

# **Determinants and Consequence of Cost Stickiness**

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# **Determinants and Consequence of Cost Stickiness**

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## ABSTRACT

This research investigates the determinants and consequence of cost stickiness using data of publicly listed U.S. firms. Understanding the determinants of cost stickiness and its implications is extremely crucial, since it affects firms' profitability, consequently, shareholders' wealth. Moreover, cost management has even wider repercussions for both debt and equity investors in the areas of risk assessment and the trust of customers, employees, and other stakeholders in the community. Therefore, this study is organised into three different research essays: (i) financial constraint and cost stickiness; (ii) trade credit and cost stickiness; and (iii) cost stickiness and firm value.

Essay One investigates the association between financial constraints and cost stickiness. Using a large U.S. sample from 1976 to 2016, I find that financially constrained firms exhibit less cost stickiness. I document that such low-cost stickiness supports both "good" and "bad" arguments depending on the managerial motivation, namely: earnings management incentives, agency problem and value-creating potential of SG&A costs. I also investigate whether the association between financial constraints and cost stickiness varies across the economic cycle. I find that low cost stickiness is observed during both economic expansion and economic contraction periods, although it is more pronounced during contraction. As resources drive the cost of a business, and financial constraints affect resource availability, studying cost behaviour of constrained firms makes a valuable contribution to the existing cost stickiness literature.

In Essay Two, I examine the relation between trade credit and cost stickiness and further investigate the moderating effects of agency problem, product market competition, and customer concentration. I find that firms using high levels of trade credit exhibit lower cost stickiness and this is prevalent in the high agency problem sub-sample. In addition, in a non-competitive market, where the agency problem arises owing to lack of competition, trade credit

plays an external monitoring role by attenuating cost stickiness. However, high customer concentration curtails this monitoring ability of trade credit providers.

Finally, in Essay Three, I investigate the association between cost stickiness and firm value, and examine whether the association, if any, is mediated by cost of equity capital and cash flows. Using a large sample of U.S. data, I find a robust negative relationship between cost stickiness and firm value. I then explore whether resource adjustment, managerial expectations, and agency theories of cost stickiness affect the negative relation, and find some support for the agency view. Furthermore, I find evidence that the detrimental impact of cost stickiness on firm value is mediated partially through the cost of equity and cash flow channels. I enrich the cost management literature by integrating cost asymmetry with corporate finance.

**Keywords:** Cost asymmetry; Cost behaviour; Financial constraint, Trade credit, Firm value, Agency problem, Resource adjustment, Managerial expectation

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*Dedicated to*  
*Baba, Ma,*  
*Shanta, Sanjib da & Shimanto*

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*“You never know God is all you need until God is all you have.” – Rick Warren*

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# CHAPTER ONE

## INTRODUCTION

### 1.1 Motivations for the Research

Traditional cost behaviour identifies all costs as either fixed or variable with respect to concurrent sales, or some other cost driver (e.g. Anderson et al., 2003; Banker & Byzalov, 2014). However, in reality, the relation between cost and cost driver is more complex (Noreen, 1991), in that some costs rise more with increases in activity, than they decrease with proportionate decreases in activity levels (Cooper & Kaplan, 1998): a phenomenon known as ‘cost stickiness’. For example, Anderson et al. (2003) find that selling, general, and administrative (SG&A) costs increase by 0.55% for each 1% increase in sales; however, SG&A costs decrease by only 0.35% for each 1% decrease in sales. In this thesis I examine the determinants and consequences of cost stickiness.

A plethora of academic research has documented evidence of cost stickiness in the U.S. and in international contexts. Some of the firm-level determinants of stickiness include prior activity change (Banker & Byzalov, 2014), managerial incentives (e.g. Dierynck et al., 2012; Kama & Weiss, 2013; Banker & Byzalov, 2014), organizational capital (Venieris et al., 2015), and investment in corporate social responsible activities (Habib & Hasan, 2019). All these studies on the drivers of asymmetric cost behaviour are grounded on three theories, namely, resource adjustment theory, managerial expectation theory, and agency theory (Hartlieb et al., 2020; Banker et al., 2018).

Resource adjustment theory is premised on the notion that many costs arise from managers’ deliberate resource commitment decisions. Once committed, it is not easy to scale back resources without incurring some adjustment costs: defined as “economic sacrifices, social, contracting or psychological costs, which emerge during the resource-adjustment

process” (Venieris et al., 2015, p. 55). Thus, managers take the decision based on cost-benefit analysis. For instance, the labour adjustment cost has been found to induce stickiness (Banker et al., 2013; Golden et al., 2020). Managers are likely to enter into contract for resources, which are costly to renegotiate; thus, when demand falls, managers are bound to retain those slack resources, because discarding them would incur obligatory contractual costs, such as severance payments (Calleja et al., 2006). Thereby, owing to high adjustment costs, managers will reduce costs to a lesser extent when activity decreases than they will expand costs when activity increases, therefore, generating cost stickiness.

Managerial expectation theory posits that when managers are optimistic (pessimistic) about future demand, they are likely to retain (reduce) slack resources in the event of declining demand (Banker & Byzalov, 2014; Banker et al., 2014). If the resource adjustment cost is high and the manager expects that sales will increase in future it would be unwise and expensive to dispose slack resources. However, if the resource adjustment cost is low but slack resource levels are high, managers’ expectation of future demand should have no impact on cost stickiness (Chen et al., 2019a).

Finally, agency theory suggests that self-serving managers tend to engage in empire building by retaining unutilized resources in order to grow the firm beyond its optimal size (Chen et al., 2012; Hope & Thomas, 2008; Jensen, 1986; Masulis et al., 2007; Stulz, 1990). Managers’ decisions to retain unutilized resources are driven by personal motives instead of economic rationales (Hartlieb et al., 2020). Such self-serving managerial actions induce cost stickiness, as slack resources are retained when demand declines.

“The relation of costs to sales is of crucial importance since it determines net profit, the maximization of which is the basic goal of organizations” (Brüggen & Zehnder, 2014, p. 170). Additionally, cost management has even wider repercussions for both debt and equity investors in the areas of risk assessment and the trust of customers, employees (with respect to job

security) and other stakeholders in the community. Despite the significance of ‘availability of resources’ as a driver of cost management, very little research, as of yet, has investigated the extent to which firm-level financial constraints affect cost stickiness. This is surprising, since the availability of resources affects cost behaviour, and constrained firms naturally suffer from resource shortages. Thereby, for Essay One I choose cost stickiness as the appropriate lens for understanding the effects of financial constraints.

I predict that costs would be less sticky for constrained firms, because managers of financially constrained firms should decrease slack resources to control costs, to maintain profitability, and to generate internal finance for investment or expansion of their business. When sales decrease, financially constrained firms suffer a relatively greater reduction in the present value of revenue. Consequently, they decrease costs by a higher amount (Cheng et al., 2018); thus, exhibit less cost stickiness. Importantly, costs also do not increase with an increase in sales, because financially constrained firms encounter higher costs of capital from both equity and debt providers. This prediction supports the “efficiency” view of cost stickiness, which implies that firms will decrease unused resources for the right reasons i.e., for survival. On the other hand, retaining unutilised resources by managers of financially-constrained firms for ‘empire building’ reasons, is a manifestation of “bad” cost stickiness, i.e., stickiness stemming from the wrong reasons (Banker et al., 2018). Examining whether cost is sticky or less sticky provides only a partial explanation; therefore, it is crucial to examine *why* the cost behaves in a certain way. Thus, I use three contextual settings to examine cost behaviour by financially-constrained firms. These contexts are the earnings management context; the agency context; and the value-creating potential of SG&A costs context.

In Essay Two I explore the association between trade credit and cost stickiness, and whether this association, if any, is moderated by agency problem, product market competition and customer concentration. Trade credit is the major source of external finance for many firms

around the globe (see, e.g. Abdulla et al., 2017; Afrifa et al., 2018; Demirgüç-Kunt & Maksimovic, 1999; Fabbri & Klapper, 2016; Wilson & Summers, 2002). Accounts payable, the major component of trade credit, comprises 25% of total liabilities, 35.36% of current liabilities and 9% of total sales in my sample of U.S. firms from 1977 to 2017. Suppliers are willing to provide trade credit because it offers them a comparative advantage over financial institutions in acquiring information (see, e.g., Ferrando & Mulier; 2013; Goto et al., 2015; Martínez-Sola et al., 2013), evaluating the creditworthiness of buyers, and enforcing credit contracts (see, e.g. Burkart & Ellingsen, 2004; Fabbri & Menichini, 2010). However, by doing so, the suppliers put themselves at risk, because there is the possibility that the buyer might misuse resources, e.g., invest heavily in unproductive expenses including in cost of goods sold (COGS) and SG&A costs, thereby, increasing the default risk. This not only leads to significant losses for suppliers, but also increases their bankruptcy risks (Jacobson & Von Schedvin, 2015). Such concerns naturally motivate suppliers to be active monitors of resource usage by customers: a function that is facilitated by the holding of private information about their buyers.

According to Anderson et al. (2003) and Brüggem and Zehnder (2014), managers retain unused resources in order to avoid adjustment costs. However, agency theory dictates that cost stickiness results from the self-serving behaviour of managers, who are likely to engage in empire building by retaining unutilised resources in order to grow the firm beyond its optimal size (see, e.g. Chen et al., 2012; Hope & Thomas, 2008; Jensen, 1986; Masulis et al., 2007; Stulz, 1990). Prior studies find that managers' empire building tendencies lead to cost stickiness, but the relation is weaker under strong corporate governance, implying that corporate governance can mitigate the agency problem (see, e.g. Chen et al., 2012). Prior literature on trade credit has provided evidence supporting the corporate governance role of trade credit (see, e.g. Cao et al., 2018; Fisman & Love, 2003; McMillan & Woodruff, 1999; Petersen & Rajan, 1997). Thereby, I posit that, when sales decrease, trade credit will play a stronger monitoring

role by forcing buyers to cut slack resources in firms plagued with marked agency problem. Thus, I expect trade credit to lessen cost stickiness in firms with marked agency problem, when compared with their immaterial agency problem counterparts.

Agency problem is more acute for firms operating in non-competitive industries, and existing evidence shows that market competition acts as an external governance mechanism that reduces agency problem (Giroud & Mueller, 2011; He, 2012) by disciplining managers and encouraging operational efficiency (Liu et al., 2017a). Thus, I predict that firms operating in non-competitive industries will benefit more from the monitoring role of trade credit in restraining manager's opportunistic empire building behaviour. It is also intuitive to expect that customer size can influence the monitoring power exerted by suppliers on customers. Prior studies find that major customers exert bargaining power over suppliers by demanding lower prices and delayed payments (see, e.g. Bhattacharyya & Nain, 2011; Campello & Gao, 2017; Fee & Thomas, 2004; Murfin & Njoroge, 2014). In such a scenario, if suppliers enforced their monitoring role on customers, profits would reduce, and the volatility of suppliers' earnings and cash flow would increase (see, e.g. Balakrishnan et al., 1996; Gosman & Kohlbeck, 2009; Huang et al., 2016; Piercy & Lane, 2006; Ravenscraft, 1983). Therefore, I would expect suppliers to play a more prominent monitoring role in the low customer concentration subsample, because of their customer's relatively weak bargaining power and high switching costs.

While a plethora of studies have examined the determinants of cost stickiness (see Banker et al., 2018 for a comprehensive review), surprisingly little evidence exists on its implications. Weiss (2010, p. 1442), who documents a positive relationship between cost stickiness and the analyst forecast error argues that a firm with higher cost stickiness demonstrates greater decline in earnings because ".....stickier costs result in a smaller cost adjustment when activity level declines and, therefore, lower cost savings [which] result in a greater decrease in earnings. This greater decrease in earnings when the activity levels fall

increases the variability of the earnings distribution, resulting in less accurate earnings predictions.”. Weiss (2010) also finds that firms with stickier costs have lower analyst coverage, and that investors rely less on such firms’ realized earnings because of their lower predictive power. Ciftci et al. (2016), reveal that analysts are unable to recognize and incorporate the ‘sticky’ nature of costs in their forecasts: a feature that increases error in earnings prediction. In addition, cost stickiness has been found to increase credit risk. Firms encounter increased default and credit risk owing to higher earnings and asset volatility stemming from cost stickiness (Homburg et al., 2016). Similar to analysts, managers are also unable to incorporate asymmetric cost behaviour, as Ciftci and Salama (2018) show that cost stickiness leads to greater errors in management earnings forecasts. Thus, in Essay Three I examine the association between cost stickiness and firm value, and the mediating effect of cost of equity capital and cash flows on this relationship, if any.

From resource adjustment and managerial expectation theory, I hypothesize that cost stickiness may not affect firm value adversely, as investors are likely to consider the downward resource adjustment costs (e.g., economic sacrifices, social, contracting or psychological costs) associated with disposing of slack resources when demand declines. From managerial expectation theory angle, when managers are optimistic (pessimistic) about future demand, then they are likely to retain (dispose) slack resources in the event of declining demand, to avoid future (current) adjustment costs (Venieris et al., 2015). Changes in managerial expectation, therefore, could affect the firm value differentially. However, agency theory perspective suggests that managers with empire-building tendencies are *unlikely* to reduce unutilised resources when sales decline (Chen et al., 2012): a phenomenon that should affect firm value adversely.

## **1.2 Findings of the Research**

Using a large sample consisting U.S. public listed firms, my overall findings suggest that financial constraint leads to less cost stickiness and, owing to the monitoring role of suppliers, trade credit lowers cost stickiness. From the implication perspective of cost stickiness, my evidence suggests that cost stickiness destroys firm value.

Using three different measures of firm level financial constraints in Essay One, I document that financially constrained firms do, indeed, exhibit less cost stickiness, and such low cost stickiness is a manifestation of both “good” and “bad” cost stickiness. I further investigate whether the business cycle moderates low cost stickiness for constrained firms. I predict that costs would be less sticky for financially constrained firms during both expansion and contraction periods, although the effects should be more pronounced during the contraction phase. During expansion, most firms operate in a favourable business environment, owing to lower information asymmetry (Choe et al., 1993). Therefore, investors are likely to charge a higher cost for the constrained firms, and this leads to use of internal capital. Covas and Haan (2011) document the observation that internal financing is procyclical. During contractionary periods external investors have limited capital. Therefore, they are more selective in providing finance, consequently, external financing turns out be extremely expensive, or even unavailable, to constrained firms. My empirical evidence documents the existence of low stickiness for financially-constrained firms during both economic expansion and economic contraction periods.

In Essay Two I use three different widely used measures of trade credit, and document that trade credit results in relatively low COGS and SG&A cost stickiness for all three measures of trade credit. I also find some evidence that trade credit-induced lower cost stickiness is prevalent in high agency problem sub-sample as compared to low agency problem sub-sample. This implies that trade credit restrains the empire building tendencies of managers in high

agency problem firms, by forcing them to dispose unutilized resources when sales decline. I also find that firms operating in non-competitive markets with more trade credit show low cost stickiness, as the magnitude of the coefficient on the interactive variable, trade credit and cost stickiness, is positive and statistically significant in the low, as opposed to the high, product market competition group. Finally, with respect to the moderating effects of customer concentration on the association between trade credit and cost stickiness, I find the coefficients on the interactive variable to be positive and significant for *both* low and high customer concentration groups.

Finally, in Essay Three I document that operating cost stickiness *reduces* firm value. In terms of economic magnitude, a one standard deviation increase in cost stickiness decreases firm value by 2.44 percent relative to its mean. An additional test suggests that this detrimental relationship between cost stickiness and firm value exists owing to investor recognition of agency problem associated with retention of slack resources. Further, I find evidence that this negative relation between cost stickiness and firm value is *partially* mediated through both the cost of equity and the cash flow channels, as the *direct effect* of cost stickiness on firm value accounts for the bulk of the total effect. The negative relationship between cost stickiness and firm value also holds for two other cost components, namely, SG&A and COGS.

### **1.3 Contributions & Implications of the Research**

In general, one of the studies contribute to the line of research that integrates management accounting (asymmetric cost behaviour) with financial accounting and corporate finance. Specifically, through Essay One I make the following contributions: first, it fills the void in the literature on how resource availability affects cost behaviour. Since costs are driven by resources, and resource availability depends on access to capital, studying the cost behaviour of constrained firms makes a valuable contribution to the existing cost asymmetry literature.

Second, it describes how financial constraint impacts SG&A costs behaviour, and how this relation persists during economic cycles. Third, it is one of the first studies to test the relation between financial constraints and cost behaviour in the context of “good” versus “bad” cost stickiness (Brüggen & Zehnder, 2014).

Essay Two, on the other hand, contributes firstly by reconfirming trade credit’s monitoring role from a cost management angle. To the best of my knowledge, this is the first study to examine the relation between trade credit and cost stickiness. Although a plethora of research has explored the determinants of trade credit (Seifert et al., 2013), very little research examines the monitoring role of trade credit (see, e.g. Cao et al., 2018; McMillan & Woodruff, 1999). Therefore, the findings of this study contribute to both cost management and trade credit literatures. Secondly, besides documenting that firms using high levels of trade credit exhibit less cost stickiness, I further show that such behaviour is desirable, because it disciplines opportunistic managers. Thirdly, I contribute to the product-market competition and customer concentration literature by documenting that the trade-credit and cost behaviour relationship varies conditional on the characteristics of the market in which the firms operate, as well as on the suppliers’ incentives for monitoring the cost management approaches of their buyers. Finally, the presence of trade credit is likely to assure investors, and increase other stakeholders’ confidence, regarding the operational efficiency of firms, especially when the external governance system is weak. Therefore, firms can send positive signals to investors and other stakeholders through trade credit finance.

Essay Three makes a significant contribution to understanding how cost stickiness could explain firm value, because it is not clear *ex-ante* whether the findings documented by Weiss (2010) will mean that firms having more cost stickiness will have lower market value. Because costs are a core driver of firm profitability, consequently, firm value. Therefore, it is important to understand how cost stickiness affects firm value, since the maximization of firm value is

considered to be the primary objective of the firm (Jensen & Meckling, 1976). Weiss (2010) uses three-day cumulative abnormal return (CAR) surrounding the earnings announcement dates to proxy for market response to quarterly earnings announcements. However, such a short window may fail to capture managerial resource adjustment decisions. This is because companies make resource adjustment decisions throughout the year, and the chosen short window may not coincide with any significant resource adjustment decisions. Hence, taking a longer time span of one year could ensure that resource adjustment decisions during the entire year are incorporated into firm value; thereby, overcoming the limitations of the short window test to some extent.

Understanding the implications of cost stickiness is important for managers as well as investors. Managers need to be aware of how their deliberate resource adjustment decisions could affect the overall financial health of the firm. Feedback from the market could enable them to be more efficient in managing resources. From the perspective of the investors, it is important that they understand the rationale behind retaining slack resources. A myopic view that fails to recognize the rationale for retaining resources: i.e., to minimize resource adjustment costs; might lead them to conclude erroneously that retention of unutilised resources is detrimental to firm value. Therefore, my study provides a timely contribution to the limited research on the implications of cost stickiness.

## **1.4 Organization of the Research**

The remainder of the thesis proceeds as follows: Chapters two, three and four review the related literature, develop the hypotheses, discuss research methods and sample selection, with analysis of test results for essay one, two and three, respectively. Essay one is titled “Financial constraint and cost stickiness”, essay two is titled “Trade credit and cost stickiness” and the third essay is

titled “Cost stickiness and firm value”. Chapter five concludes the thesis with its implications and limitations, and outlines the scope for future related research.

## CHAPTER TWO

### FINANCIAL CONSTRAINT AND COST STICKINESS (ESSAY ONE)

This study investigates the association between financial constraints and cost stickiness. Anderson et al. (2003) document that SG&A costs are sticky i.e. costs rise more when sales increase, but decrease less when sales decrease. However, costs can be anti-sticky as well, implying that the rise in costs when sales increase is less than their fall when sales decrease (e.g. Weiss, 2010; Banker & Byzalov, 2014). Despite the significance of ‘availability of resources’ as a driver of cost management, very little research as of yet has investigated the extent to which firm-level financial constraints affect cost stickiness. This is surprising since availability and accessibility to finance impacts the availability of resources, and that in turn, impacts cost behaviour.

Lamont et al. (2001) define financial constraints as frictions that prevent firms from funding their desired investments<sup>1</sup>. In a frictional environment, investment and growth depend largely on the availability of internal capital, as the cost of raising outside capital can be high relative to that of internally generated funds. This is particularly true for financially constrained firms that face severe agency and transaction costs in accessing external capital markets (Korajczyk & Levy, 2003). As constrained firms have to pay high interest rate on loans, they rely heavily on other sources of finance, e.g., trade credit and internal fund to finance continuation of their operation (Mulier et al., 2016). Consequently, constrained firms with attractive growth opportunities but without access to external financing may invest less into optimal value-increasing investment projects, resulting in lower future growth and firm value.

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<sup>1</sup>This study focuses on financial constraint, not financial distress. Senbet and Wang (2012) note that distressed firms are unable to keep the promises made to creditors. In other words, financial distress refers to the inability of a company to pay its financial obligations as they mature (Beaver et al., 2011).

Young and small firms are likely to be financially constrained because such firms suffer from high information asymmetry (Beck et al., 2006; Arslan et al., 2006; Hadlock & Pierce 2010). Firms that pay dividend (Fazzari et al., 1988), have affiliation with business groups (Hoshi et al., 1991; Kato et al., 2002), and are politically connected (Poncet et al., 2010; Shen & Lin, 2016; Cull et al., 2015) are found to be financially unconstrained. Prior research documents a number of consequences of financial constraints, including increased earnings management (Kurt, 2017), high engagement in corrupt activities (Lopatta et al., 2017), and aggressive tax planning (Edwards et al., 2016; Law & Mills, 2015).

Firms incur costs even when firms are faced with financial constraints, because some of those costs are contractual, and failing to pay those could lead to bankruptcy (Chen et al., 2019b). Therefore, it is not unlikely that financially constrained firms may retain slack resources even when sales decline: an action that leads to higher cost stickiness. However, from a resource adjustment cost perspective, I posit that financial constraints will result in lower cost stickiness for SG&A costs. When sales decrease, financially constrained firms suffer a relatively greater reduction in the present value of revenue, thereby, forcing them to cut back on unutilized resources. Importantly, costs do not increase with an increase in sales, because financially constrained firms encounter higher costs of capital from both equity and debt providers. Consequently, they decrease costs by a higher amount (Cheng et al., 2018), thus, exhibiting lower cost stickiness. Said differently, financially constrained firms may put less weight on future adjustment costs, and more weight on the costs of unused capacity, thus altering the trade-offs involved in their resource allocation decision.

Cheng et al. (2018) document anti-sticky cost behaviour for a sample of Chinese private firms using a regional financial development index as a proxy for access to finance. However, my paper differs from the Cheng et al. (2018) paper in a number of important ways. Cheng et al. (2018) use a sample consisting of only small and private Chinese companies. These firms,

compared to listed firms, have access to the debt market only. Therefore, the findings of Cheng et al. (2018) are unlikely to be generalizable to U.S. listed firms, which have access to both debt and public equity markets, and are much larger in size. In addition, prior research show that in emerging market government plays a role in allocation of financial resources (Cull et al. 2015; Chen et al., 2017). Cheng et al. (2018) use regional financial development as a proxy for financial constraints. However, such a macroeconomic variable fails to incorporate firm-specific idiosyncrasies that can affect the magnitude of financial constraints differentially. I overcome this problem by using firm-specific financial constraint measures. I also use three contextual settings, where the association between financial constraints and cost stickiness could become more, or less, pronounced.

## **2.1 Literature Review & Hypotheses Development**

In the seminal paper of Anderson et al. (2003) on cost stickiness, the authors propose two theories underlying cost stickiness: adjustment cost theory and agency theory. The former relies on the notion that many costs, arise from managers' deliberate resource commitment decisions. Once committed, it is not easy to scale back resources without incurring some kind of adjustment costs. Therefore, to the extent that managers recognize the trade-offs arising because of adjustment costs, they will reduce costs to a lesser extent when activity decreases than they will expand costs when activity increases and, thereby, generate cost stickiness. Agency theory-based arguments for cost stickiness consider the self-serving behavior of managers, who are likely to engage in empire building by retaining unutilized resources in order to grow the firm beyond its optimal size (Chen et al., 2012; Hope & Thomas, 2008; Jensen, 1986; Masulis et al., 2007; Stulz, 1990). Such actions induce cost stickiness, as slack resources are not disposed of when sales decline. In addition, managerial expectation has also been used to explain asymmetric cost behaviour (Banker & Byzalov, 2014; Banker et al., 2014b). If managers are

optimistic about future demand, they are likely to retain slack resources even when sales decrease; whereas, if managers are pessimistic about future demand then they are likely to dispose slack resources when sales decline.

Cost behaviour is driven by the availability of resources; and the availability of resources, in turn, depends on the availability of finance. Firms face financial constraints for various reasons, such as capital market imperfections stemming from information asymmetry, weak institutional settings (Chen et al., 2017), agency problem (Pawlin & Renneboog, 2005) and risk (Senbet & Wang, 2012); as a result, firms' are unable to borrow or issue equity (Lamont et al., 2001). If firms operated under frictionless capital markets then managers did not have to make trade-off decisions regarding which projects to invest in and which projects to forgo, as the availability of abundant resources would have enabled managers to invest in all positive NPV projects. However, in the real-world frictional markets, investment and growth depend largely on the availability of internal capital, as the cost of raising outside capital could be high relative to that of internally generated funds. Consequently, firms with attractive growth opportunities but without access to external financing may invest less into optimal value-increasing investment projects. Financial constraints, therefore, will require managers to carefully consider retaining or disposing slack resources for optimizing future growth and firm value.

From the resource adjustment cost perspective, I posit that when sales decrease it becomes more costly to maintain unutilized resources for constrained firms, because such resources incur additional costs which, in turn, place further constraints on the financial health of the firm. Maintaining unutilized resources decreases the present value of sales, and increases the opportunity cost of keeping unused resources and, thereby, decreases firm profitability. Especially, successive decreases in sales make it more costly, at a given time, for constrained firms to maintain slack resources for future periods. Moreover, constrained firms are more

likely to hold on to cash instead of non-cash assets, in order to fund future expansion through internal finance (Calomiris et al., 1995). Therefore, when sales decrease, financially constrained firms are more likely to dispose of unutilized resources, to reduce avoidable costs. I posit that for financially constrained firms, the option value of waiting for the arrival of new information falls short of the NPV of reduction in future costs from downward resource adjustments, since the propagation of financial constraints could lead to corporate bankruptcy.

Popov and Rocholl's (2015) study of the German market shows that firms that had a credit relation with at least one global financial crisis (GFC)-affected bank, had to decrease both the number of employees and the average compensation of the remaining employees. Fernandes and Ferreira (2017) show that, in the post-GFC era, financially constrained Portuguese firms hired more fixed-term workers compared to permanent workers, than their unconstrained counterparts.<sup>2</sup> Fernandes and Ferreira (2017) conclude that increased proportions of fixed-term employees enable the flexibility needed to adjust future employment rates without incurring additional firing costs. Constrained firms also face more *upward resource adjustment costs*, as they incur higher transaction costs and have available loans that come with stricter conditions, including stringent collateral requirements. All these increase for constrained firms during an increase in sales or an expansion of the business (Cheng et al., 2018). Therefore, constrained firms rely heavily on other sources of finance, e.g., trade credit and internal fund to finance their operation (Mulier et al., 2016).

However, the adjustment cost theory posits that, once committed, resources are not easy to scale down without incurring additional (future) adjustment costs; such as severance pay, search and training costs for new employees and transaction costs associated with purchasing new equipment (Cheng et al., 2018). This could be more applicable to constrained firms, who

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<sup>2</sup>Fixed-term workers have a flexible fixed-term contract and, therefore, can be laid off without incurring the severance payment that is required to lay off permanent workers (Fernandes & Ferreira, 2017).

face difficulty in raising capital when demand increases after a slump and, thereby, are inhibited from procuring critical resources, for example, skilled employees. Therefore, managers of constrained firms might prefer to retain unused resources in the short run to minimize the adjustment costs. Banker et al. (2013a) document that at country-level, stricter employment protection regulation results in higher firing costs, which could be more onerous for financially constrained firms, as saving costs and/or conserving cash in the present are the key priorities for these firms (Caggese et al., 2019). Therefore, in a well-developed country like the U.S., adjustment costs associated with labor are high compared to those in China and other emerging economies, owing to the availability of more highly-skilled human capital and the enforcement of minimum wage regulations (Banker et al., 2013). Thus, laying off human capital, which comes with high adjustment costs, might threaten the future growth of firms. However, based on the more rational premise that financially constrained firms will reduce unutilized resources as a survival strategy, I hypothesize the following:

***H<sub>1</sub>: Financially-constrained firms will exhibit less cost stickiness.***

I subject H<sub>1</sub> above to empirical tests using three different contextual settings as explained below, to shed light on “good” versus “bad” less cost stickiness.

My first context incorporates earnings management incentives to examine variations in cost behaviour. Kama and Weiss (2013) document that managers have an incentive to cut back resources to meet earnings benchmarks. When sales decline, financially constrained firms suffer a relatively greater reduction in the present value of revenue. Thus, such firms might be tempted to cut down resources to reduce costs, hence, increase profit to meet earnings benchmarks. This should provide a positive signal about the future survival prospects of these financially constrained firms. In line with this view, Kurt (2017) predicts and finds that constrained firms engage in income-increasing earnings management more aggressively than

unconstrained firms, around seasoned equity offerings. Linck et al. (2013) document that constrained firms overstate earnings compared to their unconstrained counterparts during the quarters prior to investment. Earnings management by financially constrained firms designed to understate costs, therefore, could result in less cost stickiness, but for the wrong reason, i.e., “bad” less stickiness. On the other hand, the existence of less cost stickiness in the absence of earnings management would support “good” less stickiness. Thus, I develop the following hypothesis:

*H<sub>IEM</sub>: Less cost stickiness exhibited by financially-constrained firms without earnings management incentives will support “good” less stickiness.*

My second context is the existence of the agency problem manifested through actions that encourage empire building. Managers who engage in empire-building for personal benefits are likely to overinvest when sales increase but are unlikely to cut back resources when sales decline (e.g. Williamson, 1963; Banker et al., 2018). This perspective suggests that financially constrained firms plagued with pervasive agency problem (empire building incentives in my case) will exhibit cost stickiness. On the contrary, Musso and Schiavo (2008) document that financial constraints increase the possibility of firms exiting the market. Therefore, survival may become crucial for constrained firms, and might require the elimination of costs in order to generate the funds they are unable to raise from the financial market. For constrained firms suffering from agency problem, the question of whether maximizing personal benefits outweighs survival remains unclear and unexplored. Based on the aforementioned arguments, I conjecture that, even in firms having pervasive agency problem, firm survival would take priority. Therefore, if firm survival takes precedence over empire building incentives, I would expect a scaling down of resources in the event of a sales decline for financially constrained

firms with agency concerns (good less cost stickiness). Thus, I develop the following hypothesis:

*H<sub>IAP</sub>: Less cost stickiness exhibited by financially-constrained firms with high agency problem will support “good” less stickiness.*

My final context involves cost behaviour conditional on the value-creating abilities of SG&A costs. Empirical research shows that value-creating SG&A costs exhibit greater cost stickiness (e.g. Lev and Sougiannis 1996, Banker et al., 2011; Chen et al., 2012). Decreasing value-creating SG&A costs involves higher resource adjustment costs (Liu et al., 2017b). Chen et al. (2012) predict, and find, that SG&A costs can create greater future value, and SG&A cost stickiness is influenced by economic considerations. The latter implies that constrained firms would trade-off the benefits derived from retaining value-creating resources against the costs of maintaining those resources. On the other hand, if SG&A costs generate low future value, then managers do not have a legitimate reason to retain such resources in the event of a sales decline. However, Caggese et al. (2019) document that employee layoff decisions of constrained firms are inefficient compared to those of their unconstrained counterparts, for a sample of Swedish companies. The authors show that constrained firms fire recently-hired workers having high expected productivity growth, to take advantage of their low firing costs. Laying off long-tenured workers who are considered less productive, may expose firms to significantly larger firing costs, e.g., higher severance payments, as compared to firing recently-recruited workers. In sum, their evidence suggests that constrained firms make *the wrong firing decisions* in order to conserve cash in the short term. Additionally, Musso and Schiavo (2008) posit that, to alleviate financial constraints, firms are likely to shed long term investments, giving rise to detrimental implications for their long-term growth prospects. Therefore,

constrained firms exhibit good (bad) less cost stickiness if they reduce future value-reducing (value-creating) SG&A costs.

*H<sub>IVSGA</sub>: Less cost stickiness through a reduction in value-destroying (value-creating) SG&A costs will support good (bad) less stickiness for financially-constrained firms.*

### **2.1.1 Financial constraints and cost behaviour during business cycles**

The business cycle adds uncertainty to economic activities and to firm performance as reflected in corporate sales, profit, cash flow, and dividends. During expansion, most firms operate in a favourable business environment, with little competitive pressure, growing sales, and rising profitability. In contrast, during recession, corporate sales decline, profits shrink, and dividends may slump, or disappear entirely. Choe et al. (1993) argue that information asymmetry is less during an expansion period. Therefore, investors are able to identify the opportunity for, and are likely to charge, a higher cost for constrained firms, and this directs those constrained firms towards the utilization of internal capital rather than external financing sources. Thus, constrained firms would face significant pressure to increase their internal resources during an economic expansion (e.g. Hennessy & White, 2007; Kurt, 2017).

During contraction periods, information asymmetry increases. Investors become extremely selective while making an investment decision for several reasons, including higher information asymmetry and scarcity of resources. This creates an adverse shock for firm cash flows. Chevalier and Scharfstein (1996) find that constrained firms have low cash flows during a contraction period, and are likely to increase prices compared to their unconstrained counterparts in order to achieve short-term profit. However, such a strategy could motivate unconstrained firms to engage in predatory pricing strategies, resulting in constrained firms being driven out of the market (Liu et al., 2017b). Firms experiencing a financial downturn reduce costs, including investments in CSR and assets substantially, to stabilize business

operations and to maintain profitability (e.g. Robbins & Pearce, 1992; Bansal et al., 2015; Habib & Hasan, 2019). According to the seminal work of Robbins and Pearce (1992), to overcome financial downturns, managers engage in “restructuring”, “downsizing” or “downscoping”: actions that save money. Firms undergoing a declining performance will reduce costs significantly in order to stabilize operations and retain profitability (e.g. Bibeault, 1982; Hambrick & Schechter, 1983; Slatter, 1984; Finkin, 1985; Bailey & Szerdy, 1988; Grinyer et al., 1988; Dumaine, 1990; Grinyer & McKiernan, 1990; Robbins & Pearce, 1992). Banker et al. (2016) document that, owing to managerial pessimism about future sales, firms’ exhibit less cost stickiness during economic contraction. Therefore, if managers are pessimist about future demand, as would be the case during a contractionary period, they would decrease slack resources aggressively when sales decrease, resulting in low cost stickiness or high anti-stickiness (Banker et al., 2018). Following, H<sub>1</sub>, I, therefore, predict that constrained firms would exhibit a greater degree of less cost stickiness during economic recession, than during economic expansion. I hypothesize as follows:

*H<sub>2</sub>: For financially constrained firms, the magnitude of less cost stickiness will be greater during a contraction period than during an expansion period.*

## 2.2 Research Design

### 2.2.1 Empirical model

I use the following regression specification to test H<sub>1</sub>:

$$LN\left[\frac{SG\&A_t}{SG\&A_{t-1}}\right] = \beta_0 + \beta_1 LN\left[\frac{SALE_t}{SALE_{t-1}}\right] + \beta_2 DECDUM * LN\left[\frac{SALE_t}{SALE_{t-1}}\right] + \beta_3 FC + \beta_4 FC * LN\left[\frac{SALE_t}{SALE_{t-1}}\right] + \beta_5 FC * DECDUM * LN\left[\frac{SALE_t}{SALE_{t-1}}\right] + \sum_{m=6}^9 \beta_m ECONVAR_{m,t} * DECDUM * LN\left[\frac{SALE_t}{SALE_{t-1}}\right] + \sum_{n=10}^{13} \beta_n ECONVAR_{n,t} + \varepsilon \quad (2.1)$$

where *SG&A* (Compustat data item XSGA) is selling, general and administrative expenses, and *SALE* (Compustat data item SALE) is sales revenue. *DECDUM* takes the value

of 1 if sales in year  $t$  are less than sales in year  $t-1$ , and 0 otherwise. Coefficient  $\beta_1$  measures the percentage increase in SG&A with a 1% increase in sales revenue. The sum of coefficients  $\beta_1$  and  $\beta_2$  measures the percentage decrease in SG&A with a 1% decrease in sales. A significant positive  $\beta_1$  and a significant negative  $\beta_2$  confirm cost stickiness.  $FC$  are the financial constraint variables (detailed in subsection 2.2.2), and  $ECONVAR$  are the economic variables and include: asset intensity ( $AIN$ ), measured as the total assets divided by the sales revenue for year  $t$ ; employee intensity ( $EIN$ ), the ratio of the total number of employees over sales; successive decrease ( $SUDEC$ ), an indicator variable equal to 1 if the revenue in year  $t-1$  is less than the revenue in  $t-2$ , and 0 otherwise; and stock performance ( $RET$ ), measured as the raw stock return from the Center for Research in Security Prices (CRSP). These four economic variables are incorporated in the model as stand-alone variables and interacted with the sticky variable:  $\beta_2$ . The coefficient of primary interest is the sign and significance of the interactive variable,  $\beta_5$ . A positive and significant  $\beta_5$  will support  $H_1$ .

### 2.2.2 Measurement of the independent variable: Financial constraints

As there is no consensus on which is the best proxy for financial constraint measurement, and the majority of studies use more than one constraint measure as a proxy, I use three different measures in this study. The financial constraint measures used are: SA index (SA); WW index (WW); and the Bodnaruk, Loughran and McDonald (BLM) text-based constraint measure.

(i) **SA index:** The index has been developed by Hadlock and Pierce (2010) using firm size and age, and higher SA indices indicate higher financial constraint. The SA index is calculated as follows:

$$SA_{it} = -0.737 SIZE_{it} + 0.043 (SIZE_{it})^2 - 0.040 AGE_{it} \quad (2.2)$$

where  $SIZE$  is the natural log of total assets, and  $AGE$  is the number of years the firm is listed on Compustat.

(ii) **WW index:** WW index has been constructed by Whited and Wu (2006), and higher WW indices mean higher financial constraint. The index is composed of six components and is calculated as follows:

$$WW_{it} = -0.091 CF_{it} - 0.062 DIVPOS_{it} + 0.021 TLTD_{it} - 0.044 LNTA_{it} + 0.102 ISG_{it} - 0.035 SG_{it} \quad (2.3)$$

where  $CF$  is cash flow (Compustat data item IB plus DP) divided by total assets (Compustat data item AT),  $DIVPOS$  is a dummy variable equal to 1 if the firm pays dividends (Compustat data item DVC plus DVP) and 0 otherwise,  $TLTD$  is long-term debt (Compustat data item DLTT) divided by total assets,  $LNTA$  is the natural log of total assets,  $ISG$  is the firm's three-digit SIC code industry annual sales growth, and  $SG$  is the firm's annual sales growth.

(iii) **Bodnaruk et al. (2015) text-based financial constraint measure (BLM):** Bodnaruk et al. (2015) developed a list of 184 constraining words from all 10-K filings. The commonly used constraining words from their list include *required*, *obligations*, *impairment*, *covenants*, *requirements*, *permitted*, *comply*, *imposed*, and the index uses the percentage of constraining words as a measure of financial constraint. Bodnaruk et al. (2015) show that the more managers are concerned about future financial constraints, the more they will disclose through the text of 10-K. Higher BLM values indicate higher financial constraint.

The underlying notion of traditional accounting-based measures of financial constraint is that larger firms are less likely to be financially constrained; whereas, owing to financial meltdown, larger and older firms can become financially constrained (Bodnaruk et al., 2015). This inherent shortcoming of traditional measures, may result in misclassifying financially constrained firms arising from previously unconstrained firms. Thus, the text-based measure can identify the financially constrained firms more accurately.

### **2.2.3 Business cycle measure**

Consistent with prior studies (e.g., DeStefano, 2004; Jenkins et al., 2009; Kim et al., 2011), this study uses the well-accepted measure based on the National Bureau of Economic Research (NBER) business cycle classification in identifying different states of economic activities (i.e., expansion and contraction).<sup>3</sup> Periods of expansion begin at the trough date and end at the peak date, and periods of recession begin at the peak date and end at the trough date. The NBER defines a recession (expansion) in terms of significant decline (increase) in economic activity spread across the economy, lasting more than a few months, normally visible in real GDP, real income, employment, industrial production, and wholesale-retail sales. Thus, unlike the employment rate and industrial production as proxies for the business cycle, the NBER's business cycle captures more comprehensive information regarding economic activities. I also consider the OECD Composite Leading Indicators as an alternative proxy to define economic recession. According to this time series, the recession begins at the midpoint of the period of the peak and ends at the midpoint of the period of the trough.

### **2.2.4 Sample selection and descriptive statistics**

Financial data are collected from Compustat, whilst the stock return data are collected from the CRSP for the years 1976 to 2016. I deliberately choose a long sample period to provide a richer analysis of the cost stickiness behaviour. Panel A, Table 2.1, illustrates the sample selection process, which follows the process used by Anderson et al. (2003). I begin with a total sample of 462,735 firm-year observations during 1976–2016. I then exclude firm-year observations from the regulated industries (two-digit SIC code 48-49), financial institutions (two-digit SIC

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<sup>3</sup>For details about NBER turning points dates of the U.S. economy <http://www.nber.org/cycles/cyclesmain.html>

codes 60-69) and any duplicate values. This process eliminates a total of 170,800 firm-year observations. After excluding observations based on missing data on *SALE* and *SG&A* for the current and previous periods, zero *SALE* and *SG&A* values, negative *SALE* and *SG&A* values, as well as  $SALE < SG\&A$ , the sample size drops down to 207,969 observations. A further 24,770 firm-year observations were lost because of the requirement for one-year lagged revenue and *SG&A* observations. The baseline regression sample, therefore, consists of 183,173 firm-year observations for the *SA* version of financial constraints. However, missing data on some of the control variables further reduces the sample. Merging the stickiness sample after including all the non-missing economic variables with financial constraint proxies *SA* and *WW*, resulted in final samples of 124,839 and 101,125 observations respectively. Merging the stickiness sample with the *BLM* sample and all the non-missing economic variables, results in 56,455 observations. The sample selection procedure is explained in Panel A of Table 2.1.

To avoid the undesirable influence of outliers, I winsorize the key variables in the extreme 1% of their respective distributions. In the regression models, sample size varies depending on the model-specific data requirements. Firm-year observations come from a wide variety of industries, with two-digit SIC codes, 35–39 (27.61%) and 70-79 (13.81%) commanding the largest industry representation in my sample, as reported in Panel B, Table 2.1.

**TABLE 2.1: Sample Selection and Industry Distribution**  
**PANEL A: Sample selection procedure**

Selection Process	Number of Observations
Total observations produced for 1975 to 2016	462,735
Drop: observations for SIC codes between 4800 to 4999	(30,397)
Drop: observations for SIC codes between 6000 to 6999	(139,254)
Drop: observations for SIC codes between duplicate observations	<u>(1,149)</u>
	291,935
Drop: observations with missing data on sales and SG&A for current period and previous period; sales and SG&A values are zero; sales and SG&A are negative; sales is smaller than SG&A	<u>(83,966)</u>
	207,969
Drop: one year-lagged variable for Sale and SG&A	<u>(24,770)</u>
Preliminary sample for the baseline regression without ECONVAR for the SA version of the financial constraint	<u>183,173</u>
 <i>Merging with constraint proxies (after including non-missing economic variables)</i>	
Merged with SA	124,839
Merged with WW	101,125
Merged with BLM	56,455

**PANEL B: Industry distribution**

Code	Industry	Observations	% observations
1-14	Agriculture and mining	17,164	9.37
15-17	Building construction	2,923	1.60
20-21	Food and kindred products	6,361	3.47
22-23	Textile mill products and apparels	4,261	2.33
24-27	Lumber, furniture, paper and printing	9,434	5.15
28-30	Chemical, petroleum, rubber and allied products	15,760	8.60
31-34	Metal	10,874	5.94
35-39	Machinery, electrical, computer equipment	50,568	27.61
40-47	Railroad and other transportation	4,828	2.64
50-52	Wholesale goods, building materials	10,512	5.74
53-59	Store merchandise, auto dealers, home furniture stores	15,537	8.48
70-79	Business services	25,305	13.81
80-99	Other	9,646	5.27
Total		<b>183,173</b>	<b>100.00</b>

## 2.3 Empirical Results & Analysis

### 2.3.1 Descriptive statistics and correlation analysis

Descriptive statistics of the sample are reported in panel A of Table 2.2. Over the study period from 1976 to 2016, the mean (median) of  $LN(SALE_t/SALE_{t-1})$  and  $LN(SG\&A_t/SG\&A_{t-1})$  are 0.10 (0.09) and 0.11 (0.09) respectively. Average sales revenue for the sample is \$1,845.18 million (median \$128.12 million). Average SG&A expense is \$317.69 million (median \$24.61 million). SA and WW have means (medians) of -2.83 (-2.92) and -0.25 (-0.24) respectively. Average number of employees per firm is approximately 8,390. On average, sample firms use 0.01

thousand (median 0.01) employees and \$1.24 million (median \$0.85 million) assets to support each million dollars in sales. The median firm of the sample has not experienced a decline in sales for two consecutive years (median 0 and mean 0.28).

Panel B of Table 2.2 presents the correlation results. *SA* is positively correlated with  $LN(SALE_t/SALE_{t-1})$ , but both *WW* and *BLM* are negatively correlated with  $LN(SALE_t/SALE_{t-1})$ . *SA* (*WW* and *BLM*) is positively (negatively) correlated with  $LN(SG\&A_t/SG\&A_{t-1})$ .

**TABLE 2.2: Descriptive Statistics and Correlation**

**PANEL A: Descriptive statistics**

Variables	Observations	Mean	Std.Dev.	25%	Median	75%
$LN(SALE_t/SALE_{t-1})$	183,173	0.10	0.29	-0.03	0.09	0.22
<i>SALE</i> (\$mil)	183,173	1,845.18	10,499.43	27.81	128.12	632.30
$LN(SG\&A_t/SG\&A_{t-1})$	183,173	0.11	0.27	-0.02	0.09	0.21
<i>SG&amp;A</i> (\$mil)	183,173	317.69	1,663.17	6.00	24.61	109.81
<i>DECDUM</i>	183,173	0.29	0.46	0.00	0.00	1.00
<i>SA</i>	183,173	-2.83	0.86	-3.43	-2.92	-2.28
<i>WW</i>	147,701	-0.25	0.12	-0.33	-0.24	-0.16
<i>BLM</i>	69,958	0.01	0.00	0.01	0.01	0.01
<i>SUDEC</i>	162,949	0.28	0.45	0.00	0.00	1.00
<i>AIN</i>	183,173	1.24	1.22	0.58	0.85	1.36
<i>ASSET</i> (\$mil)	183,173	1,416.38	4,447.35	24.12	116.94	613.25
<i>EIN</i>	170,768	0.01	0.01	0.00	0.01	0.01
<i>EMP</i> (thousands)	170,768	8.39	35.51	0.21	0.94	4.25
<i>RET</i>	139,396	0.01	0.05	-0.01	0.01	0.04
<i>AVOID</i>	183,173	0.03	0.16	0.00	0.00	0.00
<i>EDEC</i>	183,173	0.08	0.28	0.00	0.00	0.00
<i>FXP</i>	31,491	0.46	0.29	0.21	0.39	0.68
<i>TAGRWOOTH</i>	162,767	0.16	0.81	-0.04	0.06	0.19
<i>SG&amp;A_FV</i>	142,197	0.60	0.53	0.29	0.40	0.58
<i>CYCLE</i> (NBER)	183,173	0.16	0.37	0.00	0.00	0.00
<i>CYCLE</i> (OECD)	183,173	0.51	0.49	0.00	1.00	1.00

**Note:** *SALE* is sales or revenue. *SG&A* is selling, general and administrative expenses. *SA*, *WW* and *BLM* are the financial constraint proxies. *ASSET* is total assets in million dollars. *EMP* is the number of employees (in thousands). Refer to Appendix A for detailed variable definitions.

**PANEL B: Correlation**

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
$LN(SG\&A_t/SG\&A_{t-1})$ [1]	1									
$LN(SALE_t/SALE_{t-1})$ [2]	0.722***	1								
$DECDUM * LN(SALE_t/SALE_{t-1})$ [3]	0.707***	0.437***	1							
$SUDEC$ [4]	-0.151***	-0.228***	-0.128***	1						
$AIN$ [5]	-0.013	0.049***	-0.190***	0.067***	1					
$EIN$ [6]	-0.029***	-0.009	0.026**	-0.022**	-0.202***	1				
$RET$ [7]	0.145***	0.064***	0.028***	0.055***	-0.005	-0.002	1			
$SA$ [8]	0.143***	0.172***	-0.031***	-0.061***	-0.016	0.106***	0.078***	1		
$WW$ [9]	-0.0438***	-0.005	-0.139***	0.059***	-0.069***	0.135***	0.028***	0.656***	1	
$BLM$ [10]	-0.051***	-0.050***	-0.076***	0.081***	0.079***	-0.031***	-0.007	0.031***	0.107***	1

**Note:** \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ . Refer to Appendix A for variable definitions.

### 2.3.2 Regression results: Financial constraints and cost stickiness

Table 2.3, Panel A reports the OLS results for the association between financial constraints and cost stickiness. To control for unobservable industry and year characteristics associated with financial constraints and cost stickiness, I include year and industry dummy variables in all the regression specifications. To take into account the time series and cross-sectional dependence in the error terms of the regressions, I calculate t-statistics using standard errors that are clustered by firm. For my of sample of 183,173 firm-years observations SG&A costs increase by 0.67% for each 1% increase in sales and SG&A costs decrease by only 0.49% for each 1% decrease in sales (untabulated).

Columns (1) to (3) report the regression results without controlling for the economic determinants of cost stickiness. The variable of interest is  $\beta_5 (FC * DECDUM * LN \left[ \frac{SALE_t}{SALE_{t-1}} \right])$ . For  $H_1$  to hold,  $\beta_5$  has to be significant and positive. Columns (4) to (6) report regression results for the OLS model after incorporating financial constraint and all the economic variables to test for  $H_1$ . The *SA* model shows that the  $\beta_5$  (coefficient = 0.035; t statistic = 3.19;  $p < 0.01$ ) is positive and significant. This supports  $H_1$ , i.e., financially-constrained firms' exhibit less cost stickiness. The *WW* and *BLM* models produce consistent results as reported in columns (5) and (6) respectively.

Looking into economic variables interacted with sticky variables, asset intensity  $AIN * \beta_2$  is significant at the 1% level, with negative coefficients in all the models. This indicates a higher magnitude of cost stickiness for companies that rely heavily on assets to support business operations. However, employee intensity (interacted with stickiness)  $EIN * \beta_2$  has a positive coefficient, and is significant at different conventional levels in all the regression models. This implies low cost stickiness in companies where operations rely on employees. The coefficient for successive decreases in sales,  $SUDEC * \beta_2$ , is positive and significant. This suggests a lower degree

of cost stickiness in firms experiencing negative demand shocks in two consecutive years. These findings related to economic variables are consistent with Chen et al. (2012) and Dierynck et al. (2012). The coefficient for  $RET * \beta_2$  is significantly positive in the *SA* and *WW* models, but insignificant in the *BLM* model. Panel B, Table 2.3, presents the fixed effects (FE) regression results. Results are consistent with those reported using the OLS procedure<sup>4</sup>.

**TABLE 2.3: OLS and Fixed Effect Regression Results – Financial Constraints and Cost Stickiness**  
**PANEL A: OLS regression results**

	SA	WW	BLM	SA	WW	BLM
	(1)	(2)	(3)	(4)	(5)	(6)
$\beta_1: LN(SALE_t / SALE_{t-1})$	0.559*** [41.74]	0.558*** [51.48]	0.743*** [43.23]	0.578*** [28.39]	0.589*** [37.78]	0.793*** [42.48]
$\beta_2: DECDUM * LN(SALE_t / SALE_{t-1})$	-0.017 [-0.78]	-0.057*** [-3.61]	-0.279*** [-7.87]	-0.091** [-2.55]	-0.084*** [-3.13]	-0.344*** [-8.34]
$\beta_3: FC$	0.002* [1.90]	-0.000 [-0.07]	0.564 [1.23]	0.008*** [6.93]	0.041*** [5.14]	1.918*** [4.04]
$\beta_4: FC * LN(SALE_t / SALE_{t-1})$	-0.048*** [-9.80]	-0.375*** [-10.17]	-6.431*** [-2.58]	-0.044*** [-6.45]	-0.341*** [-6.52]	-12.833*** [-4.67]
$\beta_5: FC * \beta_2$	0.068*** [8.74]	0.458*** [7.91]	9.391* [1.88]	0.035*** [3.19]	0.254*** [3.09]	19.438*** [3.56]
$\beta_6: SUDEC * \beta_2$	-	-	-	0.098*** [8.01]	0.094*** [7.01]	0.103*** [5.90]
$\beta_7: AIN * \beta_2$	-	-	-	-0.047*** [-10.37]	-0.053*** [-10.40]	-0.044*** [-5.54]
$\beta_8: EIN * \beta_2$	-	-	-	3.828*** [5.02]	4.351*** [4.75]	3.122** [2.08]
$\beta_9: RET * \beta_2$	-	-	-	0.256*** [2.76]	0.314*** [3.00]	0.122 [0.97]
$\beta_{10}: SUDEC$	-	-	-	-0.059*** [-40.20]	-0.058*** [-36.58]	-0.053*** [-26.39]
$\beta_{11}: AIN$	-	-	-	0.009*** [9.62]	0.008*** [7.42]	0.013*** [9.19]
$\beta_{12}: EIN$	-	-	-	0.631*** [7.84]	0.804*** [6.91]	0.646*** [4.29]
$\beta_{13}: RET$	-	-	-	-0.348*** [-22.45]	-0.299*** [-16.78]	-0.361*** [-17.24]
Constant	0.020**	0.020**	-0.013	0.045***	0.032***	-0.038***

<sup>4</sup>To assess the robustness of my findings reported in Table 2.3 (Panel A and B), I transform all three continuous financial constraint (*FC*) variables into dummy variables, where the dummy variable takes the value of one when  $FC \geq \text{median } FC$  (financially constrained group), and zero otherwise (unconstrained group). I reran the regressions for all three *FC* variables using OLS and FE methods using the dummy instead of the continuous *FC* variables. Untabulated results reveal significant and positive coefficients for  $\beta_5$  for *WW* (FE coefficient = 0.047; t statistic = 2.12;  $p < 0.05$ ) and *BLM* (FE coefficient = 0.072; t statistic = 2.73;  $p < 0.01$ ) measures in both OLS and FE: results that are consistent with those reported in Table 2.3 (Panel A and B). However, the coefficients are insignificant for *SA* measure.

**PANEL A: OLS regression results**

	SA	WW	BLM	SA	WW	BLM
	(1)	(2)	(3)	(4)	(5)	(6)
	[2.09]	[2.03]	[-0.87]	[4.34]	[3.06]	[-3.96]
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
Observations	183,173	147,701	69,958	124,839	101,125	56,455
Adj. R-squared	0.47	0.45	0.50	0.52	0.50	0.54

**Note:** Panel A reports the results from the OLS regression of association between financial constraints and SG&A cost behaviour. Robust t-statistics are in brackets and are based on standard errors that are clustered by firm. \*\*\* p<0.01, \*\* p<0.05, \* p<0.10. Refer to Appendix A for variable definitions.

**PANEL B: Fixed effect regression results**

	SA	WW	BLM	SA	WW	BLM
	(1)	(2)	(3)	(4)	(5)	(6)
$\beta_1: LN(SALE_t/SALE_{t-1})$	0.481*** [31.35]	0.500*** [40.33]	0.693*** [33.64]	0.519*** [23.12]	0.532*** [30.68]	0.758*** [35.63]
$\beta_2: DECDUM * LN(SALE_t/SALE_{t-1})$	0.043 [1.63]	-0.011 [-0.58]	-0.274*** [-6.82]	-0.058 [-1.38]	-0.054* [-1.73]	-0.320*** [-6.84]
$\beta_3: FC$	0.020*** [15.68]	-0.001 [-0.09]	-2.283*** [-4.18]	0.010*** [5.00]	-0.010 [-0.53]	-0.135 [-0.24]
$\beta_4: FC * LN(SALE_t/SALE_{t-1})$	-0.062*** [-11.27]	-0.450*** [-10.59]	-4.600 [-1.56]	-0.054*** [-7.18]	-0.412*** [-7.11]	-12.159*** [-3.93]
$\beta_5: FC * \beta_2$	0.076*** [8.32]	0.492*** [7.40]	11.272** [2.00]	0.037*** [2.97]	0.267*** [2.85]	18.571*** [3.04]
$\beta_6: SUDEC * \beta_2$	-	-	-	0.107*** [8.19]	0.108*** [7.58]	0.117*** [6.20]
$\beta_7: AIN * \beta_2$	-	-	-	-0.046*** [-9.02]	-0.054*** [-9.63]	-0.039*** [-4.38]
$\beta_8: EIN * \beta_2$	-	-	-	5.094*** [5.80]	5.977*** [5.64]	4.394** [2.49]
$\beta_9: RET * \beta_2$	-	-	-	0.258** [2.56]	0.320*** [2.84]	0.163 [1.15]
$\beta_{10}: SUDEC$	-	-	-	-0.056*** [-36.88]	-0.054*** [-33.36]	-0.050*** [-24.02]
$\beta_{11}: AIN$	-	-	-	0.018*** [10.45]	0.014*** [7.13]	0.027*** [9.97]
$\beta_{12}: EIN$	-	-	-	2.565*** [13.38]	3.178*** [17.44]	2.703*** [5.85]
$\beta_{13}: RET$	-	-	-	-0.306*** [-20.64]	-0.257*** [-15.22]	-0.321*** [-16.00]
Constant	0.088*** [22.59]	0.033*** [8.75]	0.036*** [9.40]	0.033*** [4.74]	0.004 [0.74]	-0.007 [-1.22]
Industry	No	No	No	No	No	No
Year	Yes	Yes	Yes	Yes	Yes	Yes
Observations	183,173	147,701	69,958	124,839	101,125	56,455
Adj. R-squared	0.42	0.40	0.43	0.47	0.46	0.48

**Note:** Panel B reports the results from the FE of association between financial constraints and SG&A cost behaviour. Robust t-statistics are in brackets and are based on standard errors that are clustered by firm. \*\*\* p<0.01, \*\* p<0.05, \* p<0.10. Refer to Appendix A for variable definitions.

### 2.3.3 Is it “Good” or “Bad” less cost stickiness?

I now discuss results on whether the less cost stickiness exhibited by financially constrained firms reflect “good” or “bad” less cost stickiness (test of three sub-hypotheses developed in section 2.1).

To test  $H_{1EM}$ , I split the sample observations into ‘loss avoidance’ (*AVOID*) and ‘earnings decrease’ (*EDEC*) groups. The *AVOID* group consists of firm-year observations with annual earnings deflated by market capitalization of shareholders’ equity at prior year end, in the interval  $[0, 0.01]$  (both inclusive). The *EDEC* group consists of firm-year observations with changes in annual earnings deflated by market capitalization of shareholders’ equity at prior year end in the interval  $[0, 0.01]$  (both inclusive). Panel A1 of Table 2.4 presents the results for the *AVOID* test. The coefficient on  $\beta_5$  is positive and significant for the subsample *without* incentives to avoid losses (*AVOID*=0) (e.g., the coefficient is 0.034,  $p < 0.01$  for the *SA* model in column 1), and insignificant for the group *with* incentives to avoid losses (*AVOID*=1). Table 2.4 Panel A2, reports the results for the *EDEC* test. The coefficient on  $\beta_5$  is positive and significant for the subsample *without* incentives to avoid earnings decrease (*EDEC*=0) (e.g., the coefficient is 0.03,  $p < 0.01$  for *SA* model in column 1), and insignificant for the group *with* incentives to avoid earnings decrease (*EDEC*=1). Taken together the results for the earnings management incentives context reveal that the less cost stickiness exhibited by financially-constrained firms is “good” less cost stickiness.

To test  $H_{1AP}$ , I split the sample observations into two groups, i.e., a pervasive (high) agency problem group and a minimal (low) agency problem group. I use two different proxies to measure agency problem i.e. (i) CEO fixed pay (*FXP*) and (ii) total asset growth (*TAGROWTH*). According to Chen et al. (2012) and Kannianen (2000), a manager’s empire-building incentives can be restrained by paying fixed salaries. Banker et al. (2011) document that fixed (cash) compensation is used to penalize wasteful spending on SG&A costs. *FXP* is the ratio of salary plus bonus divided

by total compensation during the year. Firm-year observations with  $FXP \geq \text{median } FXP$  constitutes the minimal agency problem group. The pervasive agency problem group consists of observations with  $FXP < \text{median } FXP$ . CEO compensation data are collected from ExecuComp.  $TAGROWTH$  has been used as a proxy for agency problem by Giroud and Mueller (2010), Chhaochharia et al. (2012) and Guo et al. (2018). The ‘high’ agency problem group consists of firm-year observations with  $TAGROWTH \geq \text{median } TAGROWTH$ . The ‘low’ agency problem group consists of firm-year observations with  $TAGROWTH < \text{median } TAGROWTH$ .

Table 2.4 Panel B1 reports the results using CEO fixed pay. The coefficient on  $\beta_5$  is negative and significant for the high agency problem group (coefficient = -0.265; t statistic = -4.37,  $p < 0.01$ ) when  $SA$  is used as the financial constraint measure (column 2), thus, supporting “bad” cost stickiness. Columns (3) and (4) report results using the  $WW$  model and reveal that the coefficients on  $\beta_5$  are insignificant for both the low and high agency problem groups. Finally, results using the  $BLM$  measure (columns 5 and 6) show a marginally significant less sticky result for the low agency problem group (coefficient 24.99,  $p < 0.10$ ), but an insignificant coefficient for the high agency problem group. Taken together, the documented results provide weak support for “bad” cost stickiness in the agency problem context.

Panel B2 presents results when  $TAGROWTH$  is used to proxy for agency problem. The coefficients on  $\beta_5$  are insignificant for the high agency problem group across all three measures of financial constraint (columns 2, 4 and 6). However, financially constrained firms with minimal or low agency problem document positive and significant coefficients on  $\beta_5$  for all three measures of financial constraints (coefficients 0.034 ( $p < 0.10$ ), 0.436 ( $p < 0.01$ ), and 19.214 ( $p < 0.10$ ) for  $SA$ ,  $WW$  and  $BLM$  measures, respectively), thus, supporting good less cost stickiness.

**TABLE 2.4: Financial Constraints and Cost Stickiness – Is it good or bad?**

**PANEL A1: Earnings management context – avoid losses**

	SA AVOID=0 (1)	SA AVOID=1 (2)	WW AVOID=0 (3)	WW AVOID=1 (4)	BLM AVOID=0 (5)	BLM AVOID=1 (6)
$\beta_1: LN(SALE_t/SALE_{t-1})$	0.582*** [28.33]	0.490*** [4.17]	0.593*** [37.59]	0.512*** [5.96]	0.794*** [41.87]	0.774*** [7.40]
$\beta_2: DECDUM * LN(SALE_t/SALE_{t-1})$	-0.093** [-2.57]	-0.139 [-0.62]	-0.086*** [-3.15]	-0.184 [-1.09]	-0.343*** [-8.17]	-0.387 [-1.55]
$\beta_3: FC$	0.008*** [7.06]	-0.002 [-0.32]	0.042*** [5.18]	-0.049 [-0.95]	1.966*** [4.09]	0.291 [0.09]
$\beta_4: FC * LN(SALE_t/SALE_{t-1})$	-0.043*** [-6.27]	-0.068* [-1.70]	-0.335*** [-6.33]	-0.403 [-1.28]	-12.898*** [-4.65]	-11.075 [-0.66]
$\beta_5: FC * \beta_2$	0.034*** [3.07]	0.035 [0.49]	0.253*** [3.04]	-0.269 [-0.51]	19.561*** [3.54]	7.091 [0.21]
<i>ECONVAR</i> * $\beta_2$	Yes	Yes	Yes	Yes	Yes	Yes
<i>ECONVAR</i>	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.045*** [4.03]	0.001 [0.01]	0.032*** [2.80]	-0.023 [-0.41]	-0.034*** [-3.10]	-0.088 [-1.43]
Industry	No	No	No	No	No	No
Year	Yes	Yes	Yes	Yes	Yes	Yes
Observations	120,924	3,915	98,184	2,941	54,633	1,822
Adj. R-squared	0.52	0.47	0.50	0.42	0.54	0.54

**Note:** Panel A1 reports the results from the FE regression of association between financial constraints and SG&A cost behaviour with and without incentives to avoid losses. Robust t-statistics are in brackets and are based on standard errors that are clustered by firm. \*\*\* p<0.01, \*\* p<0.05, \* p<0.10. Refer to Appendix A for variable definitions.

**PANEL A2: Earnings management context – avoid earnings decreases**

	SA EDEC=0 (1)	SA EDEC=1 (2)	WW EDEC=0 (3)	WW EDEC=1 (4)	BLM EDEC=0 (5)	BLM EDEC=1 (6)
$\beta_1: LN(SALE_t/SALE_{t-1})$	0.580*** [27.58]	0.645*** [10.03]	0.584*** [36.37]	0.693*** [14.17]	0.783*** [40.48]	0.891*** [11.58]
$\beta_2: DECDUM * LN(SALE_t/SALE_{t-1})$	-0.094** [-2.56]	-0.420* [-1.95]	-0.081*** [-2.92]	-0.216 [-1.57]	-0.332*** [-7.79]	-0.454** [-2.04]
$\beta_3: FC$	0.008*** [6.06]	0.008*** [2.74]	0.039*** [4.49]	0.047** [2.29]	1.812*** [3.57]	1.452 [0.92]
$\beta_4: FC * LN(SALE_t/SALE_{t-1})$	-0.041*** [-5.82]	-0.057*** [-2.79]	-0.337*** [-6.21]	-0.318* [-1.89]	-12.379*** [-4.38]	-11.863 [-0.97]
$\beta_5: FC * \beta_2$	0.030*** [2.71]	0.005 [0.09]	0.239*** [2.81]	0.405 [1.13]	18.649*** [3.34]	23.111 [0.66]
<i>ECONVAR</i> * $\beta_2$	Yes	Yes	Yes	Yes	Yes	Yes
<i>ECONVAR</i>	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.047*** [4.33]	0.013 [0.48]	0.035*** [3.10]	0.012 [0.47]	-0.032*** [-3.35]	-0.068* [-1.67]
Industry	No	No	No	No	No	No
Year	Yes	Yes	Yes	Yes	Yes	Yes
Observations	111,251	13,588	90,347	10,778	50,006	6,449
Adj. R-squared	0.51	0.58	0.50	0.54	0.53	0.61

**Note:** Panel A2 reports the results from the FE regression of association between financial constraints and SG&A cost behaviour with and without incentives to avoid earnings decrease. Robust t-statistics are in brackets and are based on standard errors that are clustered by firm. \*\*\* p<0.01, \*\* p<0.05, \* p<0.10. Refer to Appendix A for variable definitions.

**PANEL B1: Agency problem (proxied by *FXP*) context**

	<b>SA</b> Low Agency (=>Median)	<b>SA</b> High Agency (<Median)	<b>WW</b> Low Agency (=>Median)	<b>WW</b> High Agency (<Median)	<b>BLM</b> Low Agency (=>Median)	<b>BLM</b> High Agency (<Median)
	(1)	(2)	(3)	(4)	(5)	(6)
$\beta_1: LN(SALE_t/SALE_{t-1})$	0.966*** [9.00]	1.192*** [12.74]	0.620*** [7.38]	0.658*** [9.33]	0.825*** [19.05]	0.903*** [16.04]
$\beta_2: DECDUM * LN(SALE_t/SALE_{t-1})$	-0.339 [-1.33]	-1.268*** [-5.38]	-0.273* [-1.71]	-0.365*** [-2.86]	-0.403*** [-3.59]	-0.374** [-2.50]
$\beta_3: FC$	0.010* [1.90]	0.007* [1.73]	0.082** [2.26]	0.075*** [2.86]	0.988 [0.94]	4.099*** [3.45]
$\beta_4: FC * LN(SALE_t/SALE_{t-1})$	0.062** [2.05]	0.124*** [4.70]	-0.364 [-1.53]	-0.143 [-0.78]	-11.868* [-1.82]	-23.527*** [-2.95]
$\beta_5: FC * \beta_2$	-0.034 [-0.49]	-0.265*** [-4.37]	-0.283 [-0.63]	-0.273 [-0.83]	24.986* [1.68]	16.363 [0.87]
<i>ECONVAR</i> * $\beta_2$	Yes	Yes	Yes	Yes	Yes	Yes
<i>ECONVAR</i>	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.018 [0.81]	0.023 [1.12]	0.014 [0.72]	0.032* [1.85]	-0.048*** [-3.56]	-0.073*** [-4.13]
Industry	No	No	No	No	No	No
Year	Yes	Yes	Yes	Yes	Yes	Yes
Observations	9,480	9,373	7,787	7,680	7,879	7,799
Adj. R-squared	0.58	0.61	0.55	0.57	0.58	0.60

**Note:** Panel B1 reports the results from the FE regression of association between financial constraints and SG&A cost behaviour in low and high agency problem firms (proxied by CEO fixed pay). Robust t-statistics are in brackets and are based on standard errors that are clustered by firm. \*\*\* p<0.01, \*\* p<0.05, \* p<0.10. Refer to Appendix A for variable definitions.

**PANEL B2: Agency problem (proxied by *TAGROWTH*) context**

	SA Low Agency (<Median) (1)	SA High Agency (=>Median) (2)	WW Low Agency (<Median) (3)	WW High Agency (=>Median) (4)	BLM Low Agency (<Median) (5)	BLM High Agency (=>Median) (6)
$\beta_1: LN(SALE_t/SALE_{t-1})$	0.434*** [10.50]	0.578*** [23.48]	0.411*** [13.53]	0.600*** [31.85]	0.693*** [11.19]	0.799*** [33.25]
$\beta_2: DECDUM * LN(SALE_t/SALE_{t-1})$	0.035 [0.64]	-0.260*** [-2.66]	0.079** [2.00]	-0.222*** [-3.01]	-0.223*** [-2.69]	-0.463*** [-4.50]
$\beta_3: FC$	0.007*** [4.50]	0.014*** [7.50]	0.043*** [4.19]	0.078*** [6.20]	0.547 [0.73]	3.659*** [4.90]
$\beta_4: FC * LN(SALE_t/SALE_{t-1})$	-0.053*** [-3.91]	-0.044*** [-5.33]	-0.573*** [-5.41]	-0.303*** [-4.84]	-14.303 [-1.63]	-15.384*** [-4.34]
$\beta_5: FC * \beta_2$	0.034* [1.94]	0.038 [1.34]	0.436*** [3.28]	0.332 [1.53]	19.214* [1.68]	13.557 [0.94]
<i>ECONVAR</i> * $\beta_2$	Yes	Yes	Yes	Yes	Yes	Yes
<i>ECONVAR</i>	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.032*** [3.89]	0.035*** [4.49]	0.026*** [3.24]	0.022*** [3.05]	-0.017 [-1.47]	-0.048*** [-5.04]
Industry	No	No	No	No	No	No
Year	Yes	Yes	Yes	Yes	Yes	Yes
Observations	59,568	65,115	48,298	52,565	24,794	26,735
Adj. R-squared	0.37	0.50	0.36	0.47	0.39	0.51

**Note:** Panel B2 reports the results from the FE regression of association between financial constraints and SG&A cost behaviour in low and agency problem firms (proxied by total asset growth). Robust t-statistics are in brackets and are based on standard errors that are clustered by firm. \*\*\* p<0.01, \*\* p<0.05, \* p<0.10. Refer to Appendix A for variable definitions.

**PANEL C: SG&A\_FV context**

	<b>SA</b> Low SG&A_FV (1)	<b>SA</b> High SG&A_FV (2)	<b>WW</b> Low SG&A_FV (3)	<b>WW</b> High SG&A_FV (4)	<b>BLM</b> Low SG&A_FV (5)	<b>BLM</b> High SG&A_FV (6)
$\beta_1: LN(SALE_t/SALE_{t-1})$	0.526*** [16.65]	0.588*** [19.79]	0.569*** [25.19]	0.595*** [24.34]	0.807*** [32.00]	0.825*** [25.46]
$\beta_2: DECDUM * LN(SALE_t/SALE_{t-1})$	-0.082 [-1.44]	-0.096* [-1.81]	-0.094** [-2.37]	-0.098** [-2.34]	-0.349*** [-6.03]	-0.425*** [-5.67]
$\beta_3: FC$	0.007*** [3.43]	0.011*** [6.28]	0.029** [2.37]	0.073*** [5.89]	2.712*** [3.99]	1.809** [2.19]
$\beta_4: FC * LN(SALE_t/SALE_{t-1})$	-0.049*** [-4.63]	-0.064*** [-6.30]	-0.323*** [-4.19]	-0.590*** [-7.31]	-15.293*** [-4.02]	-12.208*** [-2.65]
$\beta_5: FC * \beta_2$	0.027 [1.56]	0.066*** [3.86]	0.169 [1.36]	0.527*** [3.82]	24.417*** [3.22]	20.272** [2.06]
<i>ECONVAR</i> * $\beta_2$	Yes	Yes	Yes	Yes	Yes	Yes
<i>ECONVAR</i>	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.030*** [3.41]	0.047*** [6.45]	0.017** [2.17]	0.026** [2.18]	-0.043*** [-4.44]	0.002 [0.14]
Industry	No	No	No	No	No	No
Year	Yes	Yes	Yes	Yes	Yes	Yes
Observations	48,473	49,481	43,557	32,999	29,599	15,490
Adj. R-squared	0.49	0.59	0.48	0.59	0.55	0.58

**Note:** Panel C reports the results from the FE regression of association between financial constraints and SG&A cost behaviour in low and high future value generating SG&A firms. Robust t-statistics are in brackets and are based on standard errors that are clustered by firm. \*\*\* p<0.01, \*\* p<0.05, \* p<0.10. Refer to Appendix A for variable definitions.

Finally, in order to test  $H_{1VSGA}$ , I categorise the sample into high (above median) versus low (equal and below median) future value-creating SG&A groups, based on the industry-specific future value creation potential of SG&A costs, as per the value reported in Table 2 of Banker et al. (2011). I present the results in Panel C of Table 2.4. The coefficient on  $\beta_5$  is positive and insignificant for the low future value subsample (coefficient = 0.027; t statistic = 1.56), but positive and significant for the high future value subsample (coefficient = 0.066; t statistic = 3.86;  $p < 0.01$ ). Similar results are found using the WW model. This finding might be consistent with Caggese et al. (2019), who find inefficient employee-firing decisions by financially constrained firms. This finding could also be consistent with the fact that constrained firms are exposed to high opportunity costs associated with retaining unutilised resources, compared to their non-constrained counterparts. When firms suffer from financial constraints, they may have fewer options when deciding which kind of SG&A costs to decrease, as their main objective becomes reducing the financial burden and surviving the constraint period, to bounce back later. Therefore, from a firm survival point of view, such behaviour can be a manifestation of “good” less cost stickiness; however, from an efficiency point of view, such less stickiness could be construed as “bad”. This finding also confirms empirically the theoretical conjecture by Musso and Schiavo (2008) that, to overcome financial constraint, a firm will eliminate long term investments, and this may have an adverse effect on its long-term growth prospects. Results using the BLM measure, however, show positive and significant coefficients for both low (coefficient = 24.417;  $p < 0.01$ ) and high (coefficient = 20.272;  $p < 0.05$ ) future value-creating groups, although the absolute magnitude of the coefficient is larger for the low future value-creating group.

### 2.3.4 Financial constraints and cost stickiness during the business cycle

To investigate the relation between financial constraint and cost stickiness during the business cycle (expansion and contraction), the sample has been divided into expansion and contraction based on announcements by the NBER. Table 2.5, Panel A, reports regression results using the NBER business cycle measure. The *SA* model in columns (1) and (2) shows regression results for the expansion and contraction periods, respectively. The variable of interest is  $\beta_5$ , which is significant during both expansion (coefficient = 0.020; t statistic = 1.68,  $p < 0.10$ ) and contraction periods (coefficient = 0.064; t statistic = 2.35;  $p < 0.05$ ). I find consistent results using *WW* and *BLM*. I also use the OECD composite leading indicator (CLI) as an alternative measure of the business cycle for testing  $H_2$ . Reported results in Panel B of Table 2.5 show significant positive coefficients on  $\beta_5$  for the *WW* and *BLM* models (columns 3 to 6) for both the economic expansion and economic contraction periods.

The results support the premise of  $H_2$ , that during expansionary periods when information asymmetry is low, investors charge higher returns from financially constrained firms and, thus, could restrict financially constrained firms from accessing external finance. On the other hand, during contractionary periods investors have limited money to invest, and are likely to be more sceptical and selective. As a result, it becomes more difficult and time consuming for constrained firms to find external finance on favourable terms. Therefore, constrained firms minimize costs by reducing unutilised resources. This result refutes Chevalier and Scharfstein's (1996) finding that during contraction, when firms have low cash flow and face the difficulty of raising finance externally, financially-constrained supermarkets increase prices compared to their unconstrained counterparts, to increase short-term profit. Instead my findings are aligned with Liu et al.'s (2017b) conclusion that, if financially constrained firms increase prices during economic contraction, it

would create the opportunity for non-constrained competitors to engage in a predatory pricing strategy, which would hinder competition, resulting in constrained firms being driven out of the market. However, although the absolute magnitude of less stickiness is higher during contraction periods compared to expansion periods in all three models, and across both business cycle measures, the difference in coefficients is not statistically different between the two sub-periods (z-test of difference in coefficients is reported in Panel C, Table 2.5).

**TABLE 2.5: Business Cycle, Financial Constraint and Cost Stickiness**  
**PANEL A: NBER**

	SA	SA	WW	WW	BLM	BLM
	Expansion	Contraction	Expansion	Contraction	Expansion	Contraction
	(1)	(2)	(3)	(4)	(5)	(6)
$\beta_1: LN(SALE_t/SALE_{t-1})$	0.572*** [25.98]	0.596*** [12.45]	0.584*** [35.20]	0.595*** [15.34]	0.791*** [41.68]	0.849*** [9.84]
$\beta_2: DECDUM * LN(SALE_t/SALE_{t-1})$	-0.112*** [-2.89]	-0.022 [-0.25]	-0.078*** [-2.66]	-0.068 [-1.06]	-0.339*** [-7.41]	-0.417*** [-3.18]
$\beta_3: FC$	0.009*** [6.68]	0.005* [1.83]	0.044*** [5.12]	0.025 [1.30]	2.267*** [4.50]	0.714 [0.50]
$\beta_4: FC * LN(SALE_t/SALE_{t-1})$	-0.047*** [-6.33]	-0.029* [-1.73]	-0.366*** [-6.59]	-0.215 [-1.58]	-12.319*** [-4.40]	-25.963** [-2.13]
$\beta_5: FC * \beta_2$	0.020* [1.68]	0.064** [2.35]	0.159* [1.74]	0.452** [2.30]	22.401*** [3.66]	29.266* [1.71]
$\beta_6: SUDEC * \beta_2$	0.078*** [5.54]	0.143*** [5.68]	0.072*** [4.64]	0.132*** [4.73]	0.085*** [3.92]	0.114*** [3.46]
$\beta_7: AIN * \beta_2$	-0.048*** [-9.45]	-0.039*** [-3.67]	-0.054*** [-9.45]	-0.045*** [-3.91]	-0.039*** [-4.27]	-0.043*** [-3.00]
$\beta_8: EIN * \beta_2$	3.894*** [4.57]	2.812* [1.65]	4.209*** [4.12]	4.135** [1.99]	1.916 [1.26]	4.648 [1.13]
$\beta_9: RET * \beta_2$	0.397*** [3.70]	0.111 [0.57]	0.450*** [3.64]	0.225 [1.07]	0.287* [1.83]	0.095 [0.40]
$\beta_{10}: SUDEC$	-0.059*** [-38.47]	-0.055*** [-14.53]	-0.058*** [-35.08]	-0.054*** [-13.17]	-0.054*** [-25.27]	-0.052*** [-8.69]
$\beta_{11}: AIN$	0.008*** [8.05]	0.016*** [6.22]	0.007*** [5.91]	0.016*** [5.38]	0.012*** [8.01]	0.022*** [6.20]
$\beta_{12}: EIN$	0.647*** [7.31]	0.521*** [2.61]	0.825*** [6.57]	0.686** [2.32]	0.637*** [4.02]	0.479 [0.85]
$\beta_{13}: RET$	-0.352*** [-20.76]	-0.280*** [-7.62]	-0.297*** [-15.23]	-0.248*** [-5.93]	-0.357*** [-15.61]	-0.322*** [-6.40]
Constant	0.047*** [4.82]	0.051 [1.49]	0.035*** [3.50]	0.039 [1.19]	-0.028** [-2.31]	-0.090** [-2.48]
Industry	No	No	No	No	No	No
Year	Yes	Yes	Yes	Yes	Yes	Yes
Observations	104,294	20,545	84,120	17,005	48,615	7,840
Adj. R-squared	0.52	0.50	0.50	0.49	0.54	0.50

**Note:** Panel A reports the results from the FE regression of association between financial constraints and SG&A cost behaviour during expansion and contraction period using NBER. Robust t-statistics are in brackets and are based on standard errors that are clustered by firm. \*\*\* p<0.01, \*\* p<0.05, \* p<0.10. Refer to Appendix A for variable definitions.

**PANEL B: OECD**

	SA	SA	WW	WW	BLM	BLM
	Expansion	Contraction	Expansion	Contraction	Expansion	Contraction
	(1)	(2)	(3)	(4)	(5)	(6)
$\beta_1: LN(SALE_t/SALE_{t-1})$	0.605*** [22.48]	0.552*** [19.77]	0.586*** [28.59]	0.589*** [27.41]	0.797*** [31.42]	0.793*** [29.41]
$\beta_2: DECDUM * LN(SALE_t/SALE_{t-1})$	-0.129** [-2.52]	-0.052 [-1.06]	-0.089** [-2.21]	-0.072** [-2.02]	-0.354*** [-6.20]	-0.339*** [-5.72]
$\beta_3: FC$	0.006*** [3.74]	0.010*** [6.19]	0.031*** [2.76]	0.051*** [4.57]	2.455*** [3.80]	1.586** [2.28]
$\beta_4: FC * LN(SALE_t/SALE_{t-1})$	-0.033*** [-3.63]	-0.055*** [-5.91]	-0.326*** [-4.75]	-0.361*** [-4.96]	-12.615*** [-3.37]	-13.699*** [-3.48]
$\beta_5: FC * \beta_2$	0.022 [1.42]	0.046*** [2.98]	0.229* [1.94]	0.278** [2.41]	16.893** [2.30]	24.635*** [3.04]
$\beta_6: SUDEC * \beta_2$	0.104*** [6.02]	0.094*** [5.52]	0.099*** [5.22]	0.091*** [4.86]	0.107*** [4.57]	0.099*** [3.83]
$\beta_7: AIN * \beta_2$	-0.048*** [-7.72]	-0.046*** [-7.55]	-0.055*** [-7.45]	-0.051*** [-7.71]	-0.048*** [-5.12]	-0.035*** [-2.89]
$\beta_8: EIN * \beta_2$	4.126*** [3.67]	3.453*** [3.49]	4.508*** [3.08]	4.068*** [3.70]	5.357*** [2.60]	1.171 [0.59]
$\beta_9: RET * \beta_2$	0.003 [0.02]	0.487*** [3.68]	0.086 [0.54]	0.534*** [3.54]	-0.287 [-1.60]	0.651*** [3.51]
$\beta_{10}: SUDEC$	-0.056*** [-28.72]	-0.061*** [-30.72]	-0.055*** [-25.99]	-0.061*** [-28.24]	-0.049*** [-18.99]	-0.057*** [-19.05]
$\beta_{11}: AIN$	0.006*** [4.27]	0.012*** [9.31]	0.003** [2.18]	0.013*** [8.12]	0.006*** [3.18]	0.022*** [10.74]
$\beta_{12}: EIN$	0.683*** [5.59]	0.592*** [5.48]	0.941*** [5.23]	0.698*** [4.36]	0.729*** [3.67]	0.544** [2.36]
$\beta_{13}: RET$	-0.363*** [-16.71]	-0.335*** [-15.62]	-0.329*** [-13.22]	-0.272*** [-10.98]	-0.400*** [-14.06]	-0.320*** [-10.82]
Constant	0.039** [2.50]	0.056*** [3.34]	0.030* [1.89]	0.040** [2.35]	-0.015 [-0.89]	-0.035* [-1.93]
Industry	No	No	No	No	No	No
Year	Yes	Yes	Yes	Yes	Yes	Yes
Observations	59,042	65,797	47,689	53,436	30,354	26,101
Adj. R-squared	0.51	0.52	0.49	0.50	0.53	0.54

**Note:** Panel B reports the results from the FE regression of association between financial constraints and SG&A cost behaviour during expansion and contraction period using OECD. Robust t-statistics are in brackets and are based on standard errors that are clustered by firm. \*\*\* p<0.01, \*\* p<0.05, \* p<0.10. Refer to Appendix A for variable definitions.

**PANEL C: Z-test of difference in coefficient**

		<i>Contraction</i>	<i>Expansion</i>	
<b>FC Proxies</b>		<b>Coefficient (Std. Error)</b>	<b>Coefficient (Std. Error)</b>	<b>z-stat</b>
<i>NBER</i>	<i>SA</i>	0.064 (0.027)	0.020 (0.012)	1.489
	<i>WW</i>	0.452 (0.197)	0.159 (0.091)	1.350
	<i>BLM</i>	29.266 (17.087)	22.401 (6.125)	0.378
<i>OECD</i>	<i>SA</i>	0.046 (0.015)	0.022 (0.015)	1.131
	<i>WW</i>	0.278 (0.115)	0.229 (0.118)	0.297
	<i>BLM</i>	24.635 (8.092)	16.893 (7.345)	0.708

**Note:** Panel C reports the Z-test of difference in coefficients of FE regression reported in Panel A and B business cycle. Refer to Appendix A for variable definitions. Z-statistic to test for differences across groups is computed as follows (Cohen 1983, Clogg et al. 1995, Holzacker et al. 2015):

$$z = \frac{\hat{\beta}_1 - \hat{\beta}_2}{\sqrt{\text{se}(\hat{\beta}_1)^2 + \text{se}(\hat{\beta}_2)^2}}$$

## 2.3.5 Additional tests

### 2.3.5.1 Corporate governance, financial constraints and cost stickiness

Corporate governance plays a monitoring role in alleviating the empire building tendency of managers by restraining them from increasing SG&A costs excessively when sales increase, and encouraging them to downsize unused resources in SG&A costs when sales decrease (Chen et al., 2012). Weak governance leads to managers investing in value-destroying projects (Titman et al., 2004). This monitoring mechanism of corporate governance also plays a role in alleviating financial constraint. Francis et al. (2013) show that better corporate governance decreases financial constraints: an effect that is more pronounced in countries with relatively weak country-level governance protection. The baseline model did not include a corporate governance score and, hence, could raise an omitted variable concern. In order to alleviate this concern, I reran the baseline

regression for strong versus weak corporate governance groups. I consider two corporate governance indices, namely, the G-index (Gompers et al., 2003) (data are collected from the Institutional Shareholder Services), and the E-index (Bebchuk et al., 2008). For both of these measures, a higher value indicates weak governance. I create strong (weak) governance groups with observations below (equal and above) the median G- and E-indices. Untabulated results reveal that the coefficients on  $\beta_5$  are insignificant for strong as well as weak corporate governance subgroups across all three measures of financial constraints (e.g., the coefficients on  $\beta_5$  are 0.016 (t statistic 0.11) for strong and 0.048 (t statistic 0.39) for weak corporate governance groups following the G-index measure. The corresponding coefficients are -0.141 (t statistic -0.98) and 0.165 (t statistic 1.34) for the E-index measure, when SA is used as the proxy for financial constraints. One of the possible reasons behind these insignificant results could be the extremely small sample size for this test (for both E-index and G-index, the maximum observations is 7,189).

### **2.3.5.2 Change in tax rates, financial constraints and cost stickiness**

I consider whether changes in corporate income tax rates affect cost behaviour of financially-constrained firms. I posit that retaining unutilised resources could be a strategy to decrease tax expense in high tax rate years, while cash savings can be obtained by reducing slack resources in years with tax rate reductions (Guenther, 1994). Gordon and Lee (2001) find that change in the corporate tax rate influences corporate debt policy. Guenther (1994) hypothesises, and finds evidence, that firms engage in income decreasing accruals in the year prior to tax rate reductions.

Over the sample period, there has not been a significant increase or decrease in the tax rate in the U.S. except for the 1986 Tax Reform Act, which decreased the corporate tax rate from 46 percent to 34 percent. Therefore, I use the Tax Reform Act of 1986 for this analysis. I hypothesise

that prior to the 1986 tax rate reduction regime, financially-constrained firms would have engaged in higher sticky cost behaviour by retaining resources. But after the 1986 tax rate reduction, financially-constrained firms would have incentives to engage in less sticky behaviour by shedding unutilised resources and associated SG&A costs, to benefit from cash savings.

To test my prediction, I restrict the test period from 1986 to 1988, and denote 1986 as the last year with a 46 percent tax rate; 1987 as the transition year; and 1988 as the first year with a 34 percent tax rate. The coefficients on  $\beta_5$  are insignificant in 1986 for both the SA and the WW financial constraint measures but are positive and significant in 1988 (coefficients 0.148 and 1.39, significant at  $p < 0.05$  and  $p < 0.01$  for the SA and WW measures respectively) (untabulated).

## **2.4 Chapter Summary**

Although traditional cost behaviour identifies all costs as either fixed or variable, the relation between cost and cost driver is more complex (Noreen, 1991). Some costs rise more when cost drivers increase but do not decrease proportionately with a decrease in activity level. This cost pattern is termed cost stickiness. A significant number of academic research papers have documented evidence of cost stickiness in the U.S. and in international contexts. In this paper, I have examined the cost behaviour of financially-constrained firms.

I argue that the managers of financially constrained firms have an incentive to reduce slack resources, as an attempt to survive the adversities of financial constraints. My findings show that financially constrained firms exhibit less sticky behaviour. This prediction is in line with the “efficiency” view of cost stickiness implying that firms will decrease unused resources for the right reasons i.e., for survival. On the other hand, retaining unutilised resources by managers of financially-constrained firms for ‘empire building’ reasons, is a manifestation of “bad” cost

stickiness, i.e., stickiness stemming from the wrong reasons. I document the presence of both “good” and “bad” less stickiness using three contextual settings: namely, earnings management incentives, agency problem and the future value-creating potential of SG&A costs. I also investigate whether the association between financial constraints and cost stickiness varies across the economic cycle. I find that, less cost stickiness is observed during both economic expansion and economic contraction periods, although the effect is more pronounced during economic contraction.

## CHAPTER THREE

### TRADE CREDIT AND COST STICKINESS (ESSAY TWO)<sup>5</sup>

Prior research infers that suppliers have access to information related to customers' operational stability and performance that can restrain customers' empire building incentives (see, e.g. Cao et al., 2018; Fisman & Love, 2003; Petersen & Rajan, 1997). As trade credit is based on long-term relationships and trust, and involves sunk costs such as legal procedures, bargaining costs and search costs, suppliers have an interest in the operational stability of their clients (see, e.g. Cunat, 2007; Love & Zaidi, 2010). There is a ripple effect of customer activities on the supplier firm performance as well. Jorion and Zhang (2009), for instance, document that firms supplying credit to customers who subsequently file Chapter 11 bankruptcy, suffer from large negative abnormal stock returns. Additionally, suppliers tend to reduce both the quantity and tenure of credit available to financially constrained clients (Love & Zaidi, 2010). Suppliers are knowledgeable about clients' overall industry stability, and if the suppliers are the sole providers of inputs, then that gives them higher bargaining power, and the power to stop supplies, if payments are not paid on time (Uesugi & Yamashiro, 2008). Therefore, suppliers have both the *incentives* and the *opportunities* to monitor their customers' operations.

In the context of cost management, suppliers are likely to monitor customers' actions related to *downward* resource adjustment, because the retention of unutilised resources would decrease the present value of sales, increase the opportunity cost of keeping unused resources, and affect current cash flows of clients adversely. All these would have an adverse effect on a supplier's

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<sup>5</sup>This chapter has been accepted in Accounting & Finance (<https://doi.org/10.1111/acfi.12606>).

finance and overall operation. As suppliers have both the incentives and the scope to monitor buyers' resource adjustment decisions; I expect trade credit to be associated with cost stickiness.

### **3.1 Literature Review & Hypotheses Development**

#### **3.1.1 Trade credit and cost stickiness**

Suppliers can finance a firm's resources by extending trade credit (Petersen & Rajan, 1997; Cao et al., 2018). Although trade credit is a more expensive form of finance than bank loans (see, e.g. Afrifa et al., 2018; Guariglia & Mateut, 2006; Lin & Chou, 2015; Yang, 2011), many firms around the globe use trade credit as their main source of finance, which begs the question as to why firms prefer this source. To answer this, a number of theories, namely: financing advantage theory, transaction cost theory, as well as signalling and information asymmetry theory, have been used in prior literature to explain the usage of trade credit.

Following bank credit, trade credit is the second major source of external finance, and plays a pivotal role in the growth of clients' operations (see, e.g. Berger & Udell, 1998; Demirgüç-Kunt & Maksimovic, 2001; Cunat, 2007; Norden et al., 2020). Suppliers, through trade credit, can influence clients' business cycles either positively or negatively (see, e.g. Jacobson & Von Schedvin, 2015; Norden et al., 2020). The financing advantage theory suggests that it is easier for suppliers to investigate the credit worthiness of clients, and force the repayments, because of frequent visits by the supplier to the client's premises that lower information asymmetry (Petersen & Rajan, 1997). Bank loans usually contain stricter conditions, and require stringent collateral, owing to the heightened information asymmetry between bank (the lender), and client (the borrower), which leads to some borrowers being credit-rationed by banks (see, e.g. Cheng et al., 2018; Yang, 2011). Trade credit can reduce transaction costs for the client by cumulating and

paying on a monthly or quarterly basis, instead of every time the goods are delivered (Petersen & Rajan, 1997). In addition, the size and timing of a client's order sends signals to the supplier about that client's business condition; and a client's inability to take advantage of early payment discounts also signals their creditworthiness (see, e.g. Fisman & Love, 2003; Petersen & Rajan, 1997).

According to Jain (2001), the main motivation behind extending trade credit is the savings in monitoring cost by suppliers. Suppliers hold private information about their clients, which equips them to monitor client activities (Biais & Gollier, 1997). Hirshleifer et al. (2018) find that the amount of trade credit offered to a buyer, and the ability of the buyer to pay the credit on time, are both associated with future stock returns, thereby, confirming the proposition that suppliers possess private information about buyers. Aktas et al. (2012) document that use of trade credit sends a signal to investors about the quality of investments: a signal that is stronger in firms with weak governance. The authors conclude that trade credit is an alternative to standard governance mechanisms in mitigating the agency problem. Cao et al. (2018) find support for their conjecture that higher use of trade credit leads to lower future stock price crash risk, owing to suppliers' monitoring vigilance, whereby, managerial opportunism is restrained. I posit that such monitoring behaviour can also be manifested in cost management decisions.

Trade credit is an important alternative source of finance for both short- and long-term debt (Deloof & Jegers, 1999). The substitution hypothesis posits that trade credit is a substitute for bank credit (see, e.g. Deloof & Jegers, 1999; Blasio, 2005). Therefore, suppliers perform a crucial monitoring role for clients who rely more on trade credit as opposed to bank credit. This monitoring function becomes critical if the inputs supplied to the clients are very specialized or customized, because such inputs may be difficult to re-sell quickly should clients' default on their payment and,

thus, necessitate debt recovery. Therefore, by extending trade credit, the supplier puts itself at risk, owing to the possibility that the customer might engage in value destroying activities (Cao et al., 2018), i.e., misuse of resources and/or investing heavily in SG&A costs resulting in default. Additionally, Jacobson and Von Schedvin (2015) document that suppliers suffer from significant losses resulting from client's failure to pay trade credit, and this also increases their bankruptcy risk. Thereby, the supplier is likely to actively monitor a customer's overall operation and cost management activities, in particular.

Prior studies have documented that managers with empire building tendencies are likely to add excessive resources when sales increase and are unlikely to reduce unutilized resources when sales decline, resulting in cost stickiness (Banker et al., 2018; Chen et al., 2012). They further show that this relation is stronger in firms with weak corporate governance. Therefore, self-serving managers might be less tempted to shed unused resources, because downsizing by decreasing resources reduces their chance for maximizing private benefits. Given that such actions increase the default risk for suppliers, the suppliers have incentives to monitor the buyer's cost management practices. This is likely to be reflected in firms using trade credit to shed the slack resources in order to reduce avoidable costs in the event of a sales decline: a manifestation of *lower cost stickiness*.

However, from a resource adjustment theory perspective, one can argue that, once committed, resources are not easy to scale down without incurring additional adjustment costs, e.g., severance pay to terminated employees, pressure from media and regulators. Similarly, there is cost related to upward resource adjustment, such as training costs of new employees, and transaction costs of purchasing new equipment (Cheng et al., 2018). For instance, if firms requiring specialized skilled workers respond to a temporary demand drop by firing such workers, then the

subsequent search and hiring costs might outweigh the opportunity costs of retaining the workers. In addition, firms may retain unused resources when sales decline, even though that retention results in a decrease in the present value of sales and affects firm performance adversely, because suppliers provide trade credit even to unprofitable customers as long as they are confident about the customer's future sales potential (Petersen & Rajan, 1997). From the perspective of managerial expectations, retaining unutilised resources decreases the present value of sales, and increases the opportunity cost of keeping unused resources, thereby, affecting firm performance adversely. This becomes more acute with successive decreases in sales. Rational managers, therefore, are expected to cut down unused resources<sup>6</sup>.

Although there are competing views on the association between trade credit and cost behaviour, I posit that, when sales decrease, suppliers will force managers to reduce unused resources disproportionately more for the purpose of increasing operating efficiency and reducing the risk of customer bankruptcy. This perspective is consistent with prior studies by Petersen and Rajan (1997), Fisman and Love (2003) and Cao et al. (2018), all of which conclude that trade credit plays a monitoring role, courtesy of the supplier's better access to information on buyers' operational stability and performance<sup>7</sup>. Therefore, I develop the following directional hypothesis:

***H<sub>1</sub>: Trade credit is associated with lower cost stickiness, ceteris paribus.***

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<sup>6</sup>To rule out the possibility that the association between trade credit and cost behaviour is driven by resource adjustment and/or managerial expectations of future sales, rather than the monitoring intensity of trade credit providers, I have included empirical proxies for resource adjustments and managerial expectations in my regression models.

<sup>7</sup>As discussed before, trade credit is an external monitoring mechanism deployed by suppliers. Managerial expectation of future sales, on the other hand, is a firm-specific issue based on the manager's optimism or pessimism about future sales/demand. Similarly, operating slack arises because of managers' resource adjustment decisions. Thus, trade credit is inherently different from managerial expectations and operating slack.

### **3.1.2 The agency problem, trade credit and cost stickiness**

The association of lower cost stickiness with more trade credit, however, provides only a partial picture of the cost behaviour of firms. For instance, Kama and Weiss (2013) and Yang (2019) show that managers cut back resources to meet earnings benchmarks (bad stickiness); whereas, such cost cutting could also be a rational response to financial distress (good stickiness). As the arguments for the development of  $H_1$  above are based on the assertions that trade credit plays an external monitoring role, I posit that the hypothesized relationship in  $H_1$  above is likely to be moderated by firm-specific agency problem.

The agency problem occurs due to the misalignment of interests between principals (shareholders) and agents (managers). An implication of the agency problem is that managers engage in empire building activities, e.g., growing the firm beyond its optimal size by retaining unutilized resources, for status, power, compensation, and prestige (see, e.g. Chen et al., 2012; Hope & Thomas, 2008; Jensen, 1986; Masulis et al., 2007; Stulz, 1990). For example, overinvestment in labour (e.g., over-hiring or under-firing) could be motivated by managers' desire to engage in empire building activities by retaining underperforming projects (Williamson, 1963). Based on prior literatures of agency theory, slack resources are retained because managers get both monetary and nonmonetary benefits from managing large, complex organizations, and try to avoid time-consuming, difficult decisions related to shedding unused resources (see, e.g. Bertrand & Mullainathan, 2003; Chen et al., 2012; Datta et al., 2010). Therefore, firms with marked agency problem have more opportunity to engage in overspending in operational costs, such as SG&A. Chen et al. (2012) document that managers' empire building tendencies lead to cost stickiness, and this positive relation is weaker under strong corporate governance, implying that corporate governance can mitigate the agency problem, and results in lower cost stickiness.

Financing advantage theory posits that providers of trade credit can easily investigate and monitor the creditworthiness of their clients, courtesy of having better access to information related to customers' operational stability and performance, compared to banks and institutional lenders (see, e.g. Cao et al., 2018; Fisman & Love, 2003; Petersen & Rajan, 1997). Thereby, when sales decrease, trade credit will play a stronger monitoring role in firms plagued with high agency problem. This should be reflected in lower cost stickiness for firms with high agency problem in the setting: a manifestation of the monitoring role of trade credit on cost behaviour.

*H<sub>2</sub>: Trade credit is associated with lower cost stickiness in high agency problem firms, ceteris paribus.*

### **3.1.3 Product market competition, trade credit and cost stickiness**

Product market competition has been linked to improved managerial efficiency by decreasing operating costs and reducing agency costs (Baggs & De Bettignies, 2007). Therefore, it is likely that product market competition may moderate the association between trade credit and cost stickiness. Li and Zheng (2017) document that product market competition results in cost stickiness. The authors argue that when firms face competition, management will opt to invest more instead of curtailing resources, in order to maintain or strengthen their competitive position in the market. Sales decline could be an indicator that the firm is losing its market position and could result in aggressive investment in research and development, marketing or quality control, thus, leading to sticky cost behaviour (Li & Zheng, 2017). In addition, owing to resource adjustment costs associated with downsizing operations, e.g. severance payments, managers are likely to delay shedding unutilised resources until they can ascertain whether the decrease in demand is permanent (Li & Zheng, 2017).

However, the missing link in this finding of Li and Zheng's (2017) study, is whether trade credit moderates this strategy of retaining slack resources by firms facing high product market competition. Economists argue that firms operating in competitive industries have strong incentives to minimize slack to reduce unnecessary cost in order to maximise profits, rather than run the risk of going out of business (Giroud & Mueller, 2011). Baggs and De Bettignies (2007) document that competition leads to cost reduction, and that this relation is more prominent in firms with agency problem. Thus, market competition acts as an external governance mechanism (see, e.g. Ko et al., 2016; Lee et al., 2018). Firms operating in high (low) competitive environments have strong (weak) corporate governance environments: a factor that affects agency costs differentially (Giroud & Mueller, 2011). Therefore, owing to suppliers' monitoring roles, I would expect that the association between high levels of trade credit and lower cost stickiness should be stronger for firms operating in weak competitive markets.

*H<sub>3</sub>: Trade credit is associated with lower cost stickiness for firms operating in weak competitive markets, ceteris paribus.*

### **3.1.4 Customer concentration, trade credit and cost stickiness**

The underlying assumption so far in this study has been that all suppliers have equal ability and incentive to monitor customer behaviour. However, this disregards the possibility that variation in the bargaining power of buyers over suppliers can moderate the association between trade credit and cost stickiness. I address this concern by incorporating customer concentration as a proxy for suppliers' monitoring incentives.

Customer concentration refers to the concentration of the customer base, and is a critical factor in the supplier-customer relationship (Huang et al., 2016). Prior research documents that

customer concentration is related to supplier financial policy (see, e.g. Banerjee et al., 2008; Cohen & Li, 2016; Huang et al., 2016; Itzkowitz, 2013; Titman & Wessels, 1988; Wang, 2012), and to supplier performance and risk (see, e.g. Campello & Gao, 2017; Dhaliwal et al., 2016; Huang et al., 2016; Kalwani & Narayandas, 1995; Patatoukas, 2012; Piercy & Lane, 2006; Ravenscraft, 1983). Agostino and Trivieri (2014) assume that when customer concentration is high, suppliers have strong incentives to monitor their customers' financial health.

However, major customers are likely to exert bargaining power over suppliers by demanding lower prices and delayed payments (see, e.g. Bhattacharyya & Nain, 2011; Campello & Gao, 2017; Fee & Thomas, 2004; Murfin & Njoroge, 2014). This is likely to lower profits and increase the volatility of both earnings and cash flow for the suppliers. Also, if a supplier has an overall low market share; in other words, there are several suppliers available in the market, then the customer faces comparatively low switching costs, and has high bargaining power over the supplier (see, e.g. Hui et al., 2012; Inderst & Wey, 2007; Schumacher, 1991; Snyder, 1996). Additionally, if the customer is less reliant on the supplier because supplier provides only a small portion of total inputs then the customer can switch to another supplier without incurring extra switching costs, or manufacture the product internally (Dhaliwal et al., 2016). Thereby, suppliers' monitoring role will be prominent when customer concentration is low (i.e. stronger bargaining power of supplier), resulting in lower cost stickiness.

***H4:** Trade credit is associated with lower cost stickiness when customer concentration is low, ceteris paribus.*

## 3.2 Research Design

### 3.2.1 Empirical model

The extensive literature on cost stickiness uses the following popular model developed by Anderson et al. (2003) to test for the presence or absence of cost stickiness (e.g., Chen et al., 2012; Dierynck et al., 2012; Venieris et al., 2015):

$$LN \frac{SG\&A_t}{SG\&A_{t-1}} = \beta_0 + \beta_1 LN \left[ \frac{SALE_t}{SALE_{t-1}} \right] + \beta_2 DECDUM * LN \left[ \frac{SALE_t}{SALE_{t-1}} \right] + \varepsilon \quad (3.1)$$

I use the same model but first use COGS as the cost component. The rationale for doing so stems from the fact that COGS includes direct and indirect material costs that are financed by the supplier through trade credit.

$$LN \left[ \frac{COGS_t}{COGS_{t-1}} \right] = \beta_0 + \beta_1 LN \left[ \frac{SALE_t}{SALE_{t-1}} \right] + \beta_2 DECDUM * LN \left[ \frac{SALE_t}{SALE_{t-1}} \right] + \beta_3 TC + \beta_4 TC * LN \left[ \frac{SALE_t}{SALE_{t-1}} \right] + \beta_5 TC * DECDUM * LN \left[ \frac{SALE_t}{SALE_{t-1}} \right] + \sum_{m=6}^{11} \beta_m ECONVAR_{m,t} * DECDUM * