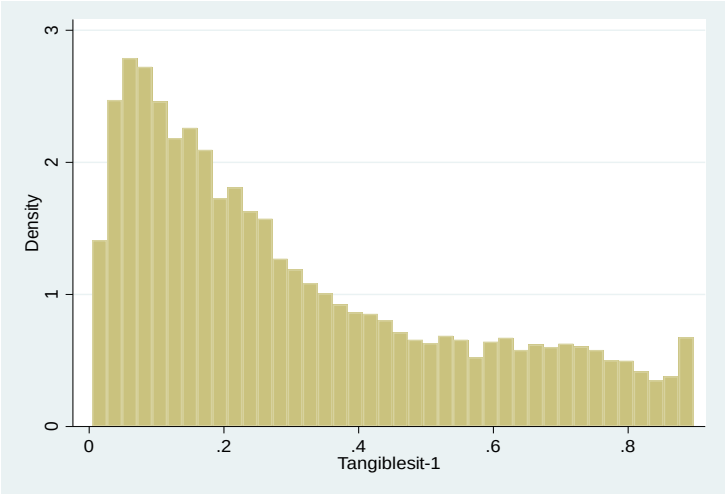
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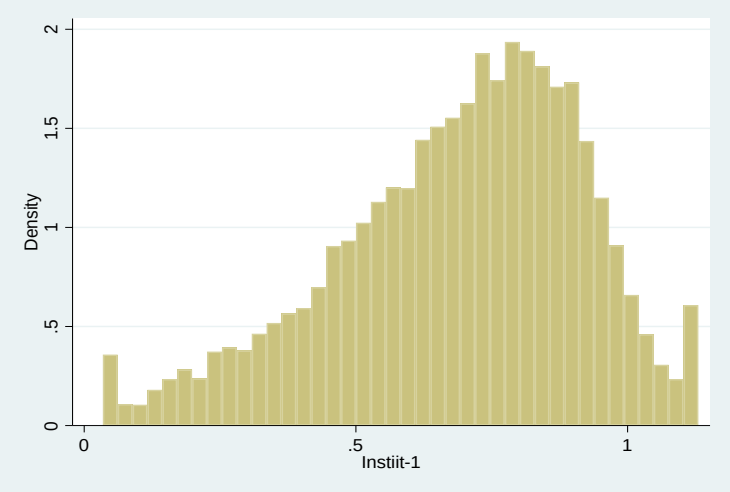
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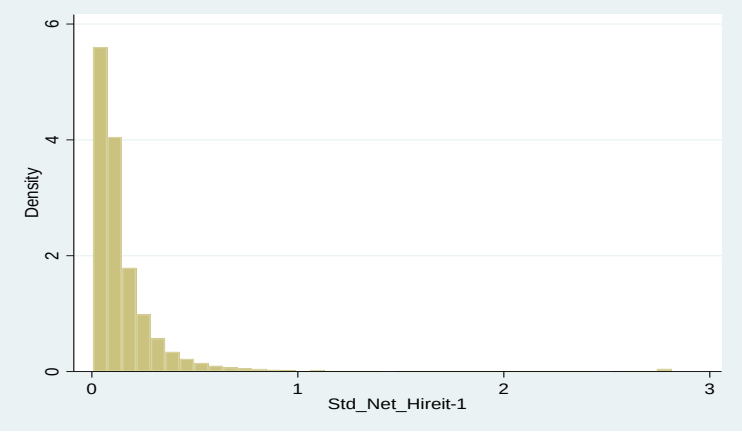
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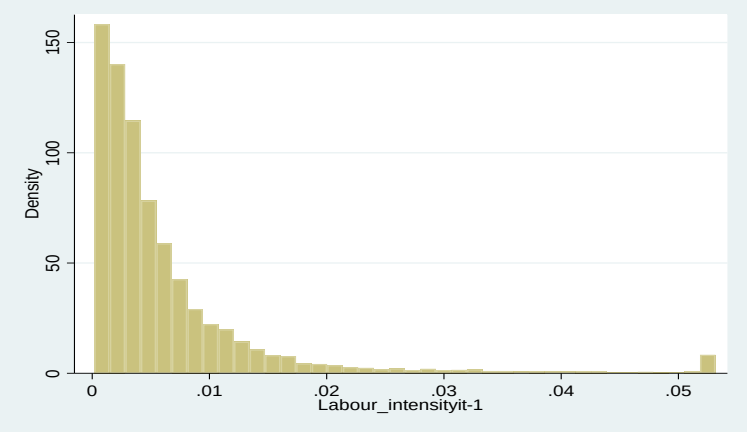
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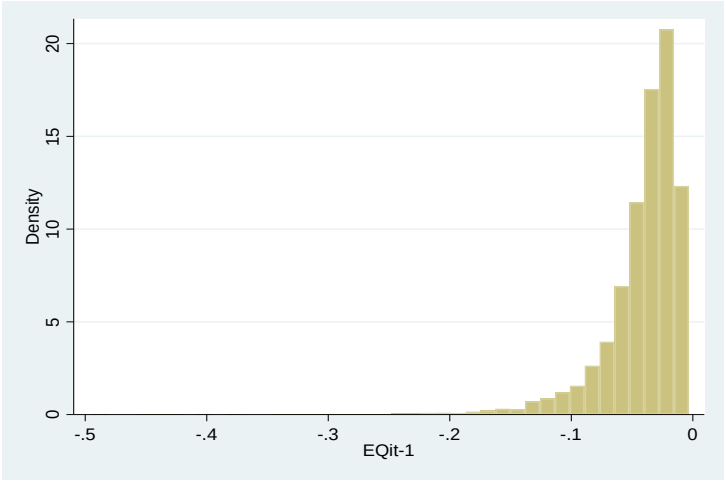
