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Labour Investment: A Managers' Decision-Making Perspective

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Labour Investment: A Managers' Decision-Making Perspective

by

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Abstract

My dissertation consists of three studies that investigate factors that affect management's labour investment decisions and how management of labour influences firm performance. In my first study, I examine how firms adjust their labour in response to business downturns and how different labour adjustment practices influence firms' financial performance. I classify firms into two groups: those with more stable labour adjustment strategies (most sticky in labour) and those with more flexible labour adjustment strategies (least sticky in labour). I find that companies with more flexible labour adjustment strategies outperform relative to companies with more stable labour adjustment strategies in terms of return on assets. Using DuPont analysis, I find that underperformance of stable companies is due to lower efficiency (asset turnover) and the superior performance of flexible firms is due to higher efficiency. However, stable firms achieve higher profit margin than flexible firms, consistent with the resource-based view of human capital.

In my second study, I investigate whether higher ability managers achieve better performance outcomes through labour investment. I document that deviations from expected net hiring are, on average, smaller for higher ability managers. In this regard, I find that higher ability managers avoid both over-investment and under-investment in labour. I also find that managerial ability mitigates the negative effects of deviations from expected hiring on future firm performance. This latter result holds whether deviations from expected hiring are positive or negative.

In my third study, I investigate how companies adjust their employment in recessions with a focus on credit constraints. Controlling for firm productivity, I find an inverted U-shaped relationship between leverage and labour growth rate. This suggests that debt accommodates labour growth up to a certain point, but adding additional debt after that point imposes financial constraints on firms' ability to effectively manage labour growth – these firms may be forced to

grow labour less or reduce labour more than the optimal amount. In addition, recession enlarges the negative impact of financial constraints on labour growth rate.

Findings of my thesis studies contribute to management decision making regarding labour adjustment in response to business cycles.

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Chapter 1 Introduction

Management accounting plays a vital role in organizations' decision making, learning, planning, and controlling activities. It provides information that supports the operational and strategic needs of the firm. Indicators of the economic condition of the firm, such as the cost and profitability of the firm's products and services, customers, and availability of different resources, are available only from the management accounting system (A. Atkinson, Banker, Kaplan, & Young, 1995). Managers use management accounting information to understand, acquire, adjust, allocate, and make effective use of firm resources (Cooper & Kaplan, 1992), including human resources. Human resources are considered a form of capital and their development requires effective management and utilization. Learning about factors that affect labour acquisition and adjustment decisions is one of the most important issues for management accounting. My thesis investigates factors that affect management's labour investment decisions and how management of labour influences firms' financial performance.

The concept of human capital is that people possess skills, experience, and knowledge that have economic value to firms (Cascio, 1991; Parnes, 1984; Schultz, 1960; Snell & Dean Jr, 1992; Wallace & Fay, 1988). Human capital has the potential to improve the efficiency and effectiveness of the firm, enabling it to exploit market opportunities (Barney, 1991; Ulrich & Lake, 1991), therefore playing a significant role in achieving organizational success and creating economic value for the firm and society (Cascio, 1991; Parnes, 1984; Wallace & Fay, 1988).

Cooper and Kaplan (1992) pay specific attention to human capital investment and management in their description of activity-based systems that support management decision making. They discriminate between flexible resources that are acquired as needed and committed resources that are acquired in advance of usage. Of the three types of resource commitments made in advance of usage, which include acquisitions of non-labour resources, leases of resources, and commitments made to salaried and hourly employees, Cooper and Kaplan (1992) describe the last type as the most important. They observe that managers need to consciously monitor and adjust labour commitments, especially when activity usage is below available supply. They state, “Management, to obtain higher profits, must take conscious action either to use the available capacity to obtain a higher volume of business or to reduce spending on resources by eliminating the unused capacity” (Cooper & Kaplan, 1992, p. 12).

Cost of labour is often the largest expenditure category for many firms. For instance, in the Annual Survey of Manufacturing and Logging Industries (2019) and Annual Capital and Repair Expenditures Survey (2019), Statistics Canada reports that total salaries and wages in the Canadian manufacturing industry totalled $89 billion in 2017, compared to $15 billion in capital expenditure. Because of the value that human capital can bring to the firm and the significance of labour costs, managers must develop labour management strategies and practices to create and manage a viable workforce and to increase the likelihood of business success (Ferguson & Reio Jr, 2010; Pfeffer, 1994, 1998).

Effective management of labour investments plays a significant role in managerial resource allocation decisions. The existing literature on corporate investment focuses more on salient but less frequent investment decisions, such as capital expenditures, research and development (R&D) projects, and mergers and acquisitions (Barker & Mueller, 2002; Bertrand & Schoar, 2003; G. C. Biddle, Hilary, & Verdi, 2009; García Lara, García Osma, & Penalva, 2016). In contrast, decisions regarding labour management and investment occur frequently and are often of less importance individually but may have large impacts when considered together.

The objective of my dissertation is to investigate how human capital is managed, and how management of labour influences firm performance, by developing and estimating empirical models to classify labour management and investment practices, identify factors that influence such practices, and relate labour management and investment strategies to financial performance. Better understanding of these relations may inform managerial decision making regarding utilization of a key corporate resource – labour.

In the first study, I examine how firms adjust their labour in response to business downturns, how firm-specific labour adjustment practices influence firm performance, and what factors drive firms' labour adjustment practices. I identify and contrast two broad types of labour strategies that manifest themselves in downturns. A stable or sticky labour strategy means that companies retain excess employees in downturns. A flexible or non-sticky labour strategy means that firms adjust their labour along with the movement of the business cycle. I find that companies with more flexible labour adjustment strategies outperform, in terms of return on assets, companies with stable or moderate labour adjustment strategies. Using DuPont analysis, I find that underperformance of stable companies is due to lower efficiency (asset turnover). However, companies that follow stable labour adjustment strategies earn higher profit margins than companies with flexible or moderate labour adjustment strategies. The overall advantage of companies with flexible labour strategies comes from a combination of asset turnover and profit margin.

In the second study, I use a measure of managerial ability derived using data envelopment analysis (DEA) and investigate whether higher ability managers attain better performance outcomes through labour investment. I build on previous research that predicts expected labour investment (net hiring) based on economic factors and demonstrates that deviations from expected labour investment negatively affect future performance. Accordingly, higher ability managers may positively affect firm performance through labour investment in two ways: (1) by making labour investment decisions that deviate less from expected net hiring and (2) by reducing the negative effects of deviations from expected net hiring. I find that deviations from expected net hiring are, on average, smaller for higher ability managers. In this regard, I find that higher ability managers avoid both over-investment and under-investment in labour. I also find that managerial ability mitigates the negative effects of deviations from expected hiring on future firm performance. This latter result holds whether deviations from expected hiring are positive or negative. Together, the results support the prediction that higher ability managers achieve better performance outcomes through labour investment.

In the third study, I investigate how companies adjust their employment in recessions with a focus on credit constraints. Using administrative data that contain the population of Canadian firms, I apply the differences-in-differences method to compare firms before and after the Great Recession by exploiting different intensity of credit-constraint in the pre-recession period. Controlling for firm productivity, I find that firms with high leverage cut labour more than the corresponding firms with low leverage, indicating that these firms may be forced to reduce labour more than the optimal amount. The findings imply that there is room for government policies to improve labour allocation efficiency by relaxing the credit constraints during recessions, in addition to standard stimulus.

The theme of my thesis studies is understanding labour investment decisions and how theses decision affect firm performance. I examine this theme from different perspectives. Study 1 identifies different labour investment strategies adopted by managers and documents how these different strategies relate to firms' financial performance; study 2 builds on previous literature that associates managerial decisions with managerial ability and documents how managerial ability affects labour investment decisions and outcomes of these decisions; and study 3 considers how financial strength affects managers' decisions and documents the effects of financial constraints on firms' labour investment decisions during the recession. The empirical evidence documented in my thesis provides insights about how labour is managed in response to movements in business cycles. It identifies factors that affect labour management and investment decisions. Findings on the effects of financial constraints on firms' labour investment decisions during the recession and how labour management practices are translated into firm performance shed light on management decision making in response to movements in the business cycles.

The remaining chapters of my dissertation are organized as follows. Chapter 2 (Study 1) investigates how labour management strategies related to different dimensions of firm performance. Chapter 3 (Study 2) examines whether higher ability managers attain better performance outcomes through labour investment. Chapter 4 (Study 3) examines how companies adjust their employment in recessions with a focus on credit constraints. Chapter 5 concludes the three studies and discusses the implications.

Chapter 2 Labour Adjustment Strategies and Performance

2.1 Abstract

I examine how firms adjust their labour in response to business downturns, how different labour adjustment practices influence firms' financial performance, and what factors drive firms' labour adjustment practices. I identify and contrast two broad types of labour strategies that manifest themselves in downturns. A stable or sticky labour strategy means that companies retain excess employees in downturns. A flexible or non-sticky labour strategy means that firms adjust their labour along with the movement of the business cycle. Using data provided by Statistics Canada, I find that companies with more flexible labour adjustment strategies outperform, in terms of return on assets, companies with stable or moderate labour adjustment strategies. Using DuPont analysis, I find that underperformance of stable companies is due to lower efficiency (asset turnover). However, companies that follow stable labour adjustment strategies earn higher profit margins than companies with flexible or moderate labour adjustment strategies, consistent with earning a premium on human capital investment. The overall advantage of companies with flexible labour strategies comes from a combination of asset turnover and profit margin, suggesting higher productivity. I also find that higher labour stability is associated with lower earnings volatility, and higher labour flexibility is associated with lower likelihood of exit in future periods. Firms that are older, that have lower leverage, and that have proportionately lower tangible assets exhibit more labour stickiness.

2.2 Introduction

Human capital is "crucial to organizational success and may offer the best return on investment for sustainable competitive advantage" (Luthans & Youssef, 2004, p. 143). The notion of human capital is that people possess skills, experience, and knowledge that have economic value to firms and enhance productivity (Cascio, 1991; Parnes, 1984; Schultz, 1960; Snell & Dean Jr, 1992; Wallace & Fay, 1988). Labour cost is the largest expense category for many firms. For instance, in the Annual Survey of Manufacturing and Logging Industries (2019) and Annual Capital and Repair Expenditures Survey (2019), Statistics Canada reports that total salaries and wages in the Canadian manufacturing industry totalled $89 billion in 2017, compared to $15 billion in capital expenditure. Despite the significance of labour cost, survey results indicate that executives only spend 15% of their time managing labour cost (Paycor, 2018). Because of the value that human capital can bring to the firm and the significance of labour costs, managers develop labour management strategies and practices to create and manage a viable workforce and to increase the likelihood of business success (Ferguson & Reio Jr, 2010; Pfeffer, 1994, 1998). An important part of a labour management strategy is how labour is adjusted when sales change. In this study, I examine how firms adjust their labour in response to business downturns, how firm-specific labour adjustment practices influence firm performance, and what factors are driving firms' labour adjustment practices.

Management accounting is concerned with how firms adjust costs in relation to changes in sales activity. Historically, adjustments in downturns have been accomplished largely through layoffs and cutbacks of other input resources as firms try hard to lower headcount and reduce operating costs. For example, the Canadian oil and gas industry has been in a "survival mode" since mid-2014 when the oil prices started to collapse. More than 100,000 oil patch employees – roughly one in three – were laid off during the oil downturn between 2014 and 2016 (Canadian Association of Petroleum Producers, 2016). Labour cutting means that companies seek to minimize costs and operate as efficiently as possible in downturns (Dietz, Stops, & Walwei, 2010).

Industry competitive pressure motivates firms to become leaner and more efficient to generate more revenue with their input resources (Banker, Chang, & Natarajan, 2005).

However, firms that cut costs faster and deeper than rivals don't necessarily perform better after a recession – some assert that they have the lowest probability of pulling ahead of the competition when times get better, compared with other firms (Gulati, Nohria, & Wohlgezogen, 2010). Consider the example of the Canadian oil and gas industry, "the industry faces the potential of significant loss of knowledge as those nearing retirement look to exit early, but have no one to share their considerable knowledge with," said Jim Fearon, vice-president, recruitment consultancy Hays Canada. Moreover, staff cuts have put remaining personnel "under considerable pressure resulting in burnout and low morale", according to a survey report by Hays Canada (2016).

Some companies retain labour in a business downturn in spite of the additional costs they incur. Keeping excess labour in downturns means that companies consider other things than simply minimizing costs and attaining higher labour efficiency, and that their decisions about labour adjustment are more complex than just weighting up actual wage rates and marginal productivity (Dietz et al., 2010). These decisions are made on a broader basis of various adjustment costs, such as severance pay when employees are dismissed, and costs of searching, training, and setting up the labour contract when demand rises again (Anderson, Banker, & Janakiraman, 2003; Becker, 1964; Bentolila & Bertola, 1990; Bowers, Deaton, & Turk, 1982; Brechling, 1965; Cooper, Haltiwanger, & Willis, 2015; Cooper & Willis, 2009; Fay & Medoff, 1985; Horning, 1994; Oi, 1962; Okun, 1981; Sharpe, 1994). In addition, more and more companies realize that human resources are no longer just a cost of doing business, but are "an indispensable asset, an investment that needs to be effectively managed so that they can yield the high return of sustainable competitive advantage" (Luthans & Youssef, 2004, p. 144).

Accordingly, I identify and contrast two broad types of labour strategies that manifest themselves in downturns. A stable or sticky labour strategy means that companies retain excess employees in downturns because of the value of human resources and the adjustment costs associated with downsizing labour forces. A flexible or non-sticky labour strategy means that firms adjust their labour along with the movement of the business cycle. Adjustments in downturns are often accomplished through layoffs to reduce labour costs.

There are pros and cons for both types of strategies. Firms that keep a stable workforce with good training and specialized knowledge are more able to provide unique and differentiated products and services to customers (Ballas, Naoum, & Vlismas, 2018; Gächter & Falk, 2002; Lawson & Lorenz, 1999; Lorenz, 1992). From a resource-based perspective, such human capital provides a competitive advantage, enabling premium pricing. In addition, secure workers, who are more satisfied and committed, may work harder and invest more in the organization (Valletta, 1999). On the other hand, because these firms bear the risks of lost production during downturns, their employees may be less motivated to work hard or to be productive and efficient because the less productive workers face lower risk of job loss and unemployment stress. Firms that adopt a flexible labour strategy are more cost conscious and develop labour practices that enable them to adjust labour with lower costs during a downturn (Foster, Grim, & Haltiwanger, 2016). But labour cutting in downturns shifts the risks of lost production to employees and may result in loss of employee morale and loss of specific skills and knowledge of the firm (Anderson et al., 2003).

Given the complexity in the relations between firms' labour adjustment strategies and performance, it is important to study how companies adjust their labour during downturns, how labour adjustment affects firm performance, and what factors are driving their labour adjustment decisions. Using data obtained from Statistics Canada, I identify firms' choice of labour adjustment strategy based on the degree of asymmetry between labour changes in response to sales increases and labour changes in response to sales decreases. Then, I examine how the revealed labour adjustment strategy affects performance over time, and I consider what factors influence the choice of labour adjustment strategy for a wide range of Canadian firms and industries.

My sample consists of 545,692 firm-year observations of Canadian firms (both public and private) from 2001 to 2015. I begin my analysis by constructing a measure of labour stickiness that relates changes in the quantity of labour employed to changes in the amount of sales generated, where the quantity of labour refers to a firm's "average labour units". Average labour units for a firm, as computed by Statistics Canada, are equal to the total wages paid to employees for a period divided by the average wage of those employed by firms in the same industry and region, and of similar size (Baldwin, Leung, & Landry, 2016). The use of average labour units is advantageous because it is a measure of labour quantity for the period[1]. My measure of labour stickiness is constructed by comparing the amount of labour added when sales increase to the amount of labour subtracted when sales decrease (see Weiss, 2010). Labour is sticky if the amount of labour added when sales increase is greater than the amount of labour subtracted for an equivalent sales decrease.

Based on this labour stickiness measure, I classify firms into three groups: those with more stable labour adjustment strategies (high labour stickiness), those with more flexible labour adjustment strategies (low labour stickiness), and those with moderate labour adjustment strategies. I find that companies with more stable labour adjustment strategies underperform and that companies with more flexible labour adjustment strategies outperform in terms of return on assets, relative to companies with moderate labour adjustment strategies. Using DuPont analysis, I find

[1] In standard datasets such as Compustat, number of employees represents the number of people employed by the company at the end of a fiscal year. It doesn't measure the actual labour consumption and is not a cost measure.

that underperformance of stable companies is due to lower efficiency (asset turnover) and the superior performance of flexible firms is due to a combination of higher efficiency and profit margin. However, the profit margin earned by the stable labour adjustment strategy is significantly higher than both the flexible and moderate strategies, consistent with earning a premium under the resource-based view of human capital. Stable firms keep skilled employees that are better able to produce and provide differentiating products and services enabling them to charge higher prices. The combination of higher turnover and profit margin for the flexible strategy suggests higher productivity for agency reasons. I also find that higher labour stickiness is associated with lower earnings volatility, and lower stickiness or higher labour flexibility is associated with less likelihood of exit in future periods. Firms that are older, that have lower leverage, or that have proportionately lower tangible assets exhibit more labour stickiness.

My findings on the effects of labour resource adjustment on firms' performance shed light on management decision making in response to movements in the business cycles. My study contributes to the management accounting literature on asymmetric cost behaviour by investigating how management of a key resource during sales downturns affects firm performance. In particular, it highlights the alternative ways that companies may adjust labour resources in response to a downturn and the potential advantages and disadvantages of stable and flexible labour strategies. It applies DuPont analysis to separate the performance effects between profit margin and operating efficiency that may result from both human capital and agency aspects of managing labour resources. It also provides information about the attributes of firms that influence their labour adjustment strategies.

The remainder of this study is organized as follows. In the next section, I review the related literature and develop my hypotheses. Section 2.4 describes the data, empirical measures, and model specifications. Section 2.5 presents the empirical results. Section 2.6 contains the conclusions.

2.3 Literature Review and Hypothesis Development

2.3.1 Firms' Labour Adjustment Strategies

Building on the theoretical model of sustained competitive advantage (Porter, 1985), Barney (1991) developed the concept of the resource-based view of the firm. Under the resource-based view, labour is a key resource for firms in a competitive environment. People add value and uniqueness and provide a source of sustained competitive advantage (Barney, 1991; Barney & Wright, 1998; Datta, Guthrie, & Wright, 2005; Ferguson & Reio Jr, 2010; S. Kim, Wright, & Su, 2010; Schuler & MacMillan, 1984; Ulrich, 1991; Wright & McMahan, 1992; Wright, McMahan, & McWilliams, 1994) because they possess skills, experience, and knowledge that have economic value to firms (Cascio, 1991; Parnes, 1984; Schultz, 1960; Snell & Dean Jr, 1992; Wallace & Fay, 1988).

Wright and McMahan (1992) provided a theoretical framework for strategic human resource management that was based on six theoretical models, including the resource-based view of the firm. According to Wright and McMahan (1992), human resource practices determine the composition of the human capital resource pool (i.e., skills and abilities) and the human resource behaviours, which further influence firm-level outcomes such as performance. Therefore, the emphasis on people is considered as strategically important to a firm's success (Barney, Wright, & Ketchen Jr, 2001), and firms' labour management policies and practices can, if properly configured, "provide a direct and economically significant contribution to firm performance" (Huselid, 1995, p. 636). Moreover, skilled employees with good training are investments that a company has made that will provide future returns to the company. Such employees will always be hard to find and retain. Because of the value of labour, more and more companies realize that human resources are no longer just a cost of doing business, but are "an indispensable asset, and, an investment that needs to be effectively managed so that they can yield the high return of sustainable competitive advantage" (Luthans & Youssef, 2004, p. 144).

Resource adjustment costs, which represent costs that firms incur in order to make changes in committed resources, also influence firms' resource commitment decisions, including labour adjustment decisions (Anderson et al., 2003; Banker, Byzalov, & Chen, 2013). The economics literature has developed models to examine firms' resource commitment decisions and adjustment costs (e.g., Abel & Eberly, 1994; Bentolila & Bertola, 1990; Caballero, 1991; Goux, Maurin, & Pauchet, 2001; Hamermesh, 1988; Leslie & Laing, 1978; Palm & Pfann, 1998). Firms incur both upward and downward adjustment costs when adjusting human resources (Banker, Byzalov, Fang, & Liang, 2018; Kim & Wang, 2016). For instance, when demand increases, upward adjustment costs of labour include searching, screening and training costs of new hires. In the case of an activity downturn, downward adjustment of labour may induce significant costs such as severance payments to laid-off workers, potential loss of morale among remaining workers, erosion of human capital, as well as the costs of searching, training, and setting up the labour contract when demand rises again at a later date (Anderson et al., 2003; Banker et al., 2018; Becker, 1964; Fay & Medoff, 1985; Horning, 1994; Oi, 1962; Okun, 1962).

Decisions regarding labour commitments trade off the adjustment costs associated with hiring and firing against the value created by the employees (Abel & Eberly, 1994; Bentolila & Bertola, 1990). In addition, downward adjustment costs are usually larger than upward adjustment costs for many resources (Bentolila & Bertola, 1990; Caballero, 1991). As a result, costs exhibit stickiness – they increase more when activity rises than they decrease when activity falls

(Anderson et al., 2003). When downward adjustment costs of labour are high, firms are less likely to cut labour in economic or business downturns (Banker et al., 2018). Such firms tend to have stickier labour.

The concept of labour stickiness is consistent with the notion of labour hoarding in the economics literature (e.g., Becker, 1964; J. E. Biddle, 2014; Oi, 1962; Okun, 1962), which means that firms do not immediately reduce labour input when activity falls. Okun (1962) provided a number of reasons why firms might hoard labour. He noted that labour hoarding might be optimal, considering the transaction costs of adjustment, the value of holding employees of certain skills that may be needed quickly during an upturn, and the adverse effects of labour cutting on morale. Miller (1971) suggested that holding a reserve labour force during downturns can save numerous transaction costs and expand supply at a more rapid speed when demand rises again. Moreover, downsizing and employee layoffs can strike fear and anxiety throughout the workplace, resulting in a loss of employee morale. Remaining employees after downsizing may feel overburdened in taking on the jobs of former co-workers that require different skills and training (Mishra, Spreitzer, & Mishra, 1998). Therefore, a firm may want to hold excess labour during downturns for the strategic goals of being able to save adjustment costs, retain firm-specific skills and relationships, expand supply rapidly when demand increases, and preserve employee morale.

On the other hand, labour is a resource that is relatively easy to adjust, compared with resources such as plant assets. In the basic neoclassical theory of firms in a competitive industry, labour input is often considered as a variable cost and is adjusted frequently in response to short-run fluctuations in demand, with the fixed capital stock unchanged. In addition, there are productivity and agency considerations associated with labour adjustment practices. The "cleansing" hypothesis in the economics literature suggests that a cyclical downturn is a time of accelerated productivity-enhancing labour reallocation because it is a relatively low-cost time for adjusting labour (Foster et al., 2016), and empirical evidence has confirmed the cleansing effect (e.g., Davis, Faberman, & Haltiwanger, 2006, 2012; Davis & Haltiwanger, 1990, 1992, 1999). Such culling of less productive workers during downturns also provides incentives to workers to expend more effort in good times to protect their jobs.

In many cases, firms make large expenditures on hiring, training, rewards, and incentives, but such investments in labour are the earliest cutbacks (Wright, Dunford, & Snell, 2001). This is especially true when labour is more flexible. At the macro level, labour market flexibility is the ability of the labour market to adapt to fluctuations and changes in the economy (J. Atkinson, 1984; Standing, 1989). At the firm level, Beatson (1995) refers to the term flexibility as the ability of a firm to deploy its workforce as it wishes. A more flexible firm is "less constrained by manning" (Haskel, Kersley, & Martin, 1997, p. 362), meaning it is more able to re-deploy labour when shocks occur (Booth & Chatterji, 1995; M. Cross, 1988; Haskel et al., 1997; Lorenz, 1992; Machin & Wadhwani, 1991a, 1991b; Marsden & Thompson, 1990), and incurs lower costs to adjust the size of its workforce (Emerson, 1988; Grubb & Wells, 1993). Because of the lower adjustment costs of flexible labour, it is not unusual for firms to lay off a large amount of its workforce in a short period of time. Firm of this type are flexible/non-sticky in labour.

To summarize, firms do not all follow the same labour adjustment strategy in response to economic shocks (Mascarenhas & Aaker, 1989). Firms that exhibit more labour stickiness retain excess employees in downturns because of the value of human resources and the adjustment costs associated with downsizing labour forces. Non-sticky firms adjust their labour along with the movement of the business cycle, lowering costs in downturns and obtaining potential benefits from incentive effects of labour adjustment.

2.3.2 Hypothesis Development

Consistent with prior literature, I use key financial statement ratios as measures of firms' financial performance. Return on assets (ROA) reflects a firm's ability to deploy assets effectively in income-producing activities. To analyze the sources of profit associated with labour adjustment strategies, I decompose ROA into two underlying ratios: profit margin (PM) and asset turnover (ATO) (Fairfield & Yohn, 2001; Nissim & Penman, 2001). PM captures a company's pricing power and product differentiation efforts. It may also capture productivity improvements that lower input costs. ATO measures a company's efficiency in utilizing its resources to generate sales revenue. Because the two components represent different aspects of firms' value creation, measure different constructs, and have different properties (Soliman, 2008), decomposing ROA into PM and ATO provides meaningful insights about how labour adjustment practices affect different aspects of performance.

Success in today's competitive environment depends on adaptability, speed, and innovation (Pfeffer, 1994). As a result, adaptability and flexibility are important in a changing environment where demand fluctuates over time. Firms that adapt quickly to the movement in the environment may achieve higher efficiency by efficient resource management such as procurement of inexpensive raw materials and labour, and tight budgetary control of overhead costs (Porter, 1980; Ward & Duray, 2000; White, 1986; Zahra & Covin, 1993). Because a downturn is a relatively low-cost time for adjusting labour (Foster et al., 2016), firms with a flexible labour strategy have a high incentive to cut unproductive workers during a downturn, which contributes to more efficient operations and thus higher resources turnover.

In addition, employees of firms that have flexible labour practices face more pressure from the threat of lay-offs, and such stress can cause employees to focus on well-learned and habitual actions at work and on those aspects of performance that are typically rewarded by the organization in an effort to retain their jobs (Farr & Ford, 1990; Probst & Brubaker, 2001). Therefore, higher levels of job insecurity for workers in flexible labour firms may improve their productivity and efficiency in solving tasks because of an enhanced level of cognitive arousal (Eysenck & Calvo, 1992; Probst, 2002; Probst, Stewart, Gruys, & Tierney, 2007). However, it is also possible that insecure employees experience considerable frustration and anxiety in the workplace (Brockner et al., 1994; Jacobson, 1987), which may contribute to them engaging in counter-productive work behaviours (Burroughs, Bing, & James, 1994) including withdrawal behaviours, such as absenteeism and tardiness (Chisholm, Kasl, & Eskenazi, 1983; Gupta & Beehr, 1979). Such employee behaviours may considerably reduce productivity and efficiency at the firm level.

Firms that adopt a stable labour strategy may be able to keep their highly qualified and productive employees that are able to make better use of resources and achieve higher efficiency in asset use. In addition, employees of such firms may be committed to the firm and tend to work harder. In fact, employees with job security are more satisfied with the organization and try to reciprocate by giving more input into the organization (Valletta, 1999), which leads to increases in the level of productivity (Imran, Majeed, & Ayub, 2015). However, these firms may unnecessarily retain unproductive workers, leading to lower efficiency (Autor, Kerr, & Kugler, 2007; Bird & Knopf, 2009). Employees in such firms may be less motivated to work hard, and lack the incentive to be productive and efficient, because they face less threat of job loss and unemployment stress.

Given the above arguments, it is expected that firms that adopt a flexible labour strategy may be better able to adapt to the changing environment and be more efficient in using resources than stable firms. On the other hand, firms that adopt a stable labour strategy may be able to keep highly productive employees, and therefore, achieve higher efficiency in asset use. Since operational gains in efficiency are reflected in improvements in asset turnover (Dickinson, 2011; Selling & Stickney, 1989), I form the following null hypothesis regarding the relationship between labour adjustment strategies and asset turnover.

H1: There is no difference in asset turnover between stable firms and flexible firms.

Profit margins are maximized during periods of greatest investment (Spence, 1977, 1979, 1981), including investment in labour, because the skills, experience, and knowledge that people possess have economic value to firms (Cascio, 1991; Parnes, 1984; Schultz, 1960; Snell & Dean Jr, 1992; Wallace & Fay, 1988). Previous research has documented that investments in human capital and labour relations can positively influence firms' financial performance (Carmeli & Tishler, 2004; Fulmer, Gerhart, & Scott, 2003). For example, Pfeffer (1994) pointed out that education prior to work accounted for 26% of the growth in the productive capacity of the United States, with learning and training on the job contributing to an additional 55% of this growth.

A sticky labour strategy makes it worthwhile for firms to invest in employees' education and training, because it reduces the uncertainty associated with the future pay-offs of such human capital investments (Agell, 1999; Kleinknecht, Oostendorp, Pradhan, & Naastepad, 2006). These investments can be developed into human capital that represents a source of sustained competitive advantage. In addition, workers with a high level of job security are likely to have more freedom, supervisory encouragement, work-group support, and organizational encouragement, and are motivated to do more creative and novel tasks (Amabile & Conti, 1999). They are more committed to the firm, as they believe the firm is motivated to keep employees (Ashford, Lee, & Bobko, 1989; Koys, 1988, 1991), and they are more willing to cooperate with management in the development of the production process.

To achieve high profit margins, companies seek to differentiate themselves from competitors so that they can deliver superior products or services to customers and charge premium prices (Porter, 1985, 1996). In his article on the resource-based view of the firm, Barney (1991) argued that sustained competitive advantage derives from the resources and capabilities a firm controls that are valuable, rare, imperfectly imitable, and not substitutable. Well-trained workers with special production skills, sophisticated sales and advertising staff, and managers familiar with the organizational culture, routines and processes of the firm are human resources that are valuable and difficult to imitate (Barney et al., 2001; Barney & Wright, 1998). They add value and uniqueness not only to the organization but also to the products and services they provide. Such workers are better able to discover and apply tacit knowledge that is needed to do more complex, creative, and varied jobs for the firm (Gächter & Falk, 2002; Lawson & Lorenz, 1999; Lorenz, 1992) enabling firms to differentiate themselves from peers. To obtain and sustain a resource-based advantage through human capital, companies need to build and retain the labour force that provides that advantage. Therefore, companies that adopt a stable strategy to build a resource-based advantage need to keep their employees through downturns to sustain the advantage.

In addition, an employee retention strategy helps the employees to be more engaged with their customers (Maylett & Warner, 2014). Retaining customers can improve firms' profitability by reducing the costs incurred in acquisition of new customers and minimize subsequent loss of customers (Dawes Farquhar, 2004; Reichheld, 1996; Reichheld & Kenny, 1990; Schmittlein, 1995). Therefore, sticky firms that retain skilled employees may be more able to develop specific types of strategic resources (e.g., human resource development programs, sophisticated customer relationship management systems, etc.) (Ballas et al., 2018) so as to provide differentiated products and services that yield higher profit margins and reduce costs associated with retaining customers.

In spite of the fact that human capital can create value for firms that retain labour, it is also possible that firms incur high costs associated with labour that outweigh the benefits created by human resources, resulting in lower profit margins.

Firms with flexible labour forces downsize to minimize costs in downturns (Dietz et al., 2010) and adapt to changing environments (Landsbergis, Cahill, & Schnall, 1999) to be competitive in today's global markets (Bahrami, 1992; Lewin & Johnston, 2000). They maintain a more flexible labour structure and are better able to re-deploy labour under high demand uncertainty, save costs when adjusting the size of workforce, cope with accelerated technical change, and adapt to fiercer international competition (Booth & Chatterji, 1995; M. Cross, 1988; Emerson, 1988; Grubb & Wells, 1993; Haskel et al., 1997; Lorenz, 1992; Machin & Wadhwani, 1991a, 1991b; Marsden & Thompson, 1990). They realize the cost benefit of keeping flexible labour. As a result, they save large amounts of operating costs associated with labour. On the other hand, there is potential loss of knowledge and skills for non-sticky/flexible firms if well-trained experienced employees are laid off. If this is the case, they are less able to provide differentiating products and services and thus may achieve lower profit margins.

It is expected that firms that adopt a stable labour strategy are better able to differentiate themselves from peers and therefore achieve a higher profit margin through premium pricing. On the other hand, firms that adopt a flexible labour strategy may achieve cost savings that also provide a higher profit margin. Therefore, I form the following null hypothesis regarding the relationship between labour adjustment strategies and profit margin.

H2: There is no difference in profit margin between stable firms and flexible firms.

An interesting question is whether a stable or a flexible strategy leads to higher ROA, where ROA is the multiplicative product of PM and ATO. Given the complexity of the relations described above, I don't make a directional hypothesis on the relationship between the strategies and ROA.

H3: There is no difference in return on assets between stable firms and flexible firms.

Firms' characteristics may influence their labour adjustment strategies. Smaller, younger and more financially constrained (e.g., high leverage, low working capital) firms are more sensitive to external shocks over the business cycle and have higher opportunity costs of capital during cyclical downturns (Sharpe, 1994). As a result, they may react more strongly to changing demand and have more pro-cyclical employment policies (Davidson & Matusz, 2000; Gertler & Gilchrist, 1994; Leitner & Stehrer, 2012; Sharpe, 1994). In other words, such firms are more likely to exhibit greater labour force adjustments in response to fluctuations in demand, meaning a more flexible (less stable) labour strategy. Similarly, more mature firms that have built strong customer relationships and achieved higher levels of financial stability that enable them to retain labour in downturns are more likely to exhibit high labour stickiness.

In addition, firms trade off tangible assets and human capital (Firer & Williams, 2003). Firms seeking to increase the deployment of tangible assets may put less emphasis on investment in human resources. When firms are more committed to tangible assets that are difficult and costly to adjust, they tend to make labour adjustments to adapt to fluctuations and changes in demand.

Therefore, I develop the following hypothesis concerning the relationship between firm characteristics and labour adjustment practice.

H4: Firms that are smaller, younger, more highly leveraged, have less working capital and proportionately more tangible assets are more likely to be flexible in labour.

2.4 Research Design and Empirical Measures

2.4.1 Data and Sample

My data source is the Corporate Income Tax File – Longitudinal Employment Analysis Program (T2-LEAP) dataset recently made available by Statistics Canada in a pilot project through its Research Data Centres. This dataset links the Longitudinal Employment Analysis Program (LEAP), which provides longitudinal data on the behaviour of employment levels of Canadian Businesses (Baldwin, Dupuy, & Penner, 1992), with the Corporate Income Tax File (T2) to create T2-LEAP.

The LEAP makes use of administrative tax records from the Business Register and the Survey of Employment, Payrolls and Hours (SEPH), which obtains information from T4 (employee compensation) filings, to derive the employment profile of businesses over time. The T2 file includes all incorporated firms that file a T2 tax return with the Canada Revenue Agency (CRA). The T2 file provides data on, among other things, assets, liabilities, sales, and gross profits for all incorporated firms in Canada. The T2-LEAP is constructed at the enterprise level and covers all incorporated employers in Canada in the private sector from 2001 to 2015. The T2-LEAP data provides an opportunity to advance research on labour and its impact on performance because it has information on labour and labour cost, operating performance, and financial performance for a large number of Canadian organizations (both publicly traded and privately owned) in the private sector over an extended period of time.

Previous research in management accounting that has examined asymmetry in labour costs has typically used Compustat data on the number of employees at the end of the year or employee cost data that is voluntarily provided by firms (e.g., Banker, Byzalov, & Plehn-Dujowich, 2014). Compared to the data on the number of employees at the end of the year, the T2-LEAP data provides information about the quantity of labour employed throughout the year.[2] Because it is a measure of labour flow, it is more appropriately matched with sales revenue. Because it is a measure of labour quantity (adjusted for price changes annually), it is less subject to changes in labour costs associated with labour rate changes over time.

I exclude observations with total assets less than $1 million to avoid the small deflator problem. I also exclude observations with missing information for variables used in the analysis. These criteria result in a final sample of 545,692 firm-year observations covering the period from 2001 to 2015. To mitigate the influence of outliers, all continuous variables are winsorized at the 1st and 99th percentiles of their respective distributions.

2.4.2 Measuring Labour Adjustment Strategy

To identify the firm-specific labour adjustment practice, I estimate the difference between the rate of labour increase with respect to sales change for recent years with increasing sales and the corresponding rate of labour decrease with respect to sales change for recent years with decreasing sales (Weiss, 2010)[3]:

$$Labour\ Stickiness_{it} = log\left(\frac{\Delta Labour}{\Delta Sales}\right)_{i,\tau 1} - log\left(\frac{\Delta Labour}{\Delta Sales}\right)_{i,\tau 2} \quad \tau 1, \tau 2\ \in\ \{t-1, \dots, t-5\}$$

where $\tau 1$ is the most recent of the last five years with an increase in sales and $\tau 2$ is the most recent of the last five years with a decrease in sales. $\Delta Sales_{it} = Sales_{it} - Sales_{i,t-1}$ and $\Delta Labour_{it} = Average\ labour\ units_{it} - Average\ labour\ units_{i,t-1}$. An average labour unit is "a measure of employment derived from the wages paid to employees divided by the average wage of those employed in firms in the same industry and region, and of the same size". As a result, this measure "capture(s) the

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[2] The T4 data only capture information on employees, not contractors.

[3] Weiss (2010) introduced a direct measure of cost stickiness at the firm level by estimating the difference between the rate of cost decrease for recent quarters with decreasing sales and the corresponding rate of cost increase for recent quarters with increasing sales.

amount of employment if firms were paying their workers an average wage and employing them for the same duration as other comparable firms" (Baldwin et al., 2016, p. 13).

A higher value of *Labour Stickiness* represents a more stable labour strategy. Firm-year observations are sorted into quartiles based on *Labour Stickiness* by year and industry. Firm-year observations that lie in the top quartile of *Labour Stickiness* are classified as *Stable* firms, and firms-year observations that lie in the bottom quartile of *Labour Stickiness* are classified as *Flexible* firms. The middle group contains those with *Moderate* levels of *Labour Stickiness*. Details on how the variables are constructed are reported in Table 2.1.

2.4.3 Model Specification

To test the relationship between labour adjustment strategies revealed in downturns and future performance, model (1) below is estimated:

$$Performance_{it+1} = \beta_0 + \beta_1 Stable_{it} + \beta_2 Flexible_{it} + \beta_3 Age_{it} + \beta_4 Size_{it} + \beta_5 Leverage_{it} + \beta_6 Working\ Capital_{it} + \beta_7 Tangibility_{it} + Ind\ FE + Year\ FE + Province\ FE + \varepsilon_{it} \quad (1)$$

where *Performance* represents one-year-ahead return on assets (*ROA*) and return on equity (*ROE*)[4]. *ROA* is the ratio of income before extraordinary items to total assets. *ROE* is the ratio of net income before extraordinary items to total shareholders' equity. To test my hypotheses, I further decompose *ROA* into asset turnover (*ATO*) and profit margin (*PM*) and use one of these ratios as the dependent variable in model (1), separately. *ATO* is the ratio of sales to total assets. *PM* is the ratio of net income before tax and extraordinary items to sales. *Stable* and *Flexible* are as previously defined. I control for firm characteristics including *Age* (estimated based on the ratio

[4] Note that the strategy, stable or flexible, is measured based on t - 1 to t - 5, and performance is measured in t + 1.

of total accumulated depreciation to depreciation expense[5]), *Size* (natural logarithm of total number of employees[6]), *Leverage* (ratio of total liabilities to total assets), *Working Capital* (ratio of working capital to total assets), and *Tangibility* (ratio of total tangible assets[7] to total assets)[8] (Jung, Lee, & Weber, 2014). β_1 captures the difference in the coefficient between the *Stable* and the middle group, and β_2 captures the difference in the coefficient between the *Flexible* and the middle group.

Additionally, I add year, industry[9] (2-digit North American Industry Classification System (NAICS)), and province fixed effects to control for time-invariant factors at the industry and province level and the economy-wide factors that may be correlated with both performance and the labour adjustment strategies. In all of the estimations, I cluster standard errors by firm to account for correlations within the same firm. Definitions of all variables are summarized in Table 2.1.

To investigate what firm characteristics determine the choice of labour adjustment strategy, the following model is estimated:

$$Labour\ Stickiness_{it+1} = \beta_0 + \beta_1 Age_{it} + \beta_2 Size_{it} + \beta_3 Leverage_{it} + \beta_4 Wokring\ Capital_{it} + \beta_5 Tangibility_{it} + Ind\ FE + Year\ FE + Province\ FE + \varepsilon_{it} \quad (2)$$

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[5] This may also indicate that "younger" firms could be those that replace their equipment or build newer plants more frequently.
[6] Results are similar when natural logarithm of total assets is used as a measure of size.
[7] According to Statistics Canada, tangible assets are assets with a physical form, such as buildings, land, and machinery and equipment. They are sometimes called fixed, capital assets, or property, plants and equipment.
[8] A more comprehensive measure of tangibility would incorporate market value of assets, but market value is not available in the T2-LEAP data.
[9] Union information is not available in the T2-LEAP data. Previous literature has used the unionization rate at the industry level. I include industry fixed effect to control for this factor that is not changing within an industry.

where *Labour Stickiness* is as previously defined. I examine firm characteristics including *Size*, *Age*, *Leverage*, *Tangibility*, and *Working Capital*[10]. All variables are as previously defined. Year, industry, and province fixed effects are controlled.

2.5 Empirical Results

2.5.1 Descriptive Statistics

Table 2.2 presents the descriptive statistics for the full sample, and for sub-samples of stable and flexible firms. The mean (median) value of *Labour Stickiness* is -0.137 (-0.125) for the full sample. A positive value of *Labour Stickiness* means that managers add more employees when sales increase than they cut employees when sales decrease. Because this log value is slightly less than zero, firms on average cut employees a little more when sales decline than they add employees when sales increase. The 25th and 75th percentiles of *Labour Stickiness* are -1.394 and 1.127, respectively, indicating that firms in the bottom quartile of *Labour Stickiness* are quite flexible and firms in the top quartile are quite stable with respect to labour adjustment in downturns.

Correlations of variables are provided in Table 2.3. Labour stickiness is negatively correlated with *ROA* and *ATO*, but positively correlated with PM, providing initial evidence that higher labour stickiness is associated with lower *ROA*, lower asset turnover, and higher margins. These findings may be because firms with higher labour stickiness incur additional costs associated with labour, which reduces efficiency (asset turnover). However, these firms are able to charge premium prices by keeping skilled employees that are able to provide differentiating products and services, resulting in higher profit margin. Taken together, the efficiency disadvantage outweighs the profit margin advantage, leading to lower *ROA* for companies with higher labour stickiness.

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[10] The T2-LEAP data used in this study provides a limited number of variables that can be used to identify firm characteristics.

2.5.2 Labour Adjustment Strategies and Future Performance

Results of estimating model (1) are reported in Table 2.4. In column (1), the estimated coefficient on *Stable* is significantly negative (β = -0.0038, p < 0.01), indicating that firms that adopt a stickier labour strategy have lower future *ROA*, compared with those with moderate strategies. The estimated coefficient on *Flexible* is significantly positive (β = 0.0050, p < 0.01), indicating that firms that adopt a less sticky labour strategy have higher future *ROA*, compared with those with moderate strategies. An F-test of the equality of the coefficients indicates that the coefficients on *Stable* and *Flexible* are different (F = 23.87, p < 0.01). With regards to firm characteristics, firms that are younger (β = -0.0003, p < 0.01), bigger (β = 0.0043, p < 0.01), have lower leverage (β = -0.0703, p < 0.01), more working capital (β = 0.0270, p < 0.01), and fewer tangible assets (β = -0.0096, p < 0.01) have higher future *ROA*. Column (2) of Table 2.4 reports the estimation results of model (1) when the dependent variable is *ROE*. The coefficient on *Stable* is consistent with that in column (1), and the coefficient on *Flexible*, while positive, is not significantly different from zero. Overall, the results suggest that stable firms underperform, and flexible firms outperform in terms of future profitability.

To further investigate the effect of labour adjustment strategies on firm performance, I decompose *ROA* into asset turnover (*ATO*) and profit margin (*PM*) following the DuPont method and use the two components separately as dependent variables in model (1). The results are reported in Table 2.5. Results in column (1) for *ATO* show that the estimated coefficient on *Stable* is significantly negative (β = -0.0901, p < 0.01), and the estimated coefficient on *Flexible* is significantly positive (β = 0.0101, p < 0.05). An F-test of the equality of the coefficients indicates that the coefficients on *Stable* and *Flexible* are different (F = 302.99, p < 0.01). These findings suggest that flexible firms have higher asset turnover relative to stable firms and indicate that underperformance of stable firms in terms of *ROA* is at least partially due to lower efficiency (asset turnover), and the superior performance of flexible firms is partially due to higher efficiency.

Results in column (2) concerning *PM* show that the estimated coefficients on *Stable* (β = 0.0663, $p < 0.01$) and *Flexible* (β = 0.0347, $p < 0.01$) are both significantly positive. In addition, the coefficient of *Stable* is significantly higher than that of *Flexible* (F = 15.23, $p < 0.01$), providing evidence that stable firms achieve significantly higher profit margin than flexible firms. Higher profit margin for the stable adjustment strategy is consistent with the resource-based view of human capital, and higher profit margin for the flexible strategy may reflect higher productivity for agency reasons. The finding that the stable adjustment strategy achieves higher profit margin than the flexible strategy supports the value of human capital for stable firms – people add value and uniqueness to firms and their products. Therefore, they are better able to differentiate themselves from other firms and charge higher prices, resulting in higher profit margin.

Overall, the findings indicate that the lower *ROA* for the stable firms relative to other firms is due to lower asset turnover (efficiency in using assets), but these firms do earn higher profit margins than other firms. The higher *ROA* for flexible firms is due to a combination of higher asset turnover and better profit margins than moderate firms.

2.5.3 Firm Characteristics that Affect Labour Stickiness

Next, I examine firm characteristics that may determine labour strategies. Table 2.6 presents results of estimating model (2). Column (1) presents the results for basic firm characteristics hypothesized in H4. The results indicate that firms that are older (β = 0.0009, $p < 0.01$), have lower leverage (β = -0.0136, $p < 0.01$), or have fewer tangible assets (β = -0.0393, $p < 0.01$) tend to be stickier in labour, but size and working capital do not have an apparent impact on labour stickiness. Thus, firms that are younger[11], more highly leveraged, or have proportionately more tangible assets are likely to be more flexible (less stable) in labour. This is partially consistent with H4 that smaller and more highly leveraged firms are more sensitive to external shocks and are more likely to exhibit greater labour force adjustments in response to fluctuations in demand. It also suggests that firms with more tangible assets tend to keep a flexible labour force that is easier and less costly to adjust.

I also consider the non-linearity of the relationship between leverage and stickiness in column (2) and find that the estimated coefficient on *Leverage* remains negative and significant ($\beta = -0.0776$, $p < 0.05$) and the quadratic form of leverage, $Leverage^2$, is positive and significant ($\beta = 0.0630$, $p < 0.01$). This finding indicates that stickiness decreases with the use of debt financing for lower levels of leverage but increases with debt financing for higher levels of leverage. Finally, results in column (3) indicate that earnings volatility does not significantly affect the stickiness in labour.

2.5.4 Additional Analysis

In additional tests, I further investigate the impact of labour adjustment on firms' earnings volatility using the following model.

$$\begin{aligned} Earnings\ Volatility_{it+1} &= \beta_0 + \beta_1 Stable_{it} + \beta_2 Flexible_{it} + \beta_3 Age_{it} + \beta_4 Size_{it} + \beta_5 Leverage_{it} \\ &+ \beta_6 Earnings\ Volatility_{it-1} + Ind\ FE + Year\ FE + Province\ FE + \varepsilon_{it} \end{aligned} \quad (3)$$

where $Earnings\ Volatility_{it+1}$ is calculated as the rolling standard deviation of *ROA* over the four-year period from $t - 2$ to $t + 1$ (with minimum of 3 observations required) (Donelson & Resutek,

[11] My proxy for firm age may also be interpreted as a measure of asset age. In that case, the finding would indicate that companies that replace assets more frequently are more flexible in labour.

2015). The *Stable*, *Flexible* and control variables are as previously defined. I include fixed effects for year, industry, and province as in the previous tests.

Table 2.7 reports the results of estimating model (3). The estimated coefficient on *Stable* is significantly negative (β = -0.0005, $p < 0.01$), and the coefficient on *Flexible* is not significantly different from zero. These results indicate that firms that adopt a stable labour strategy have less volatile earnings than those with moderate strategies, after controlling for firm characteristics and contemporaneous earnings volatility. This finding suggests that stable firms may retain labours with specific skills and knowledge to buffer the impact of downturns and to improve and refine existing operations, resulting in lower future earnings volatility.

Finally, I estimate a logistic model to test the likelihood of exit in future periods associated with labour adjustment strategies.

$$\begin{aligned} Exit = \beta_0 &+ \beta_1 Stable_{it} + \beta_2 Flexible_{it} + \beta_3 Age_{it} + \beta_4 Size_{it} + \beta_5 Leverage_{it} \\ &+ \beta_6 Working\ Capital_{it} + \beta_7 Tangibility_{it} + \beta_8 Earnings\ Volatility_{it} \\ &+ Ind\ FE + Year\ FE + Province\ FE + \varepsilon_t \qquad (4) \end{aligned}$$

where *Exit* is an indicator variable for firms that exit in $t + 1$ to $t + 3$ *or* $t + 1$ to $t + 5$[12], and all other variables are as previously defined.

The results of estimating model (4) are presented in Table 2.8. Column (1) has results for firm exit in $t + 1$ to $t + 3$ and column (2) has results for firm exit in $t + 1$ to $t + 5$. The estimated coefficient on *Flexible* is significantly negative in both column (1) (β = -0.0986, $p < 0.01$) and column (2) (β = -0.0744, $p < 0.05$), indicating that firms that have a flexible labour strategy are less likely to exit in future periods, compared with those with moderate strategies. This finding provides further support for the previously documented positive association between *Flexible* and

[12] I use a three-year and five-year horizon to provide a shorter and longer window for observing firm exit that may be associated with labour strategy measured in period $t - 1$ through $t - 5$.

ROA, *ATO*, and *PM*, respectively. Flexible firms are better able to achieve higher profitability, efficiency, and profit margins and therefore are less likely to exit in future periods.

2.6 Conclusions

In this study, I construct a measure of labour stickiness by comparing the amount of labour added per dollar change in sales when sales increase to the amount of labour subtracted per dollar change in sales when sales decrease. I classify firms into three groups based on labour stickiness: those with more stable labour adjustment strategies (high labour stickiness), those with more flexible labour adjustment strategies (low labour stickiness), and those with moderate labour adjustment strategies.

I find that companies with more stable labour adjustment strategies underperform and that companies with more flexible labour adjustment strategies outperform in terms of return on assets, relative to companies with moderate labour adjustment strategies. Using DuPont analysis, I find that underperformance of stable companies is due to lower efficiency (asset turnover) and the superior performance of flexible firms is due to higher efficiency. Both the stable and flexible adjustment strategies achieve higher profit margin than the moderate strategies. In fact, stable firms achieve even higher profit margin than flexible firms, consistent with the resource-based view of human capital. However, the profit margin advantage is not sufficient to outweigh the asset turnover disadvantage of stable firms. I also find firms that are older, that have lower leverage, and that have proportionately lower tangible assets exhibit more labour stickiness. Finally, higher stickiness is associated with lower earnings volatility, but lower stickiness is associated with less likelihood of exit in future periods.

Labour adjustment strategies identified in this study align with business strategies proposed in past literature (R. S. Kaplan & Norton, 2004; Porter, 1980; Treacy & Wiersema, 1993). For example, the flexible labour strategy aligns with the concept of cost leadership in Porter (1980), productivity emphasis in R. S. Kaplan and Norton (2004), and operational excellence in Treacy and Wiersema (1993), where firms strive to improve operational efficiency. The stable labour strategy aligns with differentiation strategy in Porter (1980), revenue growth in R. S. Kaplan and Norton (2004), and product leadership and customer intimacy in Treacy and Wiersema (1993), where firms generate greater customer value to obtain a competitive advantage. These different strategies require different methods of managing business operations and resources to deliver different value propositions.

My findings on the effects of labour resource adjustment practices on firms' performance shed light on management's resource commitment decisions in response to movements in the business cycles for a wide range of firms and industries. The findings on stable strategies and their impacts on future performance are particularly interesting: firms with stable strategies may deliberately give up return on physical capital and share some of the surplus with their employees – a form of return on their investment in human capital (Becker, 1964). As a result, they achieve higher profit margin compared with other types of firms.

My study contributes to the management accounting literature on asymmetric cost behaviour by investigating how management of a key resource – labour – during sales downturns affects firm performance over time. In particular, it highlights the alternative ways that companies may adjust labour resources in response to a downturn and the potential advantages and disadvantages of stable and flexible labour strategies. It applies DuPont analysis to separate the performance effects between operating efficiency and profit margin that may result from both human capital and agency aspects of managing labour resources. It also provides information about the attributes of firms that influence their labour adjustment strategies.

The T2-LEAP data used in my study provides an opportunity to advance research on labour and its impact on performance, but it has some limitations. Since the labour and employment information is obtained from the T4 filings, it captures information on employees only, not contractors, which make up a portion of the labour market.[13] The payroll information that is used to determine average labour units does not distinguish between factory worker salaries that are included in the cost of goods sold or inventory and salaries that go into selling, general and administrative expenses, which makes it hard to identify different types of employees doing different types of jobs.

The findings reported in this study may create many interesting opportunities for future research. For example, researchers may consider how decisions about labour resource commitment affect allocations of resources to other types of investments (e.g., capital expenditures and R&D expenditures) and development of other types of intangible assets (e.g., customer relationships). It would also be interesting to examine performance outcomes of different industries (e.g., service, resource extractive, and manufacturing) and equity market consequences such as whether investors or analysts respond in different ways to earnings reported by firms with different labour adjustment strategies.

[13] According to the contingent worker survey (CWS) conducted by the U.S. Bureau of Labor Statistics in 2017, independent contractors made up about 6.9% of the workforce. https://blogs.bls.gov/blog/tag/independent-contractors/

Table 2.1 Variable Definitions

Variable	Definition
Labour Stickiness	$log\left(\frac{\Delta Labour}{\Delta Sales}\right)_{i,\tau1} - log\left(\frac{\Delta Labour}{\Delta Sales}\right)_{i,\tau2}$ $\tau1, \tau2 \in \{t-1, \ldots, t-5\}$ where $\tau1$ is the most recent of the last five years with an increase in sales and $\tau2$ is the most recent of the last five years with a decrease in sales; $\Delta Sales_{it} = Sales_{it} - Sales_{i,t-1}$ and $\Delta Labour_{it} = Average\ labour\ unit_{it} - Average\ labour\ unit_{i,t-1}$. An average labour unit is a measure of employment derived from the wages paid to employees divided by the average wage of those employed in firms in the same industry and region, and of the same size.
Stable	An indicator variable for firm-year observations in the top quartile of *Labour Stickiness.*
Flexible	An indicator variable for firm-year observations in the bottom quartile of *Labour Stickiness.*
Return on Assets (ROA)	Income before taxes and extraordinary items divided by total assets.
Return on Equity (ROE)	Total shareholders' equity divided by total assets.
Asset Turnover (ATO)	Total sales divided by average total assets.
Profit Margin (PM)	Income before taxes and extraordinary items divided by total sales.
Leverage	Ratio of total liabilities to total assets.
Age	Accumulated amortization of tangible assets divided by amortization of tangible assets.
Size	The natural logarithm of total number of employees.
Working Capital	Working capital divided by total assets.
Tangibility	Total tangible assets divided by total assets.
Earnings Volatility	Rolling standard deviation of *ROA* over the four-year period from t - 3 to t (minimum of 3 observations are required).
Exit	An indicator variable for firms exit in t + 1 to t + 3 *or* t + 1 to t + 5.

Table 2.2 Descriptive Statistics

Panel A: Full Sample (N = 545,692)					
Variable	Mean	Std. Dev.	Median	P25	P75
Labour Stickiness	-0.137	2.188	-0.125	-1.394	1.127
ROA	0.080	0.130	0.062	0.010	0.134
ATO	1.070	1.073	0.743	0.276	1.515
PM	0.336	1.253	0.075	0.010	0.242
Leverage	0.580	0.349	0.570	0.308	0.811
Age	13.46	17.146	8.811	5.008	15.244
Size	2.909	1.527	2.948	2.027	3.799
Working Capital	0.241	0.332	0.225	0.033	0.466
Tangibility	0.565	0.531	0.396	0.146	0.856

Panel B: Stable (N = 136,423)					
Variable	Mean	Std. Dev.	Median	P25	P75
Labour Stickiness	2.548	1.339	2.170	1.577	3.122
ROA	0.075	0.129	0.058	0.007	0.131
ATO	0.989	1.036	0.657	0.235	1.400
PM	0.377	1.385	0.076	0.008	0.261
Leverage	0.579	0.352	0.569	0.301	0.812
Age	13.719	17.803	8.845	4.903	15.446
Size	2.895	1.550	2.930	1.993	3.788
Working Capital	0.240	0.336	0.028	0.224	0.469
Tangibility	0.554	0.527	0.387	0.140	0.839

Panel C: Flexible (N = 136,423)					
Variable	Mean	Std. Dev.	Median	P25	P75
Labour Stickiness	-2.834	1.375	-2.449	-3.425	-1.845
ROA	0.086	0.131	0.066	0.013	0.143
ATO	1.098	1.113	0.754	0.276	1.552
PM	0.353	1.268	0.079	0.013	0.252
Leverage	0.576	0.348	0.563	0.305	0.806
Age	13.452	17.085	5.061	8.843	15.243
Size	2.888	1.572	2.928	1.977	3.813
Working Capital	0.243	0.331	0.228	0.035	0.467
Tangibility	0.563	0.529	0.395	0.144	0.854

Table 2.3 Pearson Correlations

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) Labour Stickiness	1.000								
(2) ROA	*-0.030*	1.000							
(3) ATO	*-0.042*	*0.079*	1.000						
(4) PM	*0.010*	*0.310*	*-0.209*	1.000					
(5) Size	-0.005	*-0.032*	*0.277*	*0.032*	1.000				
(6) Age	*0.008*	*-0.033*	*-0.064*	*0.041*	*-0.277*	1.000			
(7) Leverage	0.002	*-0.325*	*0.161*	*-0.166*	*0.049*	*-0.090*	1.000		
(8) Tangibility	*-0.007*	*-0.126*	*-0.078*	*-0.086*	*-0.110*	*0.056*	*0.099*	1.000	
(9) Working Capital	-0.000	*0.258*	*0.013*	*0.071*	*0.128*	*0.100*	*-0.548*	*-0359*	1.000

Italic font denotes correlations that are statistically significant at $p < 0.05$.

Table 2.4 The Effect of Labour Adjustment Strategies on Future Profitability

Variables	(1) ROA_{it+1}	(2) ROE_{it+t}
$Stable_{it}$	-0.0038***	-0.0099*
	(0.0006)	(0.0054)
$Flexible_{it}$	0.0050***	0.0049
	(0.0006)	(0.0054)
Age_{it}	-0.0003***	-0.0004***
	(0.0000)	(0.0001)
$Size_{it}$	0.0043***	0.0130***
	(0.0002)	(0.0025)
$Leverage_{it}$	-0.0703***	0.6286***
	(0.0012)	(0.0141)
$Working\ Capital_{it}$	0.0270***	0.1846***
	(0.0012)	(0.0148)
$Tangibility_{it}$	-0.0096***	-0.0657***
	(0.0007)	(0.0066)
Intercept	0.0975***	-0.0321
	(0.0023)	(0.0222)
Year FE	YES	YES
Industry FE	YES	YES
Province FE	YES	YES
Adj. R^2	6.05%	2.42%
N	545,692	545,654

Table 2.4 reports the results of estimating model (1) where the dependent variable is ROA_{t+1} and ROE_{t+1}.
*, **, *** indicate significance at the 10 percent, 5 percent, and 1 percent levels (two-tailed), respectively.
Numbers in parentheses are standard errors corrected for firm-level clustering.
Industry fixed effects are based on 2-digit NAICS code.
Detailed variable descriptions are in Table 2.1.

Table 2.5 The Effect of Labour Adjustment Strategies on Future ATO and PM

Variables	(1) ATO_{it+1}	(2) PM_{it+1}
$Stable_{it}$	-0.0901***	0.0663***
	(0.0046)	(0.0068)
$Flexible_{it}$	0.0101**	0.0347***
	(0.0048)	(0.0062)
Age_{it}	-0.0013***	0.0027***
	(0.0001)	(0.0003)
$Size_{it}$	-0.1584***	-0.0959***
	(0.0021)	(0.0033)
$Leverage_{it}$	0.5782***	-0.5117***
	(0.0095)	(0.0138)
$Working\ Capital_{it}$	0.2738***	-0.2182***
	(0.0100)	(0.0169)
$Tangibility_{it}$	-0.0469***	-0.2103***
	(0.0064)	(0.0081)
Intercept	0.0716***	1.3886***
	(0.0202)	(0.0412)
Year FE	YES	YES
Industry FE	YES	YES
Province FE	YES	YES
Adj. R^2	17.50%	6.70%
N	545,692	545,692

Table 2.5 reports the results of estimating model (1) where the dependent variable is ATO_{t+1} and PM_{t+1}.
*, **, *** indicate significance at the 10 percent, 5 percent, and 1 percent levels (two-tailed), respectively.
Numbers in parentheses are standard errors corrected for firm-level clustering.
Industry fixed effects are based on 2-digit NAICS code.
Detailed variable descriptions are in Table 2.1.

Table 2.6 Firm Characteristics that Affect Labour Stickiness

Variables	(1) *Labour Stickiness*$_{it+1}$	(2) *Labour Stickiness*$_{it+1}$	(3) *Labour Stickiness*$_{it+1}$
Age$_{it}$	0.0009***	0.0009***	0.0009***
	(0.0003)	(0.0003)	(0.0003)
Size$_{it}$	0.0022	0.0033	0.0021
	(0.0033)	(0.0033)	(0.0033)
Leverage$_{it}$	-0.0136***	-0.0776**	-0.0776**
	(0.0057)	(0.0382)	(0.0382)
Working Capital$_{it}$	-0.0282	-0.0328*	-0.0282
	(0.0176)	(0.0177)	(0.0176)
Tangibility$_{it}$	-0.0393***	-0.0392***	-0.0392***
	(0.0100)	(0.0100)	(0.0100)
Leverage$^{2}_{it}$		0.0630***	0.0630***
		(0.0237)	(0.0237)
Earnings Volatility$_{it}$			0.0000
			(0.0000)
Intercept	-0.0496	-0.0268	-0.0263
	(0.0385)	(0.0396)	(0.0396)
Year FE	YES	YES	YES
Industry FE	YES	YES	YES
Province FE	YES	YES	YES
Adj. R^2	1.71%	1.73%	1.73%
N	545,692	545,692	545,681

Table 2.6 reports the results of estimating model (2), where the dependent variable is the continuous variable of *Labour Stickiness* estimated following Weiss (2010).
*, **, *** indicate significance at the 10 percent, 5 percent, and 1 percent levels (two-tailed), respectively.
Numbers in parentheses are standard errors corrected for firm-level clustering.
Industry fixed effects are based on 2-digit NAICS code.
Detailed variable descriptions are in Table 2.1.

Table 2.7 The Effect of Labour Adjustment Strategies on Earnings Volatility

Variables	(1) *Earnings Volatility*$_{it+1}$
Stable$_{it}$	-0.0005***
	(0.0002)
Flexible$_{it}$	0.0000
	(0.0002)
Age$_{it}$	0.0001***
	(0.0000)
Size$_{it}$	0.0003***
	(0.0001)
Leverage$_{it}$	0.0073***
	(0.0003)
Earnings Volatility$_{it}$	0.9117***
	(0.0021)
Intercept	0.0053***
	(0.0007)
Year FE	YES
Industry FE	YES
Province FE	YES
Adj. R^2	65.2%
N	545,692

Table 2.7 reports the results of estimating model (3) where the dependent variable is *Earnings Volatility*$_{t+1}$.
*, **, *** indicate significance at the 10 percent, 5 percent, and 1 percent levels (two-tailed), respectively.
Numbers in parentheses are standard errors corrected for firm-level clustering.
Industry fixed effects are based on 2-digit NAICS code.
Detailed variable descriptions are in Table 2.1.

Table 2.8 The Effect of Labour Adjustment Strategies on Likelihood of Exit

Variables	(1) $Exit_{it+1\ to\ t+3}$	(2) $Exit_{it+1\ to\ t+5}$
$Stable_{it}$	-0.0192	-0.0204
	(0.0334)	(0.0307)
$Flexible_{it}$	-0.0986***	-0.0744**
	(0.0347)	(0.0315)
Age_{it}	0.0040***	0.0040***
	(0.0008)	(0.0008)
$Size_{it}$	-0.2456***	-0.2249***
	(0.0108)	(0.0102)
$Leverage_{it}$	1.4706***	1.4579***
	(0.0459)	(0.0452)
$Working\ Capital_{it}$	-0.6045***	-0.4665***
	(0.0542)	(0.0529)
$Tangibility_{it}$	-0.2525***	-0.2229***
	(0.0353)	(0.0344)
$Earnings\ Volatility_{it}$	0.0000**	0.0000**
	(0.0000)	(0.0000)
Intercept	-4.0026***	-3.1367***
	(0.1273)	(0.1131)
Year FE	YES	YES
Industry FE	YES	YES
Province FE	YES	YES
Pesudo. R^2	6.62%	6.32%
N	345,266	225,586

Table 2.8 reports the results of estimating logistic model (4) where the dependent variable is the indicator variable of *Exit* in the future periods.
*, **, *** indicate significance at the 10 percent, 5 percent, and 1 percent levels (two-tailed), respectively.
Numbers in parentheses are standard errors corrected for firm-level clustering.
Industry fixed effects are based on 2-digit NAICS code.
Detailed variable descriptions are in Table 2.1.

Chapter 3 Managerial Ability and Labour Investment

3.1 Abstract

Using a measure of managerial ability derived using data envelopment analysis (DEA), we investigate whether higher ability managers attain better performance outcomes through labour investment. We build on previous research that predicts expected labour investment (net hiring) based on economic factors and demonstrates that deviations from expected labour investment negatively affect future performance. Accordingly, higher ability managers may positively affect firm performance through labour investment in two ways: (1) by making labour investment decisions that deviate less from expected net hiring and (2) by reducing the negative effects of deviations from expected net hiring. We document that deviations from expected net hiring are, on average, smaller for higher ability managers. In this regard, we find that higher ability managers avoid both over-investment and under-investment in labour. We also find that managerial ability mitigates the negative effects of deviations from expected hiring on future firm performance. This latter result holds whether deviations from expected hiring are positive or negative. Together, our results support the prediction that higher ability managers achieve better performance outcomes through labour investment.

3.2 Introduction

Managers' ability to understand and make effective use of firm resources is an important factor that affects firms' investment practices and outcomes (e.g., Abernathy, Kubick, & Masli, 2018; Andreou, Karasamani, Louca, & Ehrlich, 2017; Andreou, Philip, & Robejsek, 2016; Baik, Brockman, Farber, & Lee, 2018; Baik, Farber, & Lee, 2011; Bamber, Jiang, & Wang, 2010; Berk & Stanton, 2007; Choi, Han, Jung, & Kang, 2015; Demerjian, Lev, Lewis, & McVay, 2013; Demerjian, Lev, & McVay, 2012; Ge, Matsumoto, & Zhang, 2011). For instance, a significant part of the heterogeneity in firms' investment practices can be explained by unobserved manager-fixed effects (Bertrand & Schoar, 2003). In addition, existing literature on the resource-based view suggests that "a manager or a managerial team is a firm resource that has the potential for generating sustained competitive advantages" for a firm (Barney, 1991, p. 117).

We investigate a key channel through which higher ability managers may affect firm performance – labour investment. Managers must carefully evaluate the risks and payoffs associated with labour investments and develop appropriate investment strategies and practices to create and manage a viable workforce and to increase the likelihood of business success (Ferguson & Reio Jr, 2010; Pfeffer, 1994, 1998). Previous research predicts labour investment based on economic factors and demonstrates that inefficient labour investment – deviations from expected net hiring – leads to poorer future performance. Accordingly, more able managers may achieve higher performance by making more efficient labour investments and by reducing the costs of deviations from expected net hiring. Therefore, we first investigate whether higher ability managers make labour investment decisions that deviate less from expected hiring based on economic factors. Then, we examine whether higher managerial ability mitigates the negative performance consequences of deviations from expected net hiring.

We focus on labour investment and management for several reasons. Labour is the largest resource in many organizations and labour costs often represent a major portion of a firm's total costs. One report indicates that labour costs account for more than 60% of corporate expenses and this number keeps going up (Business Insider, 2015). Human capital plays a significant role in achieving organizational success and creates economic value for firms and the society (Cascio, 1991; Parnes, 1984; Wallace & Fay, 1988). Human capital is a resource whose effectiveness may be influenced in various ways by managerial ability.

Cooper and Kaplan (1992) pay specific attention to labour investment and management in their description of activity-based systems that support management decision making. They discriminate between flexible resources that are acquired as needed and committed resources that are acquired in advance of usage. Of the three types of resource commitments made in advance of usage, Cooper and Kaplan (1992) describe commitments made to salaried and hourly employees as the most important. They observe that managers need to consciously monitor and adjust labour commitments, especially when activity usage is below available supply. They state, “Management, to obtain higher profits, must take conscious action either to use the available capacity to obtain a higher volume of business or to reduce spending on resources by eliminating the unused capacity” (Cooper & Kaplan, 1992, p. 12).

The existing literature on corporate investment focuses more on salient but less frequent investment decisions, such as capital expenditures, research and development (R&D) projects, and mergers and acquisitions (Barker & Mueller, 2002; Bertrand & Schoar, 2003; G. C. Biddle et al., 2009; García Lara et al., 2016). In contrast, labour investment decisions occur frequently and are often of less importance individually but may have large impacts when considered together. We examine labour investment and management given the value that human capital can bring to the firm and the significance of labour investments in managerial resource allocation decisions.

Examination of the research question requires measures of labour investment efficiency and managerial ability. To measure labour investment efficiency, we use the absolute value of abnormal net hiring, which is estimated as the deviation of actual net hiring (percentage change in the number of employees) from its expected level, following the model described in Pinnuck and Lillis (2007) and Jung et al. (2014). This measure of abnormal net hiring captures the amount of net hiring that is not attributable to underlying economic factors, and therefore is an inverse measure of labour investment efficiency.

We use the managerial ability measure developed by Demerjian et al. (2012) that first applies data envelopment analysis (DEA) to measure firm efficiency in transforming corporate resources to revenues. Then, in a second stage, it distinguishes between managerial ability and other drivers of firm efficiency by regressing firm efficiency from the first stage on various other firm-specific factors that may affect efficiency. The residual measure of ability obtained in the second stage reflects management-specific efficiency drivers. Demerjian et al. (2012) conduct a number of validity tests and show that this DEA-based measure outperforms alternative managerial ability measures.

To avoid endogeneity concerns that there may be contemporaneous factors affecting both managerial ability and labour investment efficiency, we use managerial ability measured in period t - 1 to evaluate labour investment decisions made in period t. In addition, factors that may affect both managerial ability and labour investment efficiency are excluded in the second stage of estimating the DEA-based measure of ability. Our results indicate that managerial ability is negatively associated with abnormal net hiring, or deviation from the expected level of hiring, indicating that higher ability managers make more efficient investments in labour. This finding holds when using the ranked or continuous measure of managerial ability and for alternative measures of labour investment efficiency. It is robust to controlling for factors that may affect the efficiency of net hiring practices, including financial reporting quality, institutional ownership and other investments.

We further examine the relationship between managerial ability and labour investment efficiency for the over-investment and under-investment sub-samples. Our results indicate that higher managerial ability is associated with both less over-investment and less under-investment in labour (smaller deviations of actual net hiring from the expected levels). Therefore, higher ability managers are better able to overcome agency tendencies to over-invest (empire-building) and under-invest (risk or loss aversion) in labour, improving overall labour investment efficiency.

To ensure that the results are not attributable to other non-labour investments, we conduct an additional test by dividing the full sample into two sub-samples based on the relationship between net hiring and change in other investments. If the main results are driven by other investments, then the negative relationship between managerial ability and abnormal net hiring should only be found in the sub-sample where net hiring is positively associated with the change in other investments. The results indicate that the main finding is not driven by other contemporaneous investments, thus providing supplementary evidence that supports the main results.

Next, we replicate previous research that demonstrates that abnormal net hiring, or labour investment inefficiency, is negatively associated with future firm performance (*ROA* measured in period $t + 1$ or periods $t + 1$ through $t + 3$), indicating that deviations from the expected level of net hiring are generally costly in terms of future firm performance (Jung et al., 2014). Then, we test whether the negative impact of deviations from expected net hiring is mitigated by managerial ability. We find that the future performance loss associated with deviations from net hiring is reduced by managerial ability whether the deviations from expected net hiring are positive or negative. Thus, we provide evidence that more able managers make more efficient labour investment decisions and that deviations from expected net hiring are less costly, in terms of future performance, for higher ability managers.

Our analysis is a joint test of the managerial ability measure derived using data envelopment analysis (DEA) by Demerjian et al. (2012) and the resource-based-view prediction that managerial ability may lead to sustainable competitive advantage. It extends the literature on managerial ability by examining whether and how more able managers attain higher future performance based on their management of a key resource – labour. It contributes to the literature on the determinants of labour investment efficiency by incorporating a measure of managerial ability, which is incremental to other firm-level characteristics such as size, leverage, and growth opportunities. It adds to the literature that examines how managerial ability affects corporate investment decisions generally by providing direct evidence of the relationship between managerial ability and labour investment efficiency. This focus on efficiency in labour investments is often neglected in the existing literature on corporate investment efficiency. Given the value that human capital can bring to the firm and the significance of labour investments in managerial resource allocation decisions, improving the effectiveness of human resource management and the efficiency in labour investments contributes to a firm's future performance.

The remainder of this study is organized as follows. The next section reviews the related literature and develops our hypotheses. Section 3.4 details our research design and section 3.5 describes our sample. The primary empirical results are provided in section 3.6, along with various sensitivity tests. Section 3.7 summarizes and concludes.

3.3 Literature Review and Hypothesis Development

3.3.1 The Importance of Managerial Ability

The management literature has long emphasized the importance of managers for the outcomes achieved by companies. From a resource-based perspective, managers are a key resource for firms in a competitive environment (Barney, 1991). More able managers, as a type of human capital, add value and uniqueness and provide a source of sustained competitive advantage (Barney, 1991; Barney & Wright, 1998; Datta et al., 2005; Ferguson & Reio Jr, 2010; S. Kim et al., 2010; Schuler & MacMillan, 1984; Ulrich, 1991; Wright & McMahan, 1992; Wright et al., 1994) because they possess skills, experience, and knowledge that have economic value to firms (Cascio, 1991; Parnes, 1984; Schultz, 1960; Snell & Dean Jr, 1992; Wallace & Fay, 1988) and make superior resource allocation decisions that are unique to each firm (Penrose, 1959). The composition of the human capital resource pool (i.e., skills and abilities) can have an important impact on firm-level outcomes such as performance (Wright & McMahan, 1992).

In addition, upper echelons theory suggests that individual managers have a significant influence on corporate policies and activities (Hambrick, 2007; Hambrick & Mason, 1984). Bertrand and Schoar (2003) provide evidence that managers can influence their organization's behaviour and performance and find that a significant amount of the heterogeneity in investment, financial and organizational practices of firms can be explained by the presence of manager fixed effects. This stream of literature provides consistent evidence that managers matter for firm-level decisions and performance.

Existing literature has documented that managerial ability has a distinct effect on a firm's financial reporting quality and earnings quality (Demerjian et al., 2013; Huang & Sun, 2017; Wang, Chen, Chin, & Zheng, 2017), earnings management activities (Skousen, Sun, & Wu, 2019), accounting and disclosure policies (Abernathy et al., 2018; Baik et al., 2011; Luo & Zhou, 2017; Sun, 2016), information environment (Baik et al., 2018), tax avoidance behaviour (Koester, Shevlin, & Wangerin, 2017), investment practices (Andreou et al., 2017; Gan, 2019; García-Sánchez & García-Meca, 2018; Habib & Hasan, 2017; Lee, Wang, Chiu, & Tien, 2018), risk-taking behaviour (Andreou et al., 2016; Yung & Chen, 2018), innovation activities (Chen, Podolski, & Veeraraghavan, 2015), credit ratings (Bonsall, Holzman, & Miller, 2017; Cornaggia, Krishnan, & Wang, 2017), structure and pricing of debt (Bui, Chen, Hasan, & Lin, 2018; De Franco, Hope, & Lu, 2017; Petkevich & Prevost, 2018), dividend policies (Guan, Li, & Ma, 2018; Jiraporn, Leelalai, & Tong, 2016); audit fees (Gul, Khedmati, Lim, & Navissi, 2018; Li & Luo, 2017); firm performance (Banker, Darrough, Huang, & Plehn-Dujowich, 2013; Chen & Lin, 2018; Cox, 2017; Demerjian et al., 2012; Francis, Hasan, Mani, & Ye, 2016), and corporate social and responsibility (CSR) performance (Chatjuthamard, Jiraporn, Tong, & Singh, 2016; García-Sánchez, Hussain, & Martínez-Ferrero, 2019; Yuan, Tian, Lu, & Yu, 2019).

To summarize, managers have a significant influence on corporate policies and activities and their ability to understand and make effective use of firm resources is an important factor that determines corporate policies, activities, and outcomes.

3.3.2 Managerial Ability and Labour Investment Efficiency

Managers have heterogeneous abilities and managerial characteristics have an important impact on firms' investment decisions and practices (e.g., Andreou et al., 2017; Barker & Mueller, 2002; Bertrand & Schoar, 2003; Gan, 2019; Habib & Hasan, 2017; Hirshleifer, Low, & Teoh, 2012; Huang-Meier, Lambertides, & Steeley, 2016; Lee et al., 2018; Malmendier & Tate, 2005; Yung & Chen, 2018).

Early studies use different but less precise proxies for managerial ability, such as age, education, tenure, media citations, prior industry-adjusted stock returns, relative pay and so on (Barker & Mueller, 2002; Bertrand & Schoar, 2003; Chang, Dasgupta, & Hilary, 2010; Fee & Hadlock, 2003; Malmendier & Tate, 2009; Milbourn, 2003; Rajgopal, Shevlin, & Zamora, 2006). For instance, Barker and Mueller (2002) examine the relationship between CEO characteristics and firm R&D expenditures and find that the level of R&D is negatively associated with CEO age but is positively associated with career experience, advanced science-related degrees, and tenure. Bertrand and Schoar (2003) find that CEOs who hold an MBA degree tend to follow more aggressive corporate strategies, including engaging in higher levels of capital expenditures, holding more debts, and paying less dividends.

Demerjian et al. (2012) use data envelopment analysis to develop a direct measure of managerial ability based on firm efficiency in transforming corporate resources into revenues. This measure parses out key firm-specific drivers of efficiency and focuses on managerial ability. Assessing managers' ability based on efficiency is "intuitively appealing as it is more in line with the overarching goal of profit-maximizing firms" (Demerjian et al., 2012, p. 1230).

Recent studies have used the managerial ability measure developed by Demerjian et al. (2012) to investigate the impact of ability on firms' investment decisions and practices, but the findings are mixed. Andreou et al. (2017) examine managerial ability and corporate investment policies during the 2008 global financial crisis and find a strong positive relationship between pre-crisis managerial ability and crisis-period capital expenditures, indicating that high managerial ability mitigates under-investment problems commonly found in a crisis. Gan (2019) investigates whether managerial ability contributes to improved corporate investment efficiency and finds evidence that more able CEOs increase (decrease) capital expenditures, acquisition expenditures, and total investments when firms are more prone to under-investment (over-investment).

García-Sánchez and García-Meca (2018) examine the influence of managerial ability on investment efficiency and find that managerial ability is an economically relevant determinant of investment efficiency, resulting in lower levels of underinvestment and overinvestment. Additionally, the benefits of higher ability managers for investment efficiency are reinforced when governance mechanisms are effective for constraining inefficient investment decisions. Lee et al.

(2018) examine the effects of managerial ability on corporate investment opportunities using data on U.S. industrial firms and find that managers with superior ability obtain more favourable investment opportunities but this relationship is only significant in financially unconstrained firms or firms in a strong financial position. These results suggest that higher managerial ability leads to more efficient corporate investment and that having more able managers mitigates the problems of under- and over-investment, which are the two sources of investment inefficiency.

On the contrary, Habib and Hasan (2017) find that more able managers tend to over-invest and that future stock price crash risk increases for firms with more able managers, primarily through the investment inefficiency channel. They interpret this finding as more able mangers overemphasizing their personal career enhancement and taking actions that may worsen agency costs.

Based on the arguments made by Francis, Huang, Rajgopal, and Zang (2008) and Habib and Hasan (2017), two theories can be used to predict the relationship between managerial ability and labour investment efficiency. First, from an "efficient contracting" perspective, more able managers are expected to make more efficient investment in labour because managers with higher ability are better able to identify investment opportunities (Demerjian et al., 2012), and are more able to "synthesize information into reliable forward-looking estimates regarding the risks and returns associated with corporate investment" (Habib & Hasan, 2017, p. 264). In addition, more able managers may obtain more precise information on investment opportunities, better recognize market trends and industry context, better understand their firms' strategies, products, routines, and operating environment, employ better evaluation techniques, make better judgement, and predict demand changes more accurately (Boeker, 1989; Demerjian et al., 2012; Holcomb, Holmes, & Connelly, 2009; Kor, 2003; Lee et al., 2018; Spreitzer, McCall, & Mahoney, 1997; Trueman, 1986), and thus identify more favorable investment opportunities and make better decisions concerning labour investments that best fit firms' operating characteristics and strategic plans (Gan, 2019; Koester et al., 2017).

In contrast, the "rent extraction" perspective argues that self-interested managers may concentrate on their own personal welfare and make decisions that are not in the best interests of shareholders (Jensen, 1986; Jensen & Meckling, 1976) and that harm labour investment opportunities (Graham, Harvey, & Puri, 2013). For example, more able managers may also be over-confident, and therefore may under-estimate risks associated with and over-estimate the return payoffs from corporate investment. Empirical evidence suggests that over-confident CEOs tend to over-invest because they over-estimate payoffs from investment projects (Malmendier & Tate, 2005, 2008), which can lead to distortions in corporate investment decisions (Malmendier & Tate, 2005), and result in value-destroying mergers (Malmendier & Tate, 2008). In addition, managerial "empire building", which refers to managers' tendencies to grow the firm beyond its optimal size or to maintain slack resources in order to gain personal utility from status, power, and compensation (Chen, Lu, & Sougiannis, 2012; Hope & Thomas, 2008; Jensen, 1986; Masulis, Wang, & Xie, 2007; Stulz, 1990), may motivate managers to over-hire or under-fire employees. This may be especially true for higher ability managers that are concerned about their reputation and status, and such behaviours may result in deviations from the efficient level of investment in labour.

Because managerial ability has a direct effect on labour investment efficiency under the efficient contracting perspective and a less direct effect under the rent extraction perspective, we make the following hypothesis:

H1: Managerial ability is positively associated with labour investment efficiency.

Deviations from the efficient level of investment in labour are costly to firms and can harm future performance. For instance, Jung et al. (2014) documented that inefficient labour investments are negatively related to future performance, such as return on assets. More able managers may recognize market trends and industry context and predict demand changes more accurately, and thus align resources more quickly with the environment in which they operate (Andreou et al., 2017). In addition, higher ability managers may be better able to generate greater productivity from and make effective use of acquired labour, thus contributing to better performance. This suggests that higher ability managers may be better able to recover from over- or under-investment decisions or that such deviations will be less consequential for higher ability managers.

Therefore, we test whether the negative effects of inefficient labour investments on performance are mitigated by more able managers.

H2: Negative performance effects associated with inefficient labour investment are mitigated by higher ability managers.

3.4 Research Design

3.4.1 Measure of Labour Investment Efficiency

To measure labour investment efficiency, we first regress firms' net hiring (change in the number of employees) on several explanatory variables capturing underlying economic fundamentals following Pinnuck and Lillis (2007) and Jung et al. (2014) detailed in model (1). The difference between the actual change in a firms' labour force and the expected change based on fundamental economic factors, represents the abnormal net hiring: abnormal net hiring = actual net hiring – expected net hiring. The abnormal net hiring, or the absolute value of the residual from model (1), is our primary measure of labour investment inefficiency.

$$
\begin{aligned}
Net\ Hire_{it} = {} & \beta_0 + \beta_1 Sales\ Growth_{it-1} + \beta_2 Sales\ Growth_{it} + \beta_3 \Delta ROA_{it} + \beta_4 \Delta ROA_{it-1} \\
& + \beta_5 ROA_{it} + \beta_6 Return_{it} + \beta_7 Size\_R_{it-1} + \beta_8 Quick_{it-1} + \beta_9 \Delta Quick_{it-1} \\
& + \beta_{10} \Delta Quick_{it} + \beta_{11} Lev_{it-1} + \beta_{12} LossBin1_{it-1} + \beta_{13} LossBin2_{it-1} \\
& + \beta_{14} LossBin3_{it-1} + \beta_{15} LossBin4_{it-1} + \beta_{16} LossBin5_{it-1} + Industry \\
& + \varepsilon_{it} \qquad (1)
\end{aligned}
$$

where *Net Hire* is the percentage change in employees; *Sales Growth* is the percentage change in sales revenue; *ROA* is net income scaled by total assets at the beginning of the fiscal year; *Return* is the annual buy-and-hold stock return, *Size_R* is the log of market value of equity, ranked into percentiles; *Quick* is the ratio of cash and short-term investments plus receivables to current liabilities; *Lev* is the ratio of long-term debt to total assets; and the *LossBin* variables are five separate loss bin indicators for each 0.005 interval of *ROA* from 0 to -0.025 (i.e., *LossBin1* is equal to 1 if *ROA* is between -0.005 and 0, *LossBin2* is equal to 1 if *ROA* is between -0.010 and -0.005, and so on)[14].

The estimated model includes industry fixed effects based on the 48-industry classification scheme of Fama and French (1997). All standard errors are corrected for firm-level clustering. Definitions of all variables, including COMPUSTAT variable names, are provided in Table 3.1. After model (1) is estimated, the absolute value of the residual, |*Ab Net Hire*|, is obtained and used as our primary measure of labour investment inefficiency. It captures the deviation of actual hiring from the expected hiring. This measure has been used in previous studies to examine the relationship between labour investment efficiency and financial reporting quality (Jung et al., 2014), stock price informativeness (Ben-Nasr & Alshwer, 2016), and conditional conservatism (Ha & Feng, 2018).

[14] Loss bins are included to control for the fundamental economic characteristics of the firm in the small loss bins. Pinnuck and Lillis (2007) included both profit bins and loss bins, but later Jung et al. (2014) removed profit bins and only kept loss bins.

3.4.2 Measure of Managerial Ability

We employ the managerial ability measure developed by Demerjian et al. (2012) using data envelopment analysis (DEA). They provide a measure of how efficiently mangers use corporate resources to generate revenues. To obtain this ability measure, Demerjian et al. (2012) use the two-stage DEA-based estimation approach (Banker & Natarajan, 2008). In the first stage, firm efficiency is estimated by comparing the sales generated by each firm, conditional on the following inputs used: cost of goods sold (*CoGS*), selling, general and administrative expenses (*SG&A*), net plant, property and equipment (*PP&E*), net operating leases (*OpLease*), net research and development (*R&D*), purchased goodwill (*Goodwill*), and other intangible assets (*OtherIntan*). It assumes that efficient firms are those that generate more revenues from these resources (i.e., maximize the efficiency of the resources used).

Demerjian et al. (2012) use DEA to solve the following optimization problem:

$$Max_v \theta = \frac{Sales}{v_1 CoGS + v_2 SG\&A + v_3 PP\&E + v_4 OpLease + v_5 R\&D + v_6 Goodwill + v_7 OnterIntan}$$

The efficiency measure that DEA produces, θ, takes a value between 0 and 1. Observations with a value of 1 are the most efficient and form a frontier of efficient set of possible input combinations. Observations with efficiency measures less than 1 fall below the frontier.

The efficiency measure generated by the DEA estimation in the first stage is attributable to both firm-specific and manager-specific efficiency drivers, and thus it may over- or under-state managerial ability. Demerjian et al. (2012) therefore estimate a second stage regression to take out key firm-specific characteristics that aid or hinder management’s efforts, including firm size (*Ln(Total Assets)*), market share (*Market Share*), positive free cash flow (*Free Cash Flow*

Indicator), firm age (*Ln(Age)*), complex multi-segment (*Business Segment Concentration*), and international operations (*Foreign Currency Indicator*).

$$\begin{aligned} Firm\ Efficiency_{it} &= \beta_0 + \beta_1 Ln(Total\ Assets)_{it} + \beta_2 Market\ Share_{it} \\ &+ \beta_3 Free\ Cash\ Flow\ Indicator_{it} + \beta_4 Ln(Age)_{it} \\ &+ \beta_5 Business\ Segment\ Concentration_{it} + \beta_6 Foreign\ Currency\ Indicator_{it} \\ &+ Year + \varepsilon_{it} \end{aligned}$$

The residual from this estimation is the measure of managerial ability, which is attributable to the management team.[15] By doing so, firm-specific factors that may affect both managerial ability and labour investment efficiency are excluded from the ability measure, thus mitigating the potential endogeneity concern. To make this measure more comparable across time and industries and to mitigate the influence of extreme observations, decile ranks of managerial ability by year and industry are created and are used as our primary measure of managerial ability (*Ability*)[16].

3.4.3 Empirical Model

Model (2) below is estimated to test H1:

$$\begin{aligned} |Ab\ Net\ Hire|_{it} &= \beta_0 + \beta_1 Ability_{it-1} + \beta_2 AQ_{it-1} + \beta_3 MTB_{it-1} + \beta_4 Size_{it-1} + \beta_5 Quick_{it-1} \\ &+ \beta_6 Lev_{it-1} + \beta_7 Divdend_{it-1} + \beta_8 Std\ CFO_{it-1} + \beta_9 Std\ Sales_{it-1} \\ &+ \beta_{10} Tangible_{it-1} + \beta_{11} Loss_{it-1} + \beta_{12} Institution_{it-1} + \beta_{13} Std\ Net\ Hire_{it-1} \\ &+ \beta_{14} Labour\ Intensity_{it-1} + \beta_{15} |Ab\ Invest\ Other|_{it} + Industry + Year \\ &+ \varepsilon_{it} \qquad (2) \end{aligned}$$

where |*Ab Net Hire*| is the measure of labour investment inefficiency as estimated in model (1); *Ability* is the decile ranks of managerial ability as developed by Demerjian et al. (2012) by year and industry. We use the one-year lagged *Ability* to mitigate the potential endogeneity problem (unobserved contemporaneous factors that affect ability and labour investment efficiency).

[15] For a detailed construction of the measure of managerial ability, please refer to Demerjian et al. (2012).
[16] The results in this study are similar using a continuous variable for managerial ability.

Following the prior literature (e.g., G. C. Biddle et al., 2009; Ha & Feng, 2018; Jung et al., 2014), we control for the following variables that are found previously to be associated with investment more generally. Accounting quality (*AQ*) is based on the Dechow and Dichev (2002) model as modified by McNichols (2002) and Francis, LaFond, Olsson, and Schipper (2005). Higher accounting quality may facilitate more efficient investments in labour by mitigating market frictions that come from information asymmetry between managers and outside capital suppliers. Growth opportunities (*MTB*) is measured as the ratio of market to book value of common equity. Firms with more growth opportunities may have easier access to external financing to make investments. Firm size (*Size*) is the natural logarithm of market value of equity. Larger firms may have the capacity to carry out more investments. Liquidity (*Quick*) and leverage (*Lev*) are as previously defined. Low liquidity and high leverage may constrain firms from making efficient investments and lead to potential distortions in investments. Dividend payout (*Dividend*) is an indicator variable for firms' dividend payout. Dividend payout suggests the degree of financial constraint which determines investment decisions. Cash flow volatilities (*Std CFO*) and sales volatilities (*Std Sales*) are the standard deviation of cash flow from operations and the standard deviation of sales revenue over the periods from t - 4 to t. Tangibility (*Tangible*) is the ratio of property, plant, and equipment to total assets. Incidence of losses (*Loss*) is an indicator variable for reported loss. We also control for potential monitoring role of institutional owners by including the institutional ownership (*Institution*).

In addition, we include firms' net hiring volatility (*Std Net Hire*), measured by the standard deviation of the percentage change in employees from t - 4 to t, and labour intensity (*Labour Intensity*), the ratio of employees to total assets, to control for how much flexibility managers can exercise in hiring decisions (Jung et al., 2014). Finally, we control for abnormal other investments

(|*Ab Invest Other*|) to capture any indirect effect from other investment decisions on abnormal net hiring (Jung et al., 2014). |*Ab Invest Other*| represents the extent to which non-labour investments deviate from their expected level. The expected non-labour investment level is estimated using the following model (G. C. Biddle et al., 2009): $Invest\ Other_{it} = \beta_0 + \beta_1 Sales\ Growth_{it-1} + \varepsilon_{it}$, where *Invest Other* is the sum of capital expenditures, acquisition expenditures, and research and development (R&D) expenditures, less cash receipts from the sale of property, plant, and equipment, scaled by lagged total assets, and *Sales Growth* is as previously defined. The model is estimated for each industry-year based on Fama and French (1997) 48-industry groups with at least 20 observations in a given year. |*Ab Invest Other*| is the absolute value of the residual from this regression. Model (2) is estimated with industry and year fixed effects to control for year- and industry-specific shocks to investments, and all standard errors are corrected for firm-level clustering.

To test H2, we follow Jung et al. (2014) and Ha and Feng (2018) and examine the relationship between managerial ability, abnormal net hiring, and future firm performance, controlling for expected change in profitability unrelated to labour concerns. We estimate the following model (3):

$$\begin{aligned}\Delta ROA_{t+1}\ or\ Average\ \Delta ROA_{t+1,t+2,t+3} &= \beta_0 + \beta_1 Ability_{it} + \beta_2 |Ab\ Net\ Hire|_{it} + \beta_3 Ability_{it} \times |Ab\ Net\ Hire|_{it} + (\gamma_1 \\ &+ \gamma_2 NegDFE_{it} + \gamma_3 NegDFE_{it} \times DFE_{it} + \gamma_4 PosDFE_{it} \times DFE_{it}) \times DFE_{it} + (\delta_1 \\ &+ \delta_2 NegCE_{it} + \delta_3 NegCE_{it} \times CE_{it} + \delta_4 PosCE_{it} \times CE_{it}) \times CE_{it} + Industry \\ &+ Year + \varepsilon_{it} \qquad (3)\end{aligned}$$

where *DFE* is the difference between *ROA* and *E[ROA]*, and *E[ROA]* is the fitted value from a cross-sectional regression of *ROA* on the natural logarithm of total assets (TA_{it-1}), the market-to-book ratio of equity (MTB_{it-1}), ROA_{it-1}, and industry dummies; *PosDFE* (*NegDFE*) is a dummy variable that takes the value of 1 for positive (negative) *DFE*; *CE* is the change in *ROA* from *t* - 1 to *t*; *PosCE* (*NegCE*) is a dummy variable that takes the value of 1 for positive (negative) *CE*. The dependent variable ΔROA is one-year ahead change in *ROA*, and *Average* ΔROA is the average change in *ROA* over the next three years. Industry and year fixed effects are controlled, and all standard errors are corrected for firm-level clustering.

3.5 Sample and Estimation of Abnormal Net Hiring

3.5.1 Sample

We obtain financial statement data from COMPUSTAT and stock return data from the Center for Research in Security Prices (CRSP). The managerial ability data are made available yearly by Demerjian et al. (2012)[17] and institutional shareholding information is obtained from Thomson-Reuters Institutional Holdings (13F) Database.

Our initial sample consists of all 107,596 firm-year observations from 1989 to 2016 with the necessary information in COMPUSTAT and CRSP to estimate the level of expected net hiring using model (1). The number of observations used to estimate model (2) is reduced to 54,975 because of the availability of the explanatory variables. The sample period begins in 1989 because it is the first year the Statement of Cash Flows was available for all firms, and it ends in 2016 because of the availability of the managerial ability measure.

To mitigate the influence of outliers, all continuous variables are winsorized at the 1st and 99th percentiles of their respective distributions.

3.5.2 Estimation of Abnormal Net Hiring

To measure labour investment efficiency, we first estimate the expected abnormal net hiring based on model (1). Panel A of Table 3.2 reports the descriptive statistics for the variables

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[17] The managerial ability data are available at: http://faculty.washington.edu/pdemerj/data.html.

used in (1). The regression results of model (1) are presented in panel B of Table 3.2. The results are consistent with those in Pinnuck and Lillis (2007). The absolute values of the residuals (|*Ab Net Hire*|) from model (1) are obtained and used as our primary measure for abnormal net hiring, or labour investment inefficiency.

3.6 Empirical Results

3.6.1 Descriptive Statistics

Descriptive statistics for the variables included in model (2) are reported in panel A of Table 3.3. The mean (median) values of the primary variables, |*Abs Net Hire*| and *Ability*, are 0.153 (0.090) and 0.558 (0.600), generally consistent with the previous literature (e.g., Ha & Feng, 2018; Jung et al., 2014).

Correlations of variables in model (2) are provided in panel B of Table 3.3. *Ability* and |*Abs Net Hire*| are negatively correlated at -0.034 ($p < 0.01$), providing initial evidence that higher managerial ability is associated with smaller deviations from expected hiring.

3.6.2 Regression Results

Results of estimating model (2) for the full sample are reported in column (1) of Table 3.4. The estimated coefficient on *Ability* is negative and significant ($\beta = -0.040$, $p < 0.01$), indicating that higher managerial ability is associated with smaller deviations from expected net hiring. This result suggests that more able managers make better net hiring decisions, meaning more efficient investment in labour.

Consistent with Jung et al. (2014) and Ha and Feng (2018), the estimated coefficient on accounting quality (*AQ*) is negative and significant ($\beta = -0.003$, $p < 0.01$), suggesting that higher accounting quality facilitates more efficient net hiring practices by potentially mitigating market frictions that come from information asymmetry between managers and outside capital suppliers.

For instance, higher reporting quality may reduce agency conflicts by enhancing the monitoring abilities of investors and other outsiders. With regards to other firm characteristics, firm size (*Size*) is significantly and negatively associated with labour investment inefficiency (β = -0.005, $p < 0.01$), suggesting that firms with larger size tend to make more efficient investments in labour. Liquidity (*Quick*) (β = 0.006, $p < 0.01$) and leverage (*Lev*) (β = 0.019, $p < 0.01$) are positively and significantly associated with abnormal net hiring, suggesting that firms with higher liquidity and higher leverage make less efficient investment in labour. The positive relationship between liquidity and inefficiency suggests that more liquid firms tend to over-invest (Hoshi, Kashyap, & Scharfstein, 1991), whereas higher leverage firms may under-invest. Dividend payout (*Dividend*) and abnormal net hiring have a negative and significant relationship (β = -0.009, $p < 0.01$), indicating that firms that pay dividends make more efficient labour investments. In addition, firms with greater volatilities of operating cash flows (*Std CFO*) (β = 0.023, $p < 0.05$), sales (*Std Sales*) (β = 0.043, $p < 0.01$), and net hiring (*Std Net Hire*) (β = 0.029, $p < 0.01$) make less efficient labour investments. Incurrence of loss (*Loss*) (β = 0.013, $p < 0.01$) also reduces labour investment efficiency. Finally, firms with fewer tangible assets (*Tangible*) (β = -0.085, $p < 0.01$), less institutional ownership (*Institution*) (β = -0.029, $p < 0.01$), and lower labour intensity (*Labour Intensity*) (β = -0.639, $p < 0.01$) tend to make less efficient investments in labour. These results are consistent with findings in the previous literature (e.g., Jung et al., 2014).

We further examine the relationship between managerial ability and labour investment efficiency for the over-investment (positive abnormal net hiring, i.e., actual net hiring is greater than the expected level) and under-investment (negative abnormal net hiring, i.e., actual net hiring is less than the expected level) sub-samples. The results are reported in column (2) and (3) of Table 3.4. The estimated coefficient on *Ability* is negative and significant for both the over-investment

(β = -0.043, $p < 0.01$) and the under-investment (β = -0.031, $p < 0.01$) sub-samples, indicating that higher-ability managers are better able to overcome over- and under-investment in labour, thus improving labour investment efficiency.

Table 3.5 reports the results of estimating model (2) separately for four sub-samples. Over-hiring is the case where actual net hiring is higher than the expected level (positive abnormal net hiring), when expected net hiring is positive. Under-firing is the case where actual net hiring is higher than the expected level (positive abnormal net hiring), when expected net hiring is negative. Under-hiring is the case where actual net hiring is lower than the expected level (negative abnormal net hiring), when expected net hiring is positive. Over-firing is the case where actual net hiring is higher than the expected level (negative abnormal net hiring), when expected net hiring is negative. Both over-hiring and under-firing represent over-investment in labour, and under-hiring and over-firing represent under-investment in labour. Below is an illustration of how the four sub-samples are defined:

	Positive Abnormal Net Hiring	*Negative Abnormal Net Hiring*
Positive Expected Net Hiring	Over-hiring (Over-investment)	Under-hiring (Under-investment)
Negative Expected Net Hiring	Under-firing (Over-investment)	Over-firing (Under-investment)

In the case of over-hiring, under-firing, and under-hiring, *Ability* is negatively and significantly associated with investment inefficiency. This suggests that the relationship between managerial ability and labour investment inefficiency in general, and in over-investment and under-investment scenarios specifically, holds in different periods of expected expansion and expected contraction. The question why higher ability does not reduce over-firing is interesting and may be addressed in future research.

3.6.3 Alternative Proxies for Labour Investment Efficiency

We consider three alternative proxies for labour investment efficiency to examine the robustness of the main results. Following Jung et al. (2014), we first use the median level of net hiring in a firm's industry in a specific year as the expected level of net hiring in estimating the abnormal net hiring of a firm in a given year.[18] As a result, the abnormal net hiring is equal to the difference between firms' actual net hiring and industry-year median of net hiring.

Second, we adjust model (1) to include only $Sales\ Growth_{it-1}$ as the independent variable to estimate the expected level of net hiring and abnormal net hiring. The modified model (1) thus becomes: $Net\ Hire_{it} = \beta_0 + \beta_1 Sales\ Growth_{it-1} + \varepsilon_{it}$, and the residuals from this estimation is used as the proxy for abnormal net hiring.

Third, we estimate model (1) separately for each industry based on the 48-industry classification of Fama and French (1997) and use the residuals from industry-specific estimations as the proxy for abnormal net hiring.

Table 3.6 reports the results of estimating model (2) using the three different proxies for abnormal net hiring, or labour investment inefficiency, as described above. The results are robust and are very similar to the results using the primary measure of abnormal net hiring estimated from model (1).

3.6.4 Controlling for Other Non-Labour Investments

Although the main regression model (2) already includes the control variable of other abnormal investments (|*Ab Invest Other*|), we further examine the effect of other investments (sum of capital expenditures, acquisition expenditures, and R&D expenditures, less cash receipts from the sale of property, plant, and equipment) on the results more closely. To ensure that the results

[18] This means homogeneity in resource mix across firms in an industry, which may not be the case.

are not attributable to other non-labour investments, we conduct an additional test by dividing the full sample into two sub-samples based on the relationship between net hiring and change in other investments. If a firm increases or decreases both net hiring and other investments simultaneously, then the two have a positive relationship (more likely to be complements). If a firm increases one type of investment but decreases the other, then the two have a negative relationship (more likely to be substitutes) (Jung et al., 2014). Model (2) is then estimated separately for the two sub-samples.

The results are presented in Table 3.7. If the main results are driven by other investments, then the negative relationship between managerial ability and abnormal net hiring should only be found in the sub-sample with net hiring positively associated with a change in other investments. The results in Table 3.7 show that the negative relationship holds in both sub-samples, suggesting that the main results are not driven by other contemporaneous investments, thus providing supplementary evidence that supports the main results.

3.6.5 Managerial Ability, Abnormal Net Hiring, and Future Performance

The results of estimating model (3) are presented in Table 3.8. Columns (1) and (3) report the effect of abnormal net hiring on one-year ahead ΔROA. The column (1) results show that the estimated coefficient on *|Ab Net Hire|* is negative and significant (β = -0.086, $p < 0.01$), indicating that deviations from expected hiring are associated with lower future profitability, as documented in the previous literature (Jung et al., 2014). Column (3) reports the moderating role of managerial ability. The coefficient on the interaction between ability and abnormal net hire (*Ability* × *|Ab Net Hire|*) is positive and significant (β = 0.161, $p < 0.01$), indicating that managerial ability mitigates the negative impact of investment inefficiency on future ΔROA. These results also hold in columns (2) and (4) where the dependent variable is the average ΔROA over the next three periods (t + 1 to *t* + 3). Overall, these results indicate that deviations from optimal net hiring have a negative impact on firm's future performance, but this negative impact is mitigated by managerial ability.

We further estimate model (3) separately for the over-investment (positive abnormal net hiring) and under-investment (negative abnormal net hiring) sub-samples. The results are reported in Tables 3.9 and 3.10. The estimated coefficient on |*Ab Net Hire*| is negative and significant, and the coefficient on the interaction between ability and abnormal net hire (*Ability* × |*Ab Net Hire*|) is positive and significant for both the over-investment and the under-investment sub-samples, consistent with findings for the full sample. Thus, we see that higher ability managers utilize acquired labour more effectively than their peers. If they over-invest in labour, they either take better advantage of the excess labour or they remove labour more quickly than their peers. If they under-invest in labour, they are either able to generate higher performance with less labour or they add labour more quickly than their peers.

3.7 Conclusions

This study examines the effect of managerial ability revealed through past performance on future firm performance outcomes attributable to current labour investment and management decisions. The results indicate that higher ability managers make more efficient investments in labour as represented by smaller deviations from expected net hiring. This finding holds when using alternative measures of labour investment efficiency and is robust to controlling for factors that may affect the efficiency of net hiring practices, including financial reporting quality, institutional ownership, and other investments. The relationship between managerial ability and labour investment efficiency is further investigated for the over-investment and under-investment sub-samples, and the results indicate that higher ability is associated with less over-investment and less under-investment in labour (smaller deviation of actual net hiring from the expected level).

Therefore, managers of higher ability are better able to overcome "empire-building" tendencies to over-invest and "risk or loss-aversion" tendencies to under-invest in labour.

The study replicates evidence that abnormal net hiring, or labour investment inefficiency, is negatively associated with future firm performance, indicating that deviation from the expected level of net hiring is costly in terms of future firm performance. It then shows that this negative impact of deviations is mitigated by managerial ability, providing evidence that higher ability managers either anticipate labour needs or utilize acquired labour more effectively. This result holds whether deviations from expected hiring are positive or negative.

We recognize the potential endogeneity concern of using a managerial ability measure derived using data envelopment analysis to evaluate whether higher ability managers make more efficient investment and use of acquired resources. However, the intent of the study is to provide evidence about the ways that higher ability managers use a specific type of resource, labour, to generate higher returns on invested capital. In particular, we make specific contributions to understanding management qualities that are associated with higher managerial ability, including more accurate appraisal of investment opportunities, avoidance of agency tendencies to over or under-invest, and utilization of acquired resources. Future research may investigate various supporting mechanisms that help link managerial ability to superior performance, such as the quality of internal accounting systems or the use of team and individual incentives.

Table 3.1 Variable Definitions

Variable	Description (COMPUSTAT data items in parentheses)
Model (1) Variables:	
Net Hire	Annual percentage change in the number of employees (emp).
Sales Growth	Annual percentage change in sales revenue (revt).
ROA	Return on assets (ni / lag(at)).
Δ*ROA*	Change in *ROA* from *t* - 1 to *t*.
Return	Buy-and-hold stock returns during the fiscal year.
Size	Natural logarithm of market value (csho * prcc_f).
Size_R	Percentile rank of *SIZE*.
Quick	Quick ratio ((che + rect) / lct).
Δ*Quick*	Annual percentage change in *Quick*.
Lev	Leverage, measured as the sum of debt in current liabilities and total long-term debt, divided by total assets ((lct + dltt) / at).
LossBin1	Equals 1 if ROA is between -0.005 and 0, and 0 otherwise.
LossBin2	Equals 1 if ROA is between -0.010 and -0.005, and 0 otherwise.
LossBin3	Equals 1 if ROA is between -0.015 and -0.010, and 0 otherwise.
LossBin4	Equals 1 if ROA is between -0.020 and -0.015, and 0 otherwise.
LossBin5	Equals 1 if ROA is between -0.025 and -0.020, and 0 otherwise.
Model (2) Variables:	
|*Ab Net Hire*|	The absolute values of residuals from estimating model (1).
Ability	The managerial ability measure as developed by Demerjian et al. (2012), ranked into deciles by industry and year.
AQ	Accounting quality measure based on the Dechow and Dechev (2002) model as modified by McNichols (2002) and Francis et al. (2005). The model is $WCA_{it} = \beta_0 + \beta_1 OCF_{it-1} + \beta_2 OCF_{it} + \beta_3 OCF_{it+1} + \beta_4 \Delta Revenue_{it} + \beta_5 PP\&E_{it} + \varepsilon_{it}$, where *WCA* is working capital accruals ((act - lag(act)) - (lct - lag(lct)) - cash + stdebt) / lag(at)), *OCF* is cash flows from operations ((ni + dp + (lct - lag(lct)) - (act - lag(act)) / lag(at)), Δ*Revenue* is annual percentage change in revenue (rect), and *PP&E* is gross value of property, plant, and equipment scaled by lagged total assets (ppegt / lag(at)). The model is then estimated for each industry-year based on Fama and French (1997) 48-industry groups with at least 20 observations in a given year. The residuals from the regressions are obtained and the standard deviation of a firm's residuals are calculated over *t* - 4 to *t*. Finally, the standard deviation is multiplied by -1 (so that it increases with accounting quality) and the resulting measure is ranked into deciles by year.
MTB	Market-to-book ratio (csho * prcc_f / seq).
Dividend	Equals 1 if the firm paid dividends (dvpsp_f) during the fiscal year, and 0 otherwise.

Std CFO	Standard deviation of cash flow from operations (oancf) scaled by total assets from year *t* - 4 to *t*.
Std Sales	Standard deviation of sales (sale) scaled by total assets from year *t* - 4 to *t*.
Tangible	Property, plant, and equipment (ppent) divided by total assets.
Loss	Equals 1 if *ROA* is negative, and 0 otherwise.
Institution	Institutional shareholdings at the end of the fiscal year.
Std Net Hire	Standard deviation of change in the number of employees from *t* - 4 to *t*.
Labour Intensity	Labour intensity, measured as the number of employees divided by total assets.
|*Ab Invest Other*|	Abnormal other (non-labour) investments as in Biddle et al. (2009), 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 expenditures (capx), acquisition expenditures (aqc), and research and development expenditures (xrd), less cash receipts from the sale of property, plant, and equipment (sppe), all scaled by lagged total assets, and *Sales Growth* is as previously defined. The model is estimated for each industry-year based on Fama and French (1997) 48-industry groups with at least 20 observations in a given year.
Model (3) Variables:	
Average Δ*ROA*	Average change in ROA over the period from *t* + 1 to *t* + 3.
DFE	Difference between *ROA* and *E[ROA]*, where *E[ROA]* is the fitted value from a cross-sectional regression of *ROA* on the natural logarithm of total assets (TA_{it-1}), the market-to-book ratio of equity (MTB_{it-1}), ROA_{it-1}, and industry dummies.
PosDFE	Equals 1 if *DFE* is positive, and 0 otherwise.
NegDFE	Equals 1 if *DFE* is negative, and 0 otherwise.
CE	Change in ROA from *t* - 1 to *t*.
PosCE	Equals 1 if *CE* is positive, and 0 otherwise.
NegCE	Equals 1 if C*E* is negative, and 0 otherwise.

Table 3.2 Estimation of Abnormal Net Hiring (N = 107,596)

Panel A: Descriptive Statistics for Variables in Model (1)

Variable	Mean	Std. Dev.	Median	P25	P75
$Net\ Hire_{it}$	0.082	0.366	0.024	-0.054	0.138
$Sales\ Growth_{it}$	0.171	0.655	0.074	-0.035	0.219
$Sales\ Growth_{it-1}$	0.235	0.776	0.089	-0.020	0.253
ΔROA_{it}	0.002	0.311	-0.001	-0.049	0.035
ΔROA_{it-1}	0.014	0.375	-0.001	-0.048	0.038
ROA_{it}	-0.032	0.326	0.033	-0.048	0.083
$Return_{it}$	0.133	0.638	0.039	-0.260	0.357
$Size_{it-1}$	5.496	2.274	5.431	3.823	7.077
$Quick_{it-1}$	2.111	2.890	1.239	0.759	2.255
$\Delta Quick_{it-1}$	0.203	1.333	-0.011	-0.216	0.225
$\Delta Quick_{it}$	0.134	1.099	-0.019	-0.222	0.201
Lev_{it-1}	0.226	0.226	0.190	0.028	0.352

Panel B: Regression Results

Dependent Variable: $Net\ Hire_{it}$

Variable	Coeff.	*t*-statistic
$Sales\ Growth_{it}$	0.210***	33.684
$Sales\ Growth_{it-1}$	0.035***	12.948
ΔROA_{it}	-0.132***	-15.642
ΔROA_{it-1}	-0.033***	-6.220
ROA_{it}	0.036***	4.433
$Return_{it}$	0.067***	28.730
$Size\_R_{it-1}$	0.001***	14.833
$Quick_{it-1}$	0.006***	8.490
$\Delta Quick_{it-1}$	0.019***	12.727
$\Delta Quick_{it}$	-0.006***	-3.280
Lev_{it-1}	-0.054***	-9.247
$LossBin1_{it-1}$	-0.035***	-4.468
$LossBin2_{it-1}$	-0.030***	-3.867
$LossBin3_{it-1}$	-0.025***	-2.688
$LossBin4_{it-1}$	-0.011	-1.272
$LossBin5_{it-1}$	-0.027***	-2.843
Intercept	-0.034**	-2.236
Industry fixed effects		YES
Adj. R^2		19.04%
N		107,596

Panel B reports the results of estimating model (1).
*, **, *** indicate significance at the 10 percent, 5 percent, and 1 percent levels (two-tailed), respectively. Industry fixed effects are based on the 48-industry classification scheme of Fama and French (1997). All standard errors are corrected for firm-level clustering. All variables are defined in Table 3.1.

Table 3.3 Descriptive Statistics for Variables in Model (2) (N = 54,975)

Panel A: Descriptive Statistics					
Variable	Mean	Std. Dev.	Median	P25	P75
$\|Ab\ Net\ Hire\|_{it}$	0.153	0.208	0.090	0.041	0.177
$Ability_{it-1}$	0.558	0.274	0.600	0.300	0.800
AQ_{it-1}	5.777	2.674	6.000	4.000	8.000
MTB_{it-1}	2.939	5.201	1.947	1.142	3.432
$Size_{it-1}$	5.316	2.077	5.255	3.785	6.744
$Quick_{it-1}$	2.123	2.631	1.342	0.829	2.375
Lev_{it-1}	0.205	0.220	0.157	0.013	0.322
$Dividend_{it-1}$	0.296	0.457	0.000	0.000	1.000
$Std\ CFO_{it-1}$	0.093	0.173	0.056	0.033	0.100
$Std\ Sales_{it-1}$	0.222	0.231	0.153	0.086	0.273
$Tangible_{it-1}$	0.261	0.221	0.193	0.089	0.369
$Loss_{it-1}$	0.326	0.469	0.000	0.000	1.000
$Institution_{it-1}$	0.445	0.318	0.415	0.150	0.715
$Std\ Net\ Hire_{it-1}$	0.313	0.676	0.155	0.083	0.288
$Labour\ Intensity_{it-1}$	0.009	0.012	0.006	0.003	0.011
$\|Ab\ Invest\ Other\|_{it}$	0.111	0.130	0.077	0.037	0.141

Panel B: Pearson Correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
(1) |*Ab Net Hire*|$_{it}$	1.000															
(2) *Ability*$_{it-1}$	*-0.034*	1.000														
(3) *AQ*$_{it-1}$	*-0.107*	*0.041*	1.000													
(4) *MTB*$_{it-1}$	*0.047*	*0.091*	*-0.060*	1.000												
(5) *Size*$_{it-1}$	*-0.119*	*0.089*	*0.168*	*0.165*	1.000											
(6) *Quick*$_{it-1}$	*0.104*	*0.035*	*0.026*	*0.048*	*-0.033*	1.000										
(7) *Lev*$_{it-1}$	-0.003	*-0.167*	*-0.184*	*-0.081*	*-0.015*	*-0.283*	1.000									
(8) *Dividend*$_{it-1}$	*-0.141*	*0.055*	*0.168*	*-0.023*	*0.362*	*-0.116*	*-0.020*	1.000								
(9) *Std CFO*$_{it-1}$	*0.136*	0.004	*-0.199*	*0.108*	*-0.166*	*0.109*	*-0.047*	*-0.169*	1.000							
(10) *Std Sales*$_{it-1}$	*0.127*	*0.074*	*-0.238*	*0.045*	*-0.239*	*-0.014*	*-0.021*	*-0.186*	*0.272*	1.000						
(11) *Tangible*$_{it-1}$	*-0.058*	*-0.162*	*-0.013*	*-0.082*	*0.067*	*-0.259*	*0.297*	*0.169*	*-0.150*	*-0.181*	1.000					
(12) *Loss*$_{it-1}$	*0.122*	*-0.194*	*-0.138*	*0.025*	*-0.297*	*0.073*	*0.100*	*-0.324*	*0.198*	*0.115*	*-0.073*	1.000				
(13) *Institution*$_{it-1}$	*-0.120*	*0.010*	*0.162*	*0.044*	*0.674*	*-0.012*	*-0.039*	*0.181*	*-0.172*	*-0.206*	*-0.020*	*-0.230*	1.000			
(14) *Std Net Hire*$_{it-1}$	*0.149*	*-0.044*	*-0.168*	*0.016*	*-0.112*	-0.001	*0.073*	*-0.142*	*0.148*	*0.206*	*-0.022*	*0.120*	*-0.133*	1.000		
(15) *Labour Intensity*$_{it-1}$	*-0.037*	0.008	*0.017*	*-0.039*	*-0.207*	*-0.171*	*0.016*	*0.013*	*-0.042*	*0.130*	*0.134*	*-0.069*	*-0.136*	*0.027*	1.000	
(16) |*Ab Invest Other*|$_{it}$	*0.293*	*0.068*	*-0.064*	*0.154*	*0.046*	*0.104*	*-0.100*	*-0.135*	*0.154*	*0.012*	-0.002	*0.076*	*0.011*	*0.013*	*-0.072*	1.000

In panel B, italic font denotes correlations that are statistically significant at $p < 0.05$.

Table 3.4 The Effect of Managerial Ability on Labour Investment Efficiency

Dependent Variable: Abnormal Net Hiring $\|Ab\ Net\ Hire\|_{it}$			
	(1)	(2)	(3)
		Over-Investment in Labour	Under-Investment in Labour
Variables	Full Sample	Abnormal Net Hiring > 0	Abnormal Net Hiring < 0
$Ability_{it-1}$	-0.040***	-0.043***	-0.031***
	(-10.401)	(-5.661)	(-9.530)
AQ_{it-1}	-0.003***	-0.004***	-0.001***
	(-6.280)	(-5.129)	(-4.224)
MTB_{it-1}	0.000	0.001**	-0.000
	(1.050)	(2.082)	(-1.603)
$Size_{it-1}$	-0.005***	-0.008***	-0.002***
	(-6.483)	(-5.629)	(-3.075)
$Quick_{it-1}$	0.006***	0.009***	0.004***
	(11.002)	(7.264)	(9.911)
Lev_{it-1}	0.019***	0.033***	-0.007
	(3.356)	(3.224)	(-1.518)
$Dividend_{it-1}$	-0.009***	-0.016***	-0.005***
	(-3.838)	(-3.375)	(-2.833)
$Std\ CFO_{it-1}$	0.023**	0.002	0.052***
	(2.216)	(0.108)	(5.014)
$Std\ Sales_{it-1}$	0.043***	0.053***	0.024***
	(6.550)	(4.707)	(4.168)
$Tangible_{it-1}$	-0.085***	-0.118***	-0.043***
	(-11.272)	(-7.928)	(-7.053)
$Loss_{it-1}$	0.013***	-0.015***	0.042***
	(5.673)	(-3.210)	(22.717)
$Institution_{it-1}$	-0.029***	-0.043***	-0.025***
	(-6.527)	(-4.771)	(-7.306)
$Std\ Net\ Hire_{it-1}$	0.029***	0.035***	0.023***
	(11.621)	(7.544)	(10.785)
$Labour\ Intensity_{it-1}$	-0.639***	-1.829***	0.164
	(-4.320)	(-5.745)	(1.592)
$\|Ab\ Invest\ Other\|_{it}$	0.348***	0.466***	0.035***
	(30.676)	(31.693)	(3.188)
Intercept	0.193***	0.288***	0.129***
	(6.848)	(5.832)	(7.005)
Year FE	YES	YES	YES
Industry FE	YES	YES	YES
Adj. R^2	15.4%	18.8%	14.7%
N	54,975	21,331	33,644

Table 3.4 reports the results of estimating model (2). Results are for the full sample and for the over-investment (actual net hiring greater than expected) and under-investment (actual net hiring less than expected) sub-samples.
*, **, *** indicate significance at the 10 percent, 5 percent, and 1 percent levels (two-tailed), respectively. Industry fixed effects are based on the 48-industry classification scheme of Fama and French (1997). All standard errors are corrected for firm-level clustering.
Detailed variable descriptions are in Table 3.1.

Table 3.5 The Effect of Managerial Ability on Over- and Under-Hiring (and Firing)

Dependent Variable: Abnormal Net Hiring $\|Ab\ Net\ Hire\|_{it}$				
	(1)	(2)	(3)	(4)
Variables	Over-Hiring	Under-Firing	Under-Hiring	Over-Firing
$Ability_{it-1}$	-0.045***	-0.030**	-0.036***	-0.006
	(-5.148)	(-2.211)	(-10.256)	(-0.733)
AQ_{it-1}	-0.005***	-0.001	-0.002***	0.000
	(-5.186)	(-0.440)	(-4.377)	(0.072)
MTB_{it-1}	0.001	0.001*	-0.000	-0.000
	(1.600)	(1.958)	(-1.536)	(-0.518)
$Size_{it-1}$	-0.010***	-0.007***	-0.001*	0.003
	(-5.897)	(-2.716)	(-1.647)	(1.641)
$Quick_{it-1}$	0.008***	0.002	0.005***	0.007***
	(6.255)	(0.804)	(10.362)	(4.149)
Lev_{it-1}	0.045***	0.046**	-0.006	-0.031***
	(3.257)	(2.573)	(-1.054)	(-3.415)
$Dividend_{it-1}$	-0.017***	-0.012	-0.002	-0.011**
	(-3.235)	(-1.563)	(-1.278)	(-2.016)
$Std\ CFO_{it-1}$	0.020	0.014	0.061***	0.038***
	(0.677)	(0.616)	(4.723)	(2.708)
$Std\ Sales_{it-1}$	0.048***	0.066***	0.021***	0.026**
	(3.662)	(3.739)	(3.303)	(2.298)
$Tangible_{it-1}$	-0.150***	-0.011	-0.042***	-0.043***
	(-8.427)	(-0.491)	(-6.695)	(-2.836)
$Loss_{it-1}$	-0.009	0.004	0.038***	0.028***
	(-1.420)	(0.712)	(18.005)	(7.216)
$Institution_{it-1}$	-0.054***	-0.009	-0.027***	-0.004
	(-5.360)	(-0.581)	(-7.673)	(-0.410)
$Std\ Net\ Hire_{it-1}$	0.039***	0.021***	0.027***	0.014***
	(6.842)	(3.018)	(10.033)	(3.823)
$Labour\ Intensity_{it-1}$	-1.885***	-1.605***	0.113	0.539**
	(-5.277)	(-3.713)	(1.070)	(2.176)
$\|Ab\ Invest\ Other\|_{it}$	0.477***	0.267***	0.059***	-0.062***
	(30.869)	(6.610)	(4.892)	(-2.996)
Intercept	0.416***	0.063***	0.131***	0.052**
	(5.586)	(2.667)	(5.723)	(2.252)
Year FE	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES
Adj. R^2	19.8%	11.4%	16.2%	9.1%
N	17,157	4,174	27,041	6,603

Table 3.5 reports the results of estimating model (2) for four sub-samples. *Over-hiring* is actual net hiring that is higher than the expected level (based on model (1)), when expected net hiring is positive. *Under-firing* is actual net hiring that is higher than the expected level, when expected net hiring is negative. *Under-hiring* is actual net hiring that is lower than the expected level, when expected net hiring is positive. *Over-firing* is actual net hiring that is higher than the expected level, when expected net hiring is negative. *, **, *** indicate significance at the 10 percent, 5 percent, and 1 percent levels (two-tailed), respectively. Industry fixed effects are based on the 48-industry classification scheme of Fama and French (1997). All standard errors are corrected for firm-level clustering.
Detailed variable descriptions are in Table 3.1.

Table 3.6 Alternative Proxies for Labour Investment Efficiency

Variables	(1) Expected Net Hiring = Industry Median	(2) Expected Net Hiring Estimated Based on *Sales Growth*	(3) Model (1) Estimated Based on Industry
$Ability_{it-1}$	-0.037***	-0.034***	-0.033***
	(-7.334)	(-7.346)	(-8.921)
AQ_{it-1}	-0.004***	-0.003***	-0.003***
	(-6.677)	(-6.431)	(-6.610)
MTB_{it-1}	0.001***	0.001*	0.000
	(3.029)	(1.853)	(1.109)
$Size_{it-1}$	-0.006***	-0.007***	-0.005***
	(-5.882)	(-8.011)	(-6.633)
$Quick_{it-1}$	0.006***	0.004***	0.005***
	(7.181)	(6.494)	(10.473)
Lev_{it-1}	0.030***	0.037***	0.022***
	(4.016)	(5.388)	(4.060)
$Dividend_{it-1}$	-0.022***	-0.012***	-0.009***
	(-7.565)	(-4.599)	(-4.177)
$Std\ CFO_{it-1}$	0.004	0.017	0.015*
	(0.259)	(1.408)	(1.729)
$Std\ Sales_{it-1}$	0.066***	0.055***	0.048***
	(7.754)	(7.132)	(7.619)
$Tangible_{it-1}$	-0.115***	-0.099***	-0.076***
	(-11.283)	(-10.936)	(-10.278)
$Loss_{it-1}$	0.006*	0.022***	0.009***
	(1.885)	(7.772)	(4.257)
$Institution_{it-1}$	-0.028***	-0.028***	-0.031***
	(-4.774)	(-5.212)	(-7.140)
$Std\ Net\ Hire_{it-1}$	0.030***	0.031***	0.030***
	(9.000)	(10.244)	(11.875)
$Labour\ Intensity_{it-1}$	-1.014***	-0.852***	-0.628***
	(-5.515)	(-5.034)	(-4.363)
$\|Ab\ Invest\ Other\|_{it}$	0.506***	0.407***	0.316***
	(28.502)	(26.553)	(29.160)
Intercept	0.210***	0.215***	0.201***
	(5.917)	(6.960)	(6.443)
Year FE	YES	YES	YES
Industry FE	YES	YES	YES
Adj. R^2	15.6%	14.6%	14.8%
N	55,212	55,212	54,975

Table 3.6 reports the results of estimating model (2) using three different proxies for labour investment efficiency. In column (1), the dependent variable, abnormal net hiring, is equal to the difference between firms' actual net hiring and industry-year median of net hiring. In column (2), the residuals from $Net\ Hire_{it} = \beta_0 + \beta_1 Sales\ Growth_{it-1} + \varepsilon_{it}$ are used as the proxy for abnormal net hiring. In column (3), model (1) is estimated separately for each industry based on the 48-industry classification of Fama and French (1997) and the residuals from industry-specific estimations are used as the proxy for abnormal net hiring.
*, **, *** indicate significance at the 10 percent, 5 percent, and 1 percent levels (two-tailed), respectively. Industry fixed effects are based on the 48-industry classification scheme of Fama and French (1997). All standard errors are corrected for firm-level clustering.
Detailed variable descriptions are in Table 3.1.

Table 3.7 Controlling for Other Non-Labour Investments

Dependent Variable: Abnormal Net Hiring $\|Ab\ Net\ Hire\|_{it}$		
Variables	(1) *Net Hire* is Positively Related to Change in Other Investments	(2) *Net Hire* is Negatively Related to Change in Other Investments
$Ability_{it-1}$	-0.040***	-0.033***
	(-7.686)	(-6.309)
AQ_{it-1}	-0.002***	-0.003***
	(-3.378)	(-5.626)
MTB_{it-1}	-0.000	0.001***
	(-1.337)	(3.397)
$Size_{it-1}$	-0.004***	-0.004***
	(-4.474)	(-4.224)
$Quick_{it-1}$	0.007***	0.005***
	(9.050)	(6.672)
Lev_{it-1}	0.019***	0.015*
	(2.624)	(1.705)
$Dividend_{it-1}$	-0.011***	-0.011***
	(-3.401)	(-3.668)
$Std\ CFO_{it-1}$	0.004	0.060***
	(0.400)	(3.019)
$Std\ Sales_{it-1}$	0.048***	0.031***
	(5.579)	(3.511)
$Tangible_{it-1}$	-0.095***	-0.058***
	(-9.254)	(-5.695)
$Loss_{it-1}$	0.014***	0.020***
	(4.370)	(6.150)
$Institution_{it-1}$	-0.035***	-0.022***
	(-5.768)	(-3.758)
$Std\ Net\ Hire_{it-1}$	0.034***	0.023***
	(9.634)	(6.751)
$Labour\ Intensity_{it-1}$	-0.733***	-0.304
	(-4.175)	(-1.635)
$\|Ab\ Invest\ Other\|_{it}$	0.382***	0.185***
	(28.497)	(11.397)
Intercept	0.187***	0.202***
	(5.652)	(2.855)
Year FE	YES	YES
Industry FE	YES	YES
Adj. R-squared	0.177	0.110
Observations	29,638	21,225

Table 3.7 reports the results of estimating model (2) on two subsamples based on the relationship between *Net Hire* and change in other non-labour investments. Other non-labour investments are the sum of capital expenditures, acquisition expenditures, and R&D expenditures, less cash receipts from the sale of property, plant, and equipment.

*, **, *** indicate significance at the 10 percent, 5 percent, and 1 percent levels (two-tailed), respectively. Industry fixed effects are based on the 48-industry classification scheme of Fama and French (1997). All standard errors are corrected for firm-level clustering.

Detailed variable descriptions are in Table 3.1.

Table 3.8 The Effect of Ability and Abnormal Net Hiring on Future Performance

Panel A: Full Sample				
	(1)	(2)	(3)	(4)
		Average		Average
Variables	ΔROA_{it+1}	$\Delta ROA_{it+1\ to\ t+3}$	ΔROA_{it+1}	$\Delta ROA_{it+1\ to\ t+3}$
$\|Ab\ Net\ Hire\|_{it}$	-0.086***	-0.088***	-0.174***	-0.171***
	(-9.196)	(-9.281)	(-7.318)	(-6.033)
$Ability_{it}$			0.091***	0.088***
			(13.661)	(11.596)
$Ability_{it} \times \|Ab\ Net\ Hire\|_{it}$			0.161***	0.152***
			(4.795)	(3.519)
DFE_{it}	0.286***	0.204***	0.215***	0.136***
	(12.648)	(7.717)	(9.690)	(5.228)
$NegDFE_{it} \times DFE_{it}$	-0.042	-0.022	0.034	0.052
	(-0.915)	(-0.456)	(0.757)	(1.096)
$NegDFE_{it} \times DFE_{it}^2$	0.024***	0.021***	0.024***	0.021***
	(3.716)	(4.471)	(3.763)	(4.417)
$PosDFE_{it} \times DFE_{it}^2$	-0.022	-0.032	-0.009	-0.020
	(-1.309)	(-1.046)	(-0.577)	(-0.672)
CE_{it}	-0.526***	-0.473***	-0.492***	-0.441***
	(-15.795)	(-13.114)	(-15.033)	(-12.571)
$NegCE_{it} \times CE_{it}$	1.058***	0.980***	1.016***	0.938***
	(20.932)	(16.901)	(20.507)	(16.622)
$NegCE_{it} \times CE_{it}^2$	0.162***	0.156***	0.161***	0.154***
	(5.897)	(6.720)	(5.879)	(6.659)
$PosCE_{it} \times CE_{it}^2$	0.065***	0.064***	0.062***	0.061***
	(3.471)	(3.660)	(3.455)	(3.706)
Intercept	-0.003	0.041***	-0.048	-0.002
	(-0.080)	(3.191)	(-1.349)	(-0.132)
Year FE	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES
Adj. R-squared	0.156	0.142	0.171	0.156
Observations	52,029	44,127	52,029	44,127

Panel B: Over-Investment in Labour (Abnormal Net Hiring > 0)

	(1)	(2)	(3)	(4)
		Average		Average
Variables	ΔROA_{it+1}	$\Delta ROA_{it+1\ to\ t+3}$	$\Delta ROA_{\ it+1}$	$\Delta ROA_{it+1\ to\ t+3}$
$\lvert Ab\ Net\ Hire\rvert_{it}$	-0.037***	-0.038***	-0.104***	-0.107***
	(-3.588)	(-4.096)	(-4.021)	(-3.637)
$Ability_{it}$			0.107***	0.103***
			(10.656)	(9.566)
$Ability_{it} \times \lvert Ab\ Net\ Hire\rvert_{it}$			0.119***	0.124***
			(3.360)	(3.004)
DFE_{it}	0.329***	0.235***	0.252***	0.160***
	(10.397)	(6.317)	(8.112)	(4.340)
$NegDFE_{it} \times DFE_{it}$	-0.038	-0.019	0.034	0.051
	(-0.689)	(-0.302)	(0.615)	(0.795)
$NegDFE_{it} \times DFE_{it}^2$	0.026***	0.021***	0.025***	0.019***
	(4.447)	(3.670)	(4.287)	(3.430)
$PosDFE_{it} \times DFE_{it}^2$	-0.048***	-0.052*	-0.034**	-0.039
	(-2.684)	(-1.693)	(-2.025)	(-1.307)
CE_{it}	-0.596***	-0.511***	-0.556***	-0.474***
	(-10.861)	(-8.889)	(-10.330)	(-8.451)
$NegCE_{it} \times CE_{it}$	1.169***	1.024***	1.136***	0.990***
	(14.859)	(12.173)	(14.693)	(12.019)
$NegCE_{it} \times CE_{it}^2$	0.214***	0.185***	0.219***	0.190***
	(8.084)	(6.661)	(8.354)	(6.912)
$PosCE_{it} \times CE_{it}^2$	0.094***	0.084***	0.091***	0.081***
	(3.991)	(3.952)	(4.002)	(4.020)
Intercept	-0.092	0.011	-0.139*	-0.035*
	(-1.142)	(0.644)	(-1.722)	(-1.763)
Year FE	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES
Adj. R-squared	0.159	0.131	0.174	0.148
Observations	20,275	17,205	20,275	17,205

Panel C: Under-Investment in Labour (Abnormal Net Hiring < 0)

Variables	(1) ΔROA_{it+1}	(2) Average $\Delta ROA_{it+1\ to\ t+3}$	(3) ΔROA_{it+1}	(4) Average $\Delta ROA_{it+1\ to\ t+3}$
$\|Ab\ Net\ Hire\|_{it}$	-0.239***	-0.241***	-0.337***	-0.324***
	(-10.813)	(-9.757)	(-7.061)	(-6.284)
$Ability_{it}$			0.077***	0.075***
			(8.287)	(6.348)
$Ability_{it} \times \|Ab\ Net\ Hire\|_{it}$			0.207***	0.177*
			(2.724)	(1.716)
DFE_{it}	0.225***	0.128***	0.161***	0.071*
	(6.666)	(3.070)	(4.893)	(1.736)
$NegDFE_{it} \times DFE_{it}$	0.007	0.055	0.081	0.125*
	(0.092)	(0.735)	(1.131)	(1.675)
$NegDFE_{it} \times DFE_{it}^2$	0.024*	0.026***	0.025**	0.028***
	(1.921)	(3.711)	(2.071)	(3.981)
$PosDFE_{it} \times DFE_{it}^2$	0.068	0.112	0.079	0.117
	(1.206)	(1.388)	(1.439)	(1.494)
CE_{it}	-0.413***	-0.375***	-0.390***	-0.354***
	(-10.973)	(-9.430)	(-10.482)	(-9.018)
$NegCE_{it} \times CE_{it}$	0.868***	0.830***	0.831***	0.792***
	(13.354)	(12.642)	(12.930)	(12.288)
$NegCE_{it} \times CE_{it}^2$	0.107**	0.115***	0.102**	0.110***
	(2.240)	(3.290)	(2.150)	(3.143)
$PosCE_{it} \times CE_{it}^2$	-0.006	-0.019	-0.007	-0.019
	(-0.156)	(-0.413)	(-0.179)	(-0.410)
Intercept	0.060***	0.066***	0.017	0.026
	(3.490)	(4.390)	(0.924)	(1.598)
Year FE	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES
Adj. R-squared	0.166	0.162	0.178	0.174
Observations	31,754	26,922	31,754	26,922

Table 3.8 reports the results of estimating model (3) for the full sample (panel A), the over-investment sub-sample (panel B), and the under-investment sub-sample (panel C).
For the dependent variable, we consider one-year-ahead change in *ROA*, as well as average change of *ROA* over the next three years.
*, **, *** indicate significance at the 10 percent, 5 percent, and 1 percent levels (two-tailed), respectively. Industry fixed effects are based on the 48-industry classification scheme of Fama and French (1997). All standard errors are corrected for firm-level clustering.
Detailed variable descriptions are in Table 3.1.

Chapter 4 Financial Constraints and Labour Investment

4.1 Abstract

This study investigates how companies adjust their employment in recessions with a focus on credit constraints. Using administrative data that contain the population of Canadian firms, we compare firms before and after the Great Recession by exploiting different intensity of credit-constraints in the pre-recession period. Controlling for firm productivity, we find additional evidence that firms with high leverage cut labour more than firms with low leverage during recessions, indicating that more highly leveraged firms may be forced to reduce labour more than the optimal amount due to credit constraints. We also find heterogeneous effects of the recession interacted with credit constraints on employment growth based on productivity and firm age. The findings imply that there is room for government policies to improve labour allocation efficiency during recessions, in addition to standard stimulus.

4.2 Introduction

Business cycles impact companies in various ways, including the effects of reduced labour demand on employment adjustments. Because companies' decisions on labour management may be constrained during downturns when they are under financial stress, they may not be able to fully utilize investment opportunities and may be forced to cut more employees than would be optimal for future performance.[19] Developing a better

[19] It is true that a firm's capital structure is independent from its investment decisions in a perfect capital market ((Modigliani & Miller, 1958). However, a large theoretical and empirical literature has challenged this position, arguing that financing considerations significantly complicate the investment relationship and affect corporate investments (e.g., Aivazian, Ge, & Qiu, 2005; Fazzari, Hubbard, & Petersen, 1988b; Lang, Ofek, & Stulz, 1996). High leverage may reduce a firm's ability to finance growth through a liquidity effect (see Bemanke and Gertler (1989); Bernanke, Gertler, and Gilchrist (1994) for a review).

understanding of how business cycles exacerbating financial stress affect employment decisions is therefore an important task. Despite its importance, relatively few empirical studies analyze companies' labour adjustment practices during economic downturns, partly due to limited data on firms. Indeed, there are many studies on recessions, both in academic research and public policy, but the focus has been on either household or financial intermediary balance sheets and the existing studies have been mostly restricted to firms in the United States.

In this study, we investigate how business financing affects the labour dynamics of Canadian companies across business cycles, in particular, during the global recession of 2008 to 2009. Our study uses the Corporate Income Tax File - Longitudinal Employment Analysis Program (T2-LEAP) data on all the companies incorporated in Canada. The data set is created by combining two data sources: T2 (corporate tax return) filings and the LEAP data, which is derived from T4 (employee compensation) filings.

We evaluate the effect of the Great Recession on employment adjustment in the spirit of differences-in-differences (DID). Assuming that the timing of the recession is exogenous, we compare employment adjustment of the same firm before and after the Great Recession and analyze whether firms behave differently during the recession depending on the intensity of credit constraints in the pre-recession period.

Using leverage as a measure of credit constraints, we find an inverted U-shaped relationship between leverage and labour growth rate. These features are true for both the overall growth rate for all firms (continuers and exiters[20]) and the conditional growth rate for continuers only. The finding suggests that firms' debt accommodates acquisition of

[20] Continuers are firms that continue to operate in $t + 1$ and exiters are firms that exit the data in $t + 1$.

labour up to a certain point, thereafter, adding additional debt imposes financial constraints on firms' ability to effectively manage labour growth. Recession enlarges the negative impact of financial constraints on labour growth rate.

The negative effect of leverage on labour growth, found for more highly leveraged firms, complements the findings in Giroud and Mueller (2017) that the elasticity of establishment labour to local demand shocks increases with overall firm leverage. Their study related labour growth in local establishments[21], such as stores, to changes in the local housing price index during the Great Recession when housing prices fell dramatically as an outcome of the housing crisis in the United States. Their study is restricted to publicly-traded companies with data available on Compustat.

We analyze the heterogeneous effects of the recession interacted with credit constraints on employment growth by allowing differential effects by firms' productivity and age. We find that more productive firms are more likely to grow, even if they are highly leveraged. They are also less likely to exit during both normal times and recession. The patterns observed above hold for both mature and young firms but are more pronounced for young firms.

We add to the existing literature on the relationship between financial leverage and labour decisions by providing reliable new Canadian evidence on this relationship for a large sample of private and publicly-traded companies. The Canadian setting and comprehensive sample is interesting for several reasons. First, the Great Recession generated devastating impacts on Canadian businesses, including sharp declines in employment (see Figure 4.1). Unlike the U.S., the Canadian housing market did not go

[21] An establishment is an economic unit that produces and/or sells goods or services and operates from a single physical location. If a firm has several such locations, each is an establishment.

bust, allowing us to separate the general effect of recessions from the effects of a housing market crash. Second, since the T2-LEAP data cover the full range of corporations from small privately-held companies to large publicly-traded companies, it enables us to explore the impact of capital structure on labour adjustment and investment, for a complete set of firms and industries. Findings on the effects of leverage on firms' labour investment decisions during the recession shed light on management decision making in response to movements in the economic cycles.

The reminder of this study is organized as follows. The next section reviews the related literature and develops our hypotheses. Section 4.4 describes our sample and research design and section 4.5 reports the descriptive statistics. The primary empirical results are provided in section 4.6 and 4.7. Section 4.8 contains various robustness tests. Section 4.9 and concludes and provides policy implications.

4.3 Literature Review and Hypothesis Development

4.3.1 Related Literature

Historically, navigation of economic downturns has largely involved layoffs and cutbacks of other input resources (e.g., land, machines and equipment, and materials) as firms try hard to lower headcount and reduce operating costs. In the Canadian context, employment moves closely in line with business cycles and tends to decline during downturns, this was especially evident after the 1981-82 recession (P. Cross & Bergevin, 2012).

Firm balance sheets (equivalently, the state of borrower "solvency") play an important role in the transmission of business cycle shocks (Bemanke & Gertler, 1989; Bernanke, Gertler, & Gilchrist, 1998; Kiyotaki & Moore, 1997). Previous literature documents that firm investment is not only sensitive to investment opportunities (Brainard & Tobin, 1968; Tobin, 1969) but also balance sheet conditions (Fazzari et al., 1988b). In good times, when balance sheets are healthy, it is easier for firms to obtain outside funds, which stimulates investment and propagates the good times (Bemanke & Gertler, 1989). Conversely, downturns caused by recessions exacerbate the impact of financial constraints (Campello, Graham, & Harvey, 2010; McLean & Zhao, 2014) and reduce investment. Therefore, financially constrained firms may have to give up investment opportunities.

Previous studies of labour investment in downturns have been mostly restricted to firms in the United States. Giroud and Mueller (2017) used establishment-level data from the U.S. Census Bureau to examine the role of firm balance sheet strength in the transmission of consumer demand shocks associated with declines in housing prices during the Great Recession. They found that establishments of firms with higher leverage during the Great Recession experienced significantly more layoffs and were more likely to be closed down in response to local consumer demand shocks.

Our work differs from Giroud and Mueller (2017) in multiple ways. First, in their setup, the driving force is a local demand shock associated with the change in housing prices in a zip code area or county as opposed to a more general demand shock associated with a recession. The time period they analyze coincides with the Great Recession to take advantage of the extreme changes in housing prices during this period, but they do not specifically consider the more general effects of the Great Recession on, for instance, manufacturing plants that are impacted by changes in national or international demand for their products.

Second, their main analysis is at the establishment level for U.S. public firms, but our analysis is at the firm level for all incorporated firms, both public and private, in the

Canadian setting. Their reliance on publicly-available financial information to measure leverage at the corporate level excludes the majority of companies that are privately held. They acknowledge that financial constraints are likely to have a more pronounced effect on privately-held companies that have more limited options for raising capital. On the other hand, managers of privately-held companies do not have the same incentives to manage operations in ways that reduce the impact of recessions on reported earnings and stock prices. Due to the fixed nature of interest commitments, labour savings may be an attractive way to boost earnings for managers of highly levered firms focused on short-term results.

Sharpe (1994) focuses on the cyclicality of the labour force of the U.S. manufacturing sector firms between 1959 and 1985 and finds that employment growth at more highly leveraged firms is more sensitive to demand and financial-market conditions over the business cycle. These findings are consistent with financial constraints affecting firm's ability to engage in labour hoarding, which refers to the practice that firms do not immediately cut labour input when facing a temporary decline in demand – they retain more workers than necessary in the short-term in order to obtain longer-term benefits.

The impact of the business cycle on firm strategy has been neglected in research (Bishop, Graham, & Jones, 1984; Mascarenhas & Aaker, 1989). Companies don't all follow the same strategy during a recession. Some companies are driven by the goal of achieving improved short-term performance and growth. Other companies are concerned mainly about long-term productivity, stability and responsibility. The key to the strategic choice about labour adjustment is whether the company prefers to sacrifice short-term performance by retaining labour that may result in better long-term performance or to improve short-term performance by aggressively cutting labour (Fay & Medoff, 1985; Kahneman, 2003; Tom, Fox, Trepel, & Poldrack, 2007; Tversky & Kahneman, 1991).

Many researchers suggest that the intensity of labour reallocation increases in recessions (e.g., Caballero & Hammour, 1996; Davis & Haltiwanger, 1990; Mortensen & Pissarides, 1994). Labour or job reallocation is defined as the number of people changing employment place or state over a given period. Davis, Haltiwanger, and Schuh (1998) highlight the increased intensity of job reallocation during the 1982-83 recession. Greenstone, Mas, and Nguyen (2020) and Chodorow-Reich (2014) document that the Great Recession credit market shock led to declines in subsequent employment. Fort, Haltiwanger, Jarmin, and Miranda (2013) provide evidence that young/small businesses experienced especially large declines in net employment growth and job creation in the 2008-2009 recession. Moscarini and Postel-Vinay (2012) examine the job creation pattern of large and small employers over the business cycle and find a negative correlation between the net job creation rate of large employers and the level of aggregated unemployment that is much stronger than for smaller employers.

Foster et al. (2016) examine the "cleansing" hypothesis that "a recession is a time of accelerated productivity-enhancing reallocation because it is a relatively low-cost time for reallocation" (Foster et al., 2016, p. S294; see also Schumpeter, 1939; 1942). Foster, Haltiwanger, and Krizan (2001) find that the late 1970's to 1980's were periods of especially intense productivity-enhancing labour reallocation, when less productive jobs were destroyed and labour resources were reallocated to more productive uses. Collard-Wexler and De Loecker (2015) show that this type of reallocation contributed to much of the productivity growth in the U.S. steel industry over the past several decades.

In contrast, research has also documented that firms that cut costs faster and deeper than rivals do not necessarily perform better after a recession – they have the lowest probability of pulling ahead of the competition when times get better, compared with other firms (Gulati et al., 2010). Barlevy (2003) develops a model building on Bemanke and Gertler (1989) and shows that the cleansing effect of reallocation may be reversed under financial constraints, directing labour resources to less efficient uses rather than more efficient uses.

4.3.2 Hypothesis Development

Managers make long-term investments in human capital based on their expectations about the future. Skilled workers with good training are investments that will provide returns and such workers will always be hard to find and retain. In this case, firms keep workers to retain firm-specific human capital and to save on the costs of firing, hiring, and training workers. If specially trained employees are not laid off during a period when there is a decline in demand, the firm may experience operating losses now but will gain in the future if the decline in demand is temporary. Thus, there are incentives to retain employees with specific training and skills, and the larger a firm's investment the greater the incentive not to lay them off (Becker, 1964).

However, if the economic downturn intensifies financial constraints, which threaten the survival of the firm, managers would remove or reduce long-term investments, such as labour, aggressively in favor of improved short-term performance. Investment is sensitive to available cash flows and the sensitivity increases as firms are financially constrained (Bolton, Chen, & Wang, 2011; Lamont, Polk, & Saaá-Requejo, 2001; Whited & Wu, 2006). In addition, recession intensifies financial constraints for firms (including access to funds internally and externally), restricting investment. The sensitivity of investment to cash flow is higher during recessions (McLean & Zhao, 2014).

Because the financial constraints restrict firms' ability to make effective labour adjustment decisions during the recession, we make the following hypothesis:

H1: Credit constraints negatively affects firms' employment growth during the Great Recession.

In addition, different firms may be affected by financial constraints differently across economic cycles. Young firms are more affected by intensifying financial constraints during recessions, and therefore they may exhibit more labour adjustments in response to fluctuations in demand (Sharpe, 1994). When operating cash flows dwindle and debt commitments loom large, such firms experiencing financial difficulty may be vulnerable and are more likely to adopt pro-cyclical labour policies. Therefore, we test the following hypothesis:

H2: The negative impact of credit constraints on employment growth during the Great Recession is more pronounced for younger firms.

4.4 Data and Methodology

We use the Corporate Income Tax File – Longitudinal Employment Analysis Program (T2-LEAP) dataset recently made available by Statistics Canada in a pilot project through its Research Data Centres. This dataset links the Longitudinal Employment Analysis Program (LEAP), which provides longitudinal data on the behaviour of employment levels of Canadian Businesses (Baldwin et al., 1992), with the Corporate Income Tax File (T2) to create T2-LEAP. Because our interest is in how leverage affects labour investment in Canada, it is important that we access data on small, privately-held companies as well as large publicly-traded companies. The LEAP makes use of administrative tax records from the Business Register and the Survey of Employment, Payrolls and Hours (SEPH) to derive the employment profile of businesses over time. The T2 file includes all incorporated firms that file a T2 tax return with the Canada Revenue Agency (CRA). The T2 file provides data on, among other things, assets, liabilities, sales, and gross profits[22] for all incorporated firms in Canada. The T2-LEAP is constructed at the enterprise level and covers all incorporated employers in Canada in the private sector from 2001 to 2015.

The main variables used in our analyses are defined as follows. We measure labour growth as the annual percentage change in the number of labour:

$$\frac{Average\ Labour\ Units_{it+1} - Average\ Labour\ Units_{it}}{Average\ Labour\ Units_{it}},$$

where an average labour unit is provided by Statistics Canada and is "a measure of employment derived from the wages paid to employees divided by the average wage of those employed in firms in the same industry and region, and of the same size" (Baldwin et al., 2016, p. 13).

Productivity, or *Total Factor Productivity* (*TFP*), is measured at the firm level and is given by:

$$lnTFP_{it} = lnQ_{it} - \alpha_K lnK_{it} - \alpha_L lnL_{it} - \alpha_M LnM_{it},$$

where Q_{it} is real output, K_{it} is real capital, L_{it} is labour input, M_{it} is real materials, and α denotes factor elasticities (Baily, Hulten, & Campbell, 1992; Foster et al., 2016). Operationally, output is defined as total revenue; capital is total assets; labour input is average labour units; and materials are total expenses minus the sum of payroll and depreciation expense.

[22] Financial data included as part of the T2 filing may differ from the financial statements included in the company's annual report.

Given the large differences in output measures across industries, our *TFP* measures need to control for industry differences in any comparison over industries (Foster et al., 2016). Specifically, *TFP = (Firm lnTFP – Industry-year Mean lnTFP)/Industry Standard Deviation of lnTFP*. For simplicity, we refer to this as *TFP* in the paper but it is the deviation of firm-level *TFP* from the industry average *TFP*, deflated by the industry standard deviation of *TFP*.

Leverage is measured as the ratio of total liabilities to total assets. We use the level of leverage to measure the degree of financial constraints because Giroud and Mueller (2017) suggest that firms with higher leverage not only appear to be more financially constrained but also act like financially constrained firms during the Great Recession.

As a baseline specification, we use regression analysis to test whether more highly levered companies reduce employment more by controlling for productivity.

$$Y_{it+1} = \lambda_{t+1} + \beta_1 TFP_{it} + \beta_2 Leverage_{it} + \beta_3 TFP_{it} \times Leverage_{it} + \beta_4 Leverage_{it}^2 + X_{it}'\Theta + \varepsilon_{it+1} \quad (1)$$

where *i* is firm, *Y* is a set of outcome variables, and *TFP* and *Leverage* are as previously defined. *Y* represents three outcome variables measured from *t* to *t* + 1: *Overall Growth Rate* (continuers + exit) of employment, *Exit*, and *Conditional Growth Rate* (continuers) of employment. We include the quadratic term of *Leverage* considering the potential non-linear relationship between leverage and outcomes.

To examine the impact of recession, we expand model (1) to include the effect of recession:

$$\begin{aligned} Y_{it+1} = \lambda_{t+1} &+ \beta_1 TFP_{it} + \beta_2 Leverage_{it} + \beta_3 TFP_{it} \times Leverage_{it} + \beta_4 Leverage_{it}^2 \\ &+ \beta_5 Recession + \beta_6 TFP_{it} \times Recession + \beta_7 Leverage_{it} \times Recession \\ &+ \beta_8 TFP_{it} \times Leverage_{it} \times Recession + X_{it}'\Theta + \varepsilon_{it+1} \end{aligned} \quad (2)$$

where *Recession* is a dummy for the recession taking on a value of 1 in years 2008 and 2009. Table 4.1 presents the definitions of all variables used in the analyses.

We estimate models (1) and (2) pooling all years with year, industry, and province fixed effects and controlling for firm characteristics including size and age. Standard errors are clustered at the firm level.

4.5 Descriptive Statistics

Table 4.2 provides descriptive statistics of the variables used in our analyses. We have 1,352,781 firm-year observations, representing 203,275 unique firms, from 2001 to 2015. The overall growth rate for both continuers and exiters (before exiting) is 5.2 and is slightly higher for continuers (5.7 percent). The exit rate is 9.6 percent (firm exiting the data/total firms in period *t*) and the entry rate is 5.9 percent[23]. *TFP* is the deviation of firm-level *TFP* from its' industry-year mean, therefore, by construction the mean of *TFP* is zero. The mean leverage of all firms is 61.4 percent. The *Recession* dummy applies to 14.9 percent of our firm-year observations. The mean size (natural logarithm of total assets) is 15.694, and average age[24] of all firms is 11.31.

Table 4.2 also reports summary statistics with firms classified into young and mature, based on the age of the firm. We focus on firm age since the existing studies point out that recessions, which often reduce on-the-job training and learning opportunities, are particularly harmful for the growth of young firms (Ouyang, 2009). We define firms that are older than the median age as "Young," and the rest as "Mature." The data show that younger firms tend to have higher overall/conditional labour growth rate (9.2/9.9 percent)

[23] Exit is the last time a firm appears in the data, and entry is the first time a firm appears in the data.
[24] Asset age is also a proxy of firm age.

than mature firms (1.1/1.5 percent). The exit rate is slightly higher for mature firms (10.6 percent) than for young firms (8.6 percent). *TFP* is 0.018 for young and -0.018 for mature businesses. The differences are not statistically significant due to a large standard deviation. We will later explore these differences by firm age using regression analysis to control for observable firm characteristics.

Table 4.3 reports an exploratory test on the potential exogenous factors that may affect firms' leverage ratio. We examine the association between leverage and firms' characteristics (age and employment size) using a regression model controlling for year, industry, and province fixed effects. The result shows that firms that are larger and younger tend to have higher leverage (higher financial constraints). Firms tend to have lower leverage (lower financial constraints) during the Great Recession, which may be driven by large private firms reducing their leverage during the crisis (Dinlersoz, Kalemli-Ozcan, Hyatt, & Penciakova, 2018).

Figure 4.2 provides additional evidence on how financial constraints affect firms' employment policies. Firms with higher leverage (above median), in general, have higher labour turnover rate, compared with firms with lower leverage (below median). However, highly leveraged firms incur a sharper decline in the labour growth rate (both the change in the natural logarithm of average labour units and the percentage change in average labour units) during the recession (2008 to 2009) than firms with lower leverage. This, again, suggests that the financial constraints have a significant influence on how firms manage and maintain their work force.

4.6 Regression Results

Results of estimating models (1) and (2) are reported in Table 4.4. Columns (1), (4) and (7) are for specifications without *Recession*. We find that firm productivity, *TFP*, is positively related to *Overall Growth Rate* (continuers + exiters) of employment and *Conditional Growth Rate* (continuers only) of employment and negatively related to *Exit*, consistent with previous literature. All of these effects are statistically significant at the 1 percent level. We also find that there is an inverted U-shaped relationship between *Leverage* and growth, suggesting that growth rate rises with increases in leverage ratio (liabilities to assets) to a certain point (0.871 for both continuers and exiters and 0.918 for continuers only) and then decreases with further increases in the leverage. In addition, the coefficient on the interaction between *TFP* and *Leverage* is significantly positive, indicating that the positive impact of *TFP* on growth is enhanced when leverage is higher. When we use *Exit* as the dependent variable, the effect of *TFP* × *Leverage* is not statistically significant. These results do not seem to be driven by more highly levered firms being less productive. Since we control for the level of productivity, the effect estimated here is the ceteris paribus effect of leverage.

Columns (2), (5), and (8) of Table 4.4 shows whether the patterns identified above change in the Great Recession by allowing for the differential effect of recession, depending on firm productivity. Column (2) shows that the estimated coefficient on the interaction between *Leverage* and *Recession* is negative and statistically significant, suggesting that the recession magnifies the negative impact of financial constraints on growth rate. We do not find any evidence showing that such effects differ by firm productivity since the interaction terms *TFP* × *Recession* and *TFP* × *Leverage* × *Recession* are both insignificant. These observations are true for both the overall growth rate for all firms and the conditional growth rate for continuers only. These results are consistent with our prediction that credit constraints may restrict firms' ability to make effective labour adjustment decisions.

As for exit, the interaction between *Leverage* and *Recession* is positive and significant, suggesting that the recession increases the effect of financial constraints on the likelihood of exit. Unlike the effects on employment growth, we find that the effect of recessions on exit depends on firm productivity as well as leverage. When leverage is low, *TFP* tends to diminish the effect of *Recession* on exit, as indicated by the negative and significant effect of *TFP* × *Recession* on exit. However, such mitigating effects are smaller for firms with high leverage since the 3-way estimated effect (*TFP* × *Leverage* × *Recession*) is positive and statistically significant on exit, revealing highly productive firms are less likely to exit during recession, but within highly productive firms, the exit probability is higher for more highly levered firms (e.g., For a firm with 0 leverage, the probability of exiting during recession is lower by 0.230 as *TFP* increases by one standard deviation during recession. For a firm with 0 leverage the probability is lower by 0.052 (= - 0.230 + 0.178*(1.0)) as *TFP* goes up by one standard deviation.). In sum, these results provide evidence that financial constraints lead to higher likelihood of firm exit. While highly productive firms are less likely to exit during the recession, the adverse effect of leverage is still significant even for productive firms.

We repeat the above analysis by using year dummies, 2008 and 2009, instead of a recession dummy, in order to evaluate the dynamic effects of recessions. The results are reported in columns (3), (6), and (9) of Table 4.4. We find similar results as noted above. Most importantly, the estimated coefficient on *Leverage* × *2008* is negative and statistically significant for both the overall growth and the conditional growth rate.

Leverage × 2009 is marginally significant for the overall growth. This may indicate that firms with high leverage have exited in the year of 2008 already, resulting in a weak effect in 2009.

4.7 Heterogeneous Effects by Firm Age

We then examine whether these patterns vary by firm age. As before, we define firms that are older than the median age as “Young,” and the rest as “Mature.” The results are shown in Table 4.5. We find that the general patterns for the full sample hold for both young and mature (compare columns (1), (4), and (7) in Table 4.5 to those in Table 4.4). However, young firms are less likely to exit, and the effect of leverage is larger in magnitude for young firms for the overall growth and conditional growth but the effect is smaller for exit.

These findings are consistent with the literature that highlights the importance of young firms in job creation and employment dynamics. For example, Haltiwanger, Jarmin, and Miranda (2013) use the U.S. data and show that there is no systematic relationship between firm size and employment growth, controlling for firm age. This finding indicates that young firms drive employment growth conditional on their survival and thus play a key role for employment growth and their exit dynamics. Similar patterns are also reported in analysis using data from other countries (see Criscuolo, Gal, & Menon, 2014 for evidence in 17 OECD countries and Brazil; see also Lawless, 2014 for related evidence in Ireland).

Mature firms with higher *TFP* achieve higher growth rate and are less likely to exit. In addition, the interaction effect of *TFP* and leverage is larger for mature firms for the overall and conditional growth. Columns (2), (5), and (8) of Table 4.5 shows whether the patterns identified above change in the recession. The results are largely consistent with those for the full sample (in Table 4.4). The interaction effect of leverage and recession on growth rate is negative and is mainly for young firms. This indicates that young firms are affected more negatively by financial constraints during the recession.

4.8 Robustness Check

For robustness, we use the leverage of year 2007, *Leverage2007*, to replace the variable *Leverage* in model (1) and (2) to avoid the potential endogeneity concern regarding the level of leverage and employment growth during the recession. We report our findings in Table 4.6. We find similar results as presented in Table 4.4. Of our main interests, *Leverage2007* × *Recession* is negative and significant for the overall growth and the conditional growth and is positive and significant for exit. For the specification with year dummies of 2008 and 2009, the estimated coefficients on *Leverage2007* × *2008* and *Leverage2007* × *2009* are both negative and significant for overall growth and conditional growth and are positive and significant for exit.

We conduct additional robustness checks including replacing leverage with lagged leverage and replacing the continuous leverage ratio with an indicator variable of high leverage. The results are similar, and the details are reported in Table 4.7.

4.9 Conclusions

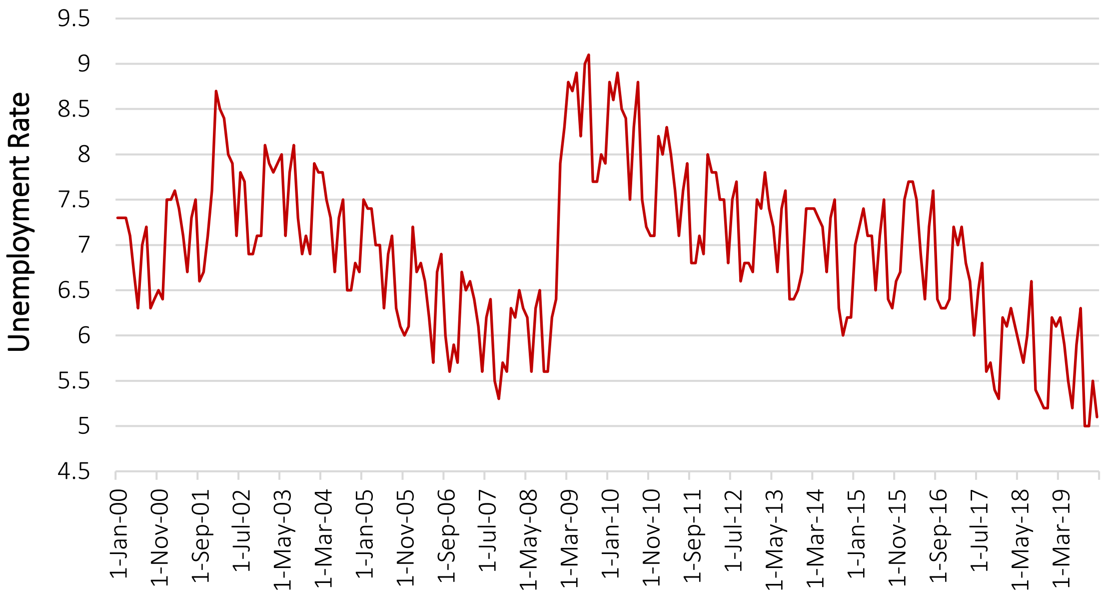
We examine the question of whether financial constraints and productivity affect firms' decision making regarding labour management. We find an inverted U-shaped relationship between leverage and the labour growth rate. This suggests that debt accommodates additional labour up to a certain point, thereafter adding additional debt imposes financial constraints on firms' ability to effectively manage labour growth.

Recession magnifies the impact of financial constraints on growth rate, and this is true for both the overall growth rate for all firms and the conditional growth rate for continuers only. We also find that more productive firms are more likely to grow, even for highly leveraged firms. They are also less likely to exit during both normal times and recession. The patterns observed above mostly hold for both mature and young firms but are more pronounced for young firms. Lastly, we use graphs to show that highly leveraged firms incur a sharper decline in the labour growth rate during the recession compared to firms with lower leverage.

The T2-LEAP data enables us to analyze a general population of firms, both public and private, in the Canadian setting. However, it has limitations. T2-LEAP provides a limited set of financial variables that can be used to represent financial constraints. Although results in Giroud and Mueller (2017) suggest that "firms with higher leverage not only appear to be more financially constrained but also act like financially constrained firms during the Great Recession" (p. 274), supporting the use of leverage ratio as an indicator of the extent of financial constraints, there are a number of alternative proxies for financial constraints that are commonly used in the literature. For instance, previous studies have relied on indirect proxies (such as credit rating or dividend payment), investment-cash-flow sensitivities (Fazzari, Hubbard, & Petersen, 1988a), or indices based on linear combinations of observable firm characteristics, such as size, age, leverage, sales growth, cash flow, or dividend payout (Hadlock & Pierce, 2010; S. N. Kaplan & Zingales, 1997; Whited & Wu, 2006). Given the inability of these popular measures to precisely identify constrained firms for a general population (Farre-Mensa & Ljungqvist, 2016) and the financial variables provided by the T2-LEAP data, we use leverage ratio as a proxy for financial constraints.

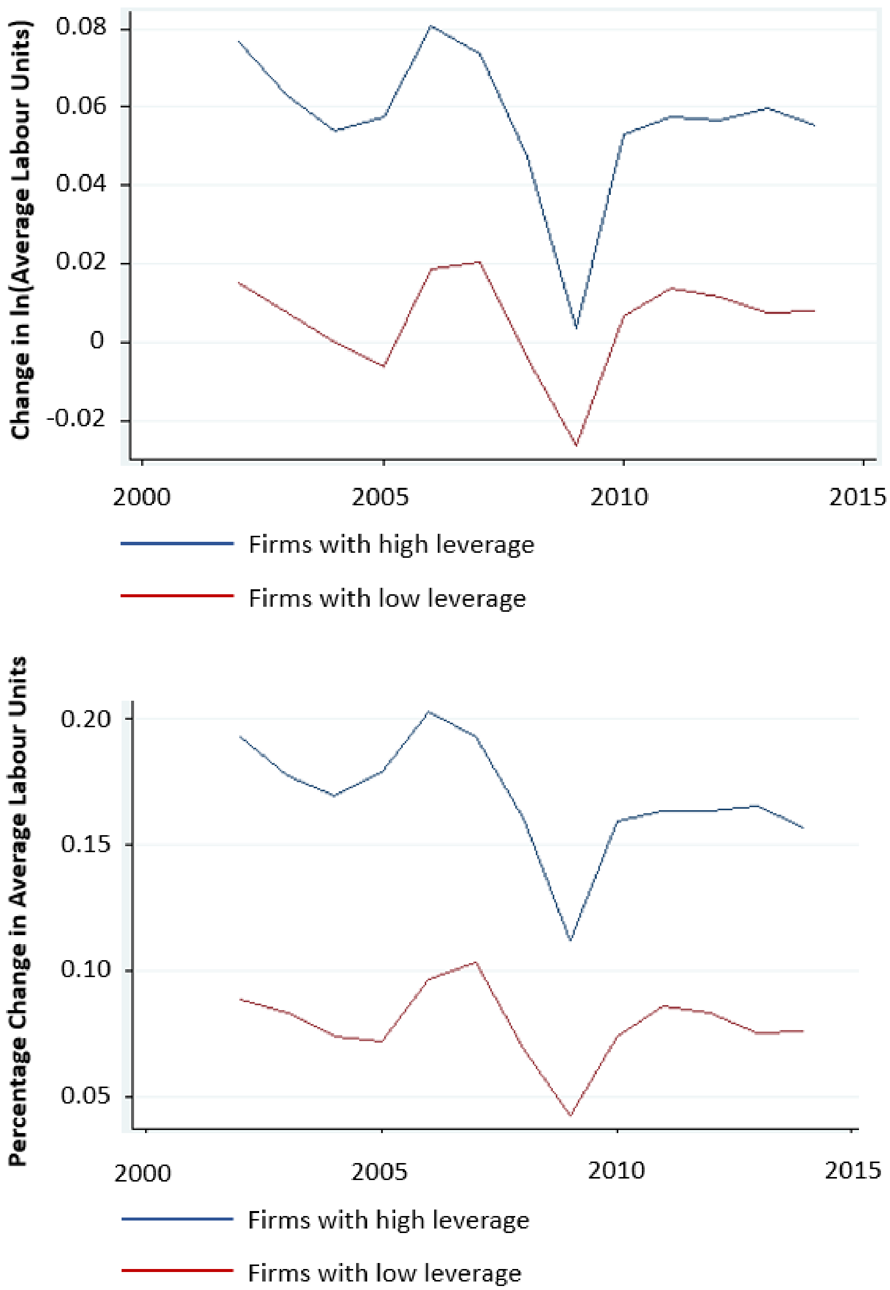
Future research may take a closer look at different sectors and examine how this pattern varies across industries. For instance, labour-intensive industries under financial constraints may see more substantially change in the labour growth rate during the recession than less labour-intensive industries. Findings of the different patterns may provide additional insights about how firms with different capital structure may react differently to recession. We provide empirical evidence that firm balance sheets play an important role in the transmission of business cycle shocks. The findings indicate that credit constraints may prevent firms from engaging in the optimal amount of labour hoarding. Given that recessions tighten the credit constraints and worsen the labour allocations, the government may want to consider policies that directly target more highly levered firms as an additional stimulus to fight the recession.

Figure 4.1 Canada Unemployment Rate (Percentage), January 2000 – December 2019



Source: Statistics Canada.

Figure 4.2 Labour Growth Rate Over Time



Source: Authors' calculations using the T2-LEAP data.

Note: High (low) leverage refers to firms with above (below) median leverage.

Table 4.1 Variable Definitions

Variable	Definition
Overall Growth Rate	Annual percentage change in the number of labour that is calculated as: $\frac{Average\ Labour\ Units_{it+1} - Average\ Labour\ Units_{it}}{Average\ Labour\ Units_{it}}$, where an average labour unit is provided by Statistics Canada and is "a measure of employment derived from the wages paid to employees divided by the average wage of those employed in firms in the same industry and region, and of the same size" (Baldwin et al., 2016, p. 13).
Conditional Growth Rate	Overall growth rate conditional on continuers only.
Total Factor Productivity (TFP)	*TFP* is measured at the firm level and is given by: $lnTFP_{it} = lnQ_{it} - \alpha_K lnK_{it} - \alpha_L lnL_{it} - \alpha_M LnM_{it}$, where Q_{it} is real output, K_{it} is real capital, L_{it} is labour input, M_{it} is real materials, and α denotes factor elasticities (Baily et al., 1992; Foster et al., 2016). Operationally, output is defined as total revenue; capital is total assets; labour input is average labour units; and materials are total expenses minus the sum of payroll and depreciation expense. Given the large differences in output measures across industries, our *TFP* measures need to control for industry differences in any comparison over industries (Foster et al., 2016). Specifically, *TFP = (Firm lnTFP - Industry-year Mean lnTFP)/Industry Standard Deviation of lnTFP*. For simplicity, we refer to this as *TFP* in the paper but it is the deviation of firm-level *TFP* from the industry-by-year average.
Recession	An indicator variable taking on value of 1 in years 2008-09.
Leverage	Ratio of total liabilities to total assets.
Size	The natural logarithm of total assets.
Age	Accumulated amortization of tangible assets divided by amortization of tangible assets.
Exit	An indicator variable taking on value of 1 if the firm exits in $t + 1$.
2008	An indicator variable taking on value of 1 for fiscal year 2008.
2009	An indicator variable taking on value of 1 for fiscal year 2009.
Leverage2007	Leverage in year 2007 for the firm.
Young	An indicator variable taking on value of 1 if age is higher than the median age.
Mature	An indicator variable taking on value of 1 if the firm is lower than the median age.

Table 4.2 Descriptive Statistics

	N	Mean	Standard Deviation
Overall Growth Rate (Continuers + Exiters)	1,352,781	0.052	0.487
Young	676,390	0.092	0.555
Mature	676,391	0.011	0.405
Exit	1,352,781	0.096	0.294
Young	676,390	0.086	0.280
Mature	676,391	0.106	0.307
Conditional Growth Rate (Continuers only)	1,223,368	0.057	0.486
Young	618,422	0.099	0.553
Mature	604,946	0.015	0.402
Firm Entry	1,352,781	0.059	0.235
TFP	1,352,781	0.000	0.999
Young	676,390	0.018	1.044
Mature	676,391	-0.018	0.954
Leverage	1,352,781	0.614	0.354
Recession	1,352,781	0.149	0.357
Size	1,352,781	15.694	16.625
Age	1,352,781	11.310	15.452
Years	2002 – 2014		

Because TFP is the deviation of firm-level TFP from its' industry-year mean, the mean of TFP is by construction, equal to 0.

Table 4.3 Firm Characteristics and Financial Constraints

Variables	(1) **Leverage**
Size	0.028***
	(0.001)
Age	-0.003***
	(0.000)
Recession	-0.053***
	(0.001)
Constant	0.225***
	(0.013)
Observations	1,352,781
Adj. R^2	5.0%
Year FE	Yes
Industry FE	Yes
Province FE	Yes

Table 4.3 reports the potential exogenous factors that may affect firms' leverage ratio.
Detailed variable descriptions are in Table 4.1.

Table 4.4 Growth Rate, Productivity, and Financial Constraints

Variables	Overall Growth Rate (Continuers + Exiters) (1)	(2)	(3)	Exit (4)	(5)	(6)	Conditional Growth Rate (Continuers Only) (7)	(8)	(9)
TFP	0.012***	0.012***	0.012***	-0.005***	-0.004***	-0.004***	0.013***	0.012***	0.012***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.0013)	(0.001)	(0.001)	(0.001)	(0.001)
Leverage	0.216***	0.219***	0.219***	-0.070***	-0.069***	-0.073***	0.213***	0.217***	0.217***
	(0.004)	(0.004)	(0.004)	(0.007)	(0.007)	(0.007)	(0.004)	(0.004)	(0.0040
TFP × Leverage	0.007***	0.006***	0.006***	0.0018	0.001	0.003	0.007***	0.007***	0.007***
	(0.001)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)
$Leverage^2$	-0.124***	-0.124***	-0.124***	0.104***	0.095***	0.104***	-0.116***	-0.116***	-0.116***
	(0.003)	(0.003)	(0.003)	(0.005)	(0.005)	(0.005)	(0.003)	(0.003)	(0.003)
Recession		0.006**			-1.059***			0.005	
		(0.003)			(0.069)			(0.003)	
TFP × Recession		0.005			-0.23***			0.004	
		(0.003)			(0.0793)			(0.003)	
Leverage × Recession		-0.022***			1.419***			-0.021***	
		(0.004)			(0.079)			(0.0034	
TFP × Leverage × Recession		0.001			0.178***			0.001	
		(0.004)			(0.065)			(0.004)	
TFP × 2008			0.004			-0.128*			0.004
			(0.004)			(0.073)			(0.004)
TFP × 2009			0.005			-0.172**			0.004
			(0.004)			(0.071)			(0.004)
Leverage × 2008			-0.037***			0.505***			-0.036***
			(0.005)			(0.051)			(0.005)
Leverage × 2009			-0.009*			0.483***			-0.007
			(0.005)			(0.053)			(0.005)
TFP × Leverage × 2008			-0.003			0.069			-0.003
			(0.005)			(0.077)			(0.005)

TFP × Leverage × 2009			0.005			0.029			0.006
			(0.005)			(0.073)			(0.006)
Size	-0.004***	-0.004***	-0.004***	0.019***	0.019***	0.019***	-0.005***	-0.005***	-0.005***
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Age	-0.009***	-0.002***	-0.002***	-0.002***	0.001***	0.001***	-0.002***	-0.002***	-0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	0.075***	0.072***	0.072***				0.084***	0.081***	0.081***
	(0.007)	(0.007)	(0.007)				(0.008)	(0.008)	(0.008)
Observations	1,352,781	1,352,781	1,352,781	1,352,781	1,352,781	1,352,781	1,223,368	1,223,368	1,223,368
Adj. R^2	1.2%	1.2%	1.1%				1.2%	1.2%	1.2%
Year FE	Yes	Yes	Yes				Yes	Yes	Yes
Industry FE	Yes	Yes	Yes				Yes	Yes	Yes
Province FE	Yes	Yes	Yes				Yes	Yes	Yes

*, **, *** indicate significance at the 10 percent, 5 percent, and 1 percent levels (two-tailed), respectively.
Numbers in parentheses are standard errors corrected for firm-level clustering.
Industry fixed effects are based on the 2-digit North American Industry Classification System (NAICS) code.
2008 and 2009 indicate fiscal years of 2008 and 2009, separately.
Detailed variable descriptions are in Table 4.1.

Table 4.5 Growth Rate, Productivity, and Financial Constraints by Firm Age

	Overall Growth Rate (Continuers + Exiters)			Exit			Conditional Growth Rate (Continuers Only)		
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Young	0.022***	0.022***	0.022***	-0.023***	-0.021***	-0.022***	0.021***	0.021***	0.021***
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)
TFP × Mature	0.013***	0.012***	0.012***	-0.007***	-0.007***	-0.007***	0.013***	0.013***	0.013***
	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
TFP × Young	0.009***	0.007***	0.007***	-0.004	-0.001	-0.002	0.009***	0.008***	0.008***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Leverage × Mature	0.182***	0.182***	0.182***	-0.087***	-0.085***	-0.091***	0.176***	0.176***	0.177***
	(0.004)	(0.004)	(0.004)	(0.007)	(0.007)	(0.007)	(0.004)	(0.004)	(0.004)
Leverage × Young	0.262***	0.268***	0.268***	-0.055***	-0.057***	-0.059***	0.262***	0.268***	0.268***
	(0.005)	(0.005)	(0.005)	(0.007)	(0.007)	(0.007)	(0.005)	(0.005)	(0.005)
TFP × Leverage ×	0.017***	0.017***	0.017***	0.005	0.005	0.006**	0.017***	0.016***	0.016***
Mature	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)	(0.002)	(0.003)	(0.002)
TFP × Leverage ×	0.006***	0.006***	0.006***	0.000	-0.001	0.000	0.006***	0.007**	0.007**
Young	(0.002)	(0.002)	(0.002)	(0.004)	(0.004)	(0.004)	(0.002)	(0.003)	(0.003)
$Leverage^2$	-0.133***	-0.133***	-0.133***	0.105***	0.096***	0.104***	-0.126***	-0.126***	-0.126***
	(0.003)	(0.003)	(0.003)	(0.005)	(0.005)	(0.005)	(0.003)	(0.003)	(0.003)
Recession		0.009***			-1.054***			0.007**	
		(0.003)			(0.069)			(0.003)	
TFP × Recession ×		0.002			-0.204*			0.001	
Mautre		(0.004)			(0.120)			(0.004)	
TFP × Recession ×		0.010**			-0.245**			0.009*	
Young		(0.004)			(0.105)			(0.004)	
Leverage ×		-0.005			1.507***			-0.001	
Recession × Mautre		(0.004)			(0.086)			(0.004)	
Leverage ×		-0.035***			1.371***			-0.034***	
Recession × Young		(0.004)			(0.085)			(0.004)	
TFP × Leverage ×		0.003			0.115			0.003	
Recession × Mautre		(0.005)			(0.092)			(0.006)	

TFP × Leverage ×		-0.003			0.205**			-0.003	
Recession × Young		(0.006)			(0.088)			(0.006)	
TFP × 2008 ×			-0.003			-0.100			-0.004
Mature			(0.005)			(0.109)			(0.005)
TFP × 2009 ×			0.006			-0.150			0.005
Mature			(0.005)			(0.094)			(0.005)
TFP × 2008 ×			0.013**			-0.143			0.012**
Young			(0.006)			(0.096)			(0.006)
TFP × 2009 ×			0.007			-0.188*			0.006
Young			(0.006)			(0.104)			(0.006)
Leverage × 2008 ×			-0.017***			0.627***			-0.014***
Mature			(0.005)			(0.086)			(0.005)
Leverage × 2009 ×			0.007			0.575***			0.011**
Mature			(0.005)			(0.094)			(0.005)
Leverage × 2008 ×			-0.051***			0.447***			-0.051***
Young			(0.006)			(0.066)			(0.006)
Leverage × 2009 ×			-0.020***			0.445***			-0.017***
Young			(0.006)			(0.067)			(0.006)
TFP × Leverage ×			0.004			0.032			0.004
2008 × Mature			(0.007)			(0.120)			(0.007)
TFP × Leverage ×			0.002			-0.057			0.002
2009 × Mature			(0.007)			(0.087)			(0.008)
TFP × Leverage ×			-0.010			0.081			-0.011
2008 × Young			(0.007)			(0.100)			(0.007)
TFP × Leverage ×			0.005			0.070			0.005
2009 × Young			(0.008)			(0.109)			(0.008)
Size	-0.004***	-0.004***	-0.004***	0.019***	0.018***	0.019***	-0.004***	-0.004***	-0.004***
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Constant	0.025***	0.022***	0.022***		0.034***		0.034***	0.031***	0.031***
	(0.007)	(0.007)	(0.007)		(0.008)		(0.008)	(0.008)	(0.008)
Observations	1,352,781	1,352,781	1,352,781	1,352,781	1,352,781	1,352,781	1,223,368	1,223,368	1,223,368
Adj. R^2	1.5%	1.5%	1.5%				1.6%	1.6%	1.6%

Year FE	Yes	Yes	Yes				Yes	Yes	Yes
Industry FE	Yes	Yes	Yes				Yes	Yes	Yes
Province FE	Yes	Yes	Yes				Yes	Yes	Yes

Table 4.5 reports results of estimating model (1) and model (2) conditional on firm age. Overall growth rate is the employment growth for continuers and exiters, and conditional growth rate is the employment growth conditional on continuers.
*, **, *** indicate significance at the 10 percent, 5 percent, and 1 percent levels (two-tailed), respectively.
Numbers in parentheses are standard errors corrected for firm-level clustering.
Industry fixed effects are based on the 2-digit North American Industry Classification System (NAICS) code.
2008 and 2009 indicate fiscal years of 2008 and 2009, separately.
Young (Mature) is an indicator variable taking on value of 1 if age is lower (higher) than the median age.
Detailed variable descriptions are in Table 4.1.

Table 4.6 Growth Rate, Productivity, and Financial Constraints (of Year 2007)

	Overall Growth Rate (Continuers + Exiters)			**Exit**			**Conditional Growth Rate (Continuers Only)**		
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
TFP	0.019***	0.018***	0.003*	-0.001	-0.001	0.000	0.019***	0.018***	0.019***
	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)
Leverage2007	0.102***	0.092***	0.003*	0.028***	0.027***	0.024***	0.115***	0.104***	0.123***
	(0.003)	(0.003)	(0.002)	(0.005)	(0.005)	(0.005)	(0.003)	(0.004)	(0.003)
TFP × Leverage2007	0.005***	0.009***	0.003*	-0.015***	-0.012***	-0.013***	0.004**	0.009***	0.002
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)
$Leverage2007^2$	-0.044***	-0.040***	-0.046***	0.015***	0.007**	0.011***	-0.049***	-0.045***	-0.051***
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)
Recession		-0.012***			-0.402***			-0.010***	
		(0.003)			(0.054)			(0.003)	
TFP × Recession		-0.001			-0.259***			-0.002	
		(0.003)			(0.070)			(0.003)	
Leverage2007 ×		-0.028***			1.119***			-0.025***	
Recession		(0.004)			(0.056)			(0.004)	
TFP × Leverage2007		0.009**			0.143**			0.010**	
× Recession		(0.004)			(0.058)			(0.004)	
TFP × 2008			0.000			-0.197**			-0.000
			(0.004)			(0.080)			(0.004)
TFP × 2009			0.002			-0.303***			0.000
			(0.004)			(0.076)			(0.004)
Leverage2007 × 2008			-0.055***			0.949***			-0.053***
			(0.005)			(0.047)			(0.005)
Leverage2007 × 2009			-0.023***			0.823***			-0.080***
			(0.005)			(0.046)			(0.005)
TFP × Leverage2007			0.007			0.118*			0.007
× 2008			(0.005)			(0.063)			(0.005)
TFP × Leverage2007			0.015***			0.128**			0.016***
× 2009			(0.006)			(0.059)			(0.006)

Size	-0.001**	0.000	-0.010**	0.008***	0.008***	0.008***	-0.002***	-0.000	-0.002***
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Age	-0.002***	-0.001***	-0.002***	0.000***	0.000***	0.000***	-0.002***	-0.001***	-0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.0000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	0.071***	0.035***	0.067***				0.080***	0.042***	0.076***
	(0.007)	(0.007)	(0.007)				(0.008)	(0.008)	(0.008)
Observations	1,288,855	1,218,462	1,288,855	1,288,855	1,218,462	1,288,855	1,177,670	1,107,318	1,177,670
Adj. R^2	1.1%	1.0%	1.1%				1.1%	1.1%	1.2%
Year FE	Yes	Yes	Yes				Yes	Yes	Yes
Industry FE	Yes	Yes	Yes				Yes	Yes	Yes
Province FE	Yes	Yes	Yes				Yes	Yes	Yes

Table 4.6 reports results of estimating model (1) and model (2) where the leverage is measured in year 2007. Overall growth rate is the employment growth for continuers and exiters, and conditional growth rate is the employment growth conditional on continuers.
*, **, *** indicate significance at the 10 percent, 5 percent, and 1 percent levels (two-tailed), respectively.
Numbers in parentheses are standard errors corrected for firm-level clustering.
Industry fixed effects are based on the 2-digit North American Industry Classification System (NAICS) code.
2008 and 2009 indicate fiscal years of 2008 and 2009, separately.
Leverage2007 is *Leverage* in year 2007 for the firm.
Detailed variable descriptions are in Table 4.1.

Table 4.7 Robustness Check

Panel A: Growth Rate, Productivity, and Financial Constraints (Lagged Leverage)									
	Overall Growth Rate (Continuers + Exiters)			**Exit**			**Conditional Growth Rate (Continuers Only)**		
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
TFP	0.015***	0.014***	0.014***	-0.005***	-0.004***	-0.003***	0.015***	0.015***	0.015***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Lag_Leverage	0.018***	0.022***	0.022***	0.076***	0.062***	0.069***	0.025***	0.029***	0.029***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
TFP × Lag_Leverage	0.014***	0.013***	0.013***	-0.005**	-0.004*	-0.004*	0.014***	0.013***	0.013***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
$Lag\_Leverage^2$	0.000**	0.000***	0.000***	-0.000***	-0.000***	-0.000***	0.000**	0.000**	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Recession		0.010***			-0.954***			0.007**	
		(0.003)			(0.064)			(0.003)	
TFP × Recession		0.002			-0.298***			0.001	
		(0.003)			(0.075)			(0.003)	
Lag_Leverage × Recession		-0.023***			1.394***			-0.020***	
		(0.004)			(0.071)			(0.004)	
TFP × Lag_Leverage × Recession		0.005			0.191***			0.006	
		(0.004)			(0.061)			(0.004)	
TFP × 2008			0.001			-0.150**			-0.000
			(0.004)			(0.075)			(0.004)
TFP × 2009			0.003			-0.238***			0.002
			(0.004)			(0.073)			(0.004)
Lag_Leverage × 2008			-0.038***			0.607***			-0.037***
			(0.005)			(0.048)			(0.005)
Lag_Leverage × 2009			-0.008			0.595***			-0.004
			(0.005)			(0.050)			(0.005)
TFP × Lag_Leverage × 2008			0.004			0.061			0.005
			(0.006)			(0.076)			(0.006)

TFP × Lag_Leverage			0.006			0.078			0.007
× 2009			(0.006)			(0.075)			(0.006)
Size	0.000	0.000	0.000	0.014***	0.014***	0.014***	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Age	-0.002***	-0.002***	-0.002***	0.001***	0.001***	0.001***	-0.002***	-0.002***	-0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	0.044***	0.042***	0.042***				0.052***	0.049***	0.049***
	(0.007)	(0.007)	(0.007)				(0.008)	(0.008)	(0.008)
Observations	1,272,539	1,272,539	1,272,539	1,272,539	1,272,539	1,272,539	1,144,444	1,144,444	1,144,444
Adj. R^2	0.9%	0.9%	0.9%				1.0%	1.0%	1.0%
Year FE	Yes	Yes	Yes				Yes	Yes	Yes
Industry FE	Yes	Yes	Yes				Yes	Yes	Yes
Province FE	Yes	Yes	Yes				Yes	Yes	Yes

Table 4.7 reports results of estimating model (1) and model (2) where the leverage is measured in year *t* - 1. Overall growth rate is the employment growth for continuers and exiters, and conditional growth rate is the employment growth conditional on continuers.
*, **, *** indicate significance at the 10 percent, 5 percent, and 1 percent levels (two-tailed), respectively.
Numbers in parentheses are standard errors corrected for firm-level clustering.
Industry fixed effects are based on the 2-digit North American Industry Classification System (NAICS) code.
2008 and 2009 indicate fiscal years of 2008 and 2009, separately.
Lag_Leverage is the leverage ratio of the prior year for the firm.
Detailed variable descriptions are in Table 4.1.

Panel B: Growth Rate, Productivity, and Financial Constraints (High Leverage Indicator)

	Overall Growth Rate (Continuers + Exiters)				**Exit**		**Conditional Growth Rate (Continuers Only)**		
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
TFP	0.002	0.001	0.000	-0.004***	-0.004***	-0.003***	0.002	0.001	0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
High Leverage	0.039***	0.041***	0.041***	0.022***	0.018***	0.021***	0.042***	0.044***	0.044***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
TFP × High Leverage	0.024***	0.024***	0.025***	-0.010***	-0.008***	-0.009***	0.024***	0.024***	0.024***
	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
Recession		-0.002			-0.400***			-0.002	
		(0.003)			(0.067)			(0.003)	
TFP × Recession		0.005**			-0.079			0.006**	
		(0.003)			(0.061)			(0.003)	
High Leverage × Recession		-0.011***			0.460***			-0.011***	
		(0.003)			(0.078)			(0.003)	
TFP × High Leverage × Recession		0.002			-0.107*			-0.000	
		(0.004)			(0.060)			(0.004)	
TFP × 2008			0.008**			-0.117			0.008**
			(0.004)			(0.088)			(0.004)
TFP × 2009			0.009**			-0.255***			0.008*
			(0.004)			(0.079)			(0.004)
High Leverage × 2008			-0.019***			0.155***			-0.020***
			(0.003)			(0.039)			(0.003)
High Leverage × 2009			-0.003			0.116***			-0.003
			(0.003)			(0.041)			(0.003)
TFP × High Leverage × 2008			-0.006			-0.008			-0.008
			(0.005)			(0.098)			(0.005)
TFP × High Leverage × 2009			0.001			0.062			0.001
			(0.005)			(0.094)			(0.005)
Size	-0.003***	-0.003***	-0.003***	0.018***	0.018***	0.017***	-0.004***	-0.004***	-0.004***
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)

Age	-0.002***	-0.002***	-0.002***	0.001***	0.001***	0.001***	-0.002***	-0.002***	-0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	0.100***	0.098***	0.098***				0.109***	0.107***	0.107***
	(0.007)	(0.007)	(0.007)				(0.008)	(0.008)	(0.008)
Observations	1,352,781	1,352,781	1,352,781	1,352,781	1,352,781	1,352,781	1,223,368	1,223,368	1,223,368
Adj. R^2	1.0%	1.0%	1.0%				1.1%	1.1%	1.1%
Year FE	Yes	Yes	Yes				Yes	Yes	Yes
Industry FE	Yes	Yes	Yes				Yes	Yes	Yes
Province FE	Yes	Yes	Yes				Yes	Yes	Yes

Table 4.8 reports results of estimating model (1) and model (2) where the leverage ratio is replaced with an indicator of high level of leverage. Overall growth rate is the employment growth for continuers and exiters, and conditional growth rate is the employment growth conditional on continuers.
*, **, *** indicate significance at the 10 percent, 5 percent, and 1 percent levels (two-tailed), respectively.
Numbers in parentheses are standard errors corrected for firm-level clustering.
Industry fixed effects are based on the 2-digit North American Industry Classification System (NAICS) code.
2008 and 2009 indicate fiscal years of 2008 and 2009, separately.
High Leverage is an indicator for firms with a leverage ratio that is higher than the 25% percentile.
Detailed variable descriptions are in Table 4.1.

Chapter 5 Conclusions

The objective of my thesis is to investigate factors that affect management's labour investment decisions and how management of labour influences firm performance. My first study examines how firms adjust their labour in response to business downturns, how different labour adjustment practices influence firm performance, and what factors drive firms' labour adjustment practices. My second study investigates whether higher ability managers attain better performance outcomes through labour investment. My third study examines how financial constraints affect labour adjustment during the recession.

In my first study, I examine how different labour adjustment strategies relate to firms' financial performance. I construct a measure of labour stickiness by comparing the amount of labour added per dollar change in sales when sales increase to the amount of labour subtracted per dollar change in sales when sales decrease. I classify firms into three groups based on labour stickiness: those with more stable labour adjustment strategies (high labour stickiness), those with more flexible labour adjustment strategies (low labour stickiness), and those with moderate labour adjustment strategies. Using data provided by Statistics Canada, I find that companies with more stable labour adjustment strategies underperform and that companies with more flexible labour adjustment strategies outperform in terms of return on assets, relative to companies with moderate labour adjustment strategies. Using DuPont analysis, I find that underperformance of stable companies is due to lower efficiency (asset turnover) and the superior performance of flexible firms is due to higher efficiency. Both the stable and flexible adjustment strategies achieve higher profit margin than the moderate strategies. In fact, stable firms achieve even higher profit margin than flexible firms, consistent with the resource-based view of human capital. I also find firms that are older, that have lower leverage, and that have proportionately lower tangible assets exhibit more labour stickiness. Finally, higher stickiness is associated with lower earnings volatility, but lower stickiness is associated with less likelihood of exit in future periods. My findings on the effects of labour resource adjustment practices on firms' performance shed light on management's resource commitment decisions in response to movements in the business cycles for a wide range of firms and industries. The findings on stable strategies and their impacts on future performance are particularly interesting: firms with stable strategies may deliberately give up return on physical capital and share some of the surplus with their employees – a form of return on their investment in human capital (Becker, 1964). As a result, they achieve higher profit margin compared with other types of firms.

In the second study, I use a measure of managerial ability derived using data envelopment analysis (DEA) and investigate whether higher ability managers attain better performance outcomes through labour investment. The results indicate that higher ability managers make more efficient investments in labour as represented by smaller deviations from expected net hiring. This finding holds when splitting the sample into over- and under-investment subsamples, using alternative measures of labour investment efficiency, and is robust to controlling for factors that may affect the efficiency of net hiring practices, including financial reporting quality, institutional ownership, and other investments. Therefore, managers of higher ability are better able to overcome "empire-building" tendencies to over-invest and "risk or loss-aversion" tendencies to under-invest in labour. This study replicates evidence that abnormal net hiring, or labour investment inefficiency, is negatively associated with future firm performance, indicating that deviation from the expected level of net hiring is costly in terms of future firm performance. It then shows that this negative impact of deviations is mitigated by managerial ability, providing evidence that higher ability managers either anticipate labour needs or utilize acquired labour more effectively. This result holds whether deviations from expected hiring are positive or negative. This study provides evidence about the ways that higher ability managers use a specific type of resource, labour, to generate higher returns on invested capital. In particular, I make specific contributions to understanding management qualities that are associated with higher managerial ability, including more accurate appraisal of investment opportunities, avoidance of agency tendencies to over or under-invest, and utilization of acquired resources.

In the third study, I investigate how companies adjust their employment in recessions with a focus on credit constraints. Using administrative data that contain the population of Canadian firms, I apply the differences-in-differences method to compare firms before and after the Great Recession by exploiting different intensity of credit-constraint in the pre-recession period. I find an inverted U-shaped relationship between leverage and labour growth rate, suggesting that debt accommodates labour growth up to a certain point, but adding additional debt imposes financial constraints on the firms' ability to effectively manage labour growth. Recession enlarges the impact of financial constraints on growth rate. This is true for both the overall growth rate for all firms and the conditional growth rate for continuers only. More productive firms are more likely to grow, even for highly leveraged firms. They are also less likely to exit during both normal times and recession. The patterns observed above mostly hold for both mature and young firms but are mainly for young firms. Lastly, graphs show that highly leveraged firms incur a sharper decline in the labour growth rate during the recession compared to firms with lower leverage. This study adds to the existing literature on the relationship between financial leverage and labour decisions by providing reliable new large-sample Canadian evidence on this relationship. The T2-LEAP data cover both small privately-held companies as well as large publicly-traded companies that enable me to explore the impact of capital structure that affects labour adjustment and investment, for a wide range of firms and industries. Findings on the effects of leverage on firms' labour investment decisions during the recession shed light on management decision making in response to movements in the economic cycles.

The results from the three studies provide useful insights for management decision making regarding labour and contribute to our understanding of the role of effective management of labour investments in managerial resource allocation decisions. The mapping from labour management strategies and investment decisions to financial performance indicates how managerial accounting systems may be used by managers to understand, evaluate, adjust, and make effective use of firm resources, such as human resources. Understanding factors that affect labour investment decisions and the impact of such decisions would help managers appropriately manage human capital and plan actions to achieve better performance.

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