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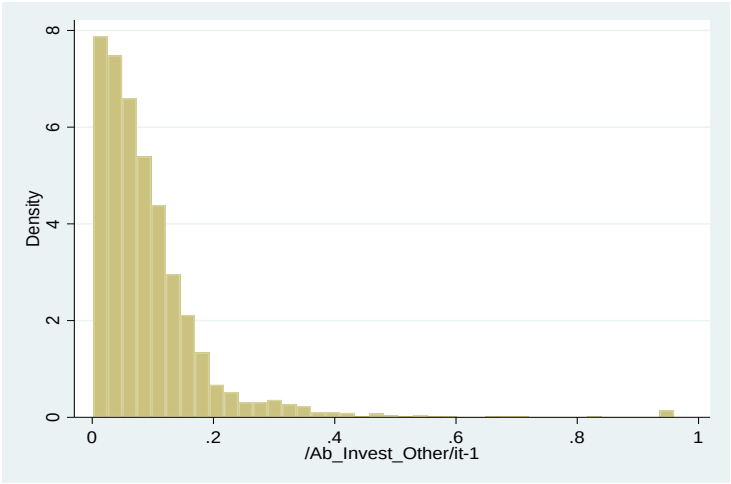
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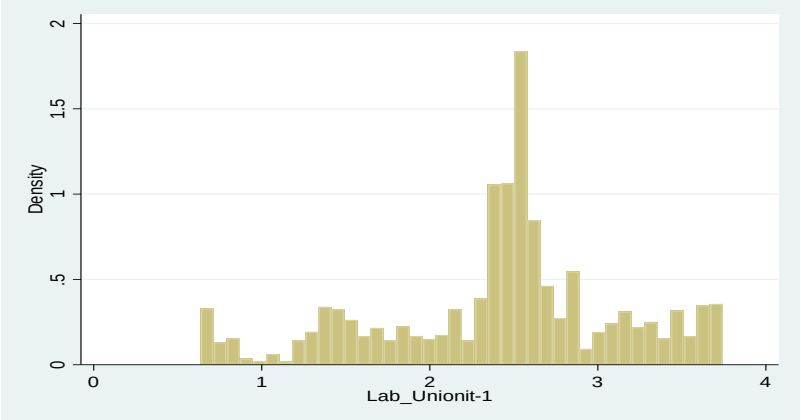
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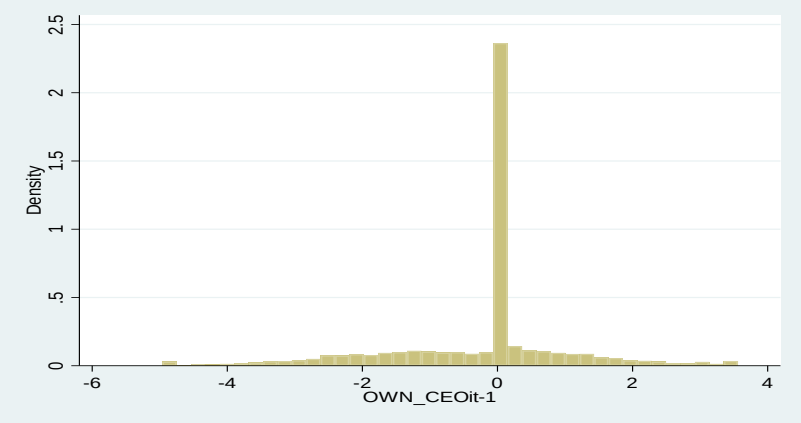
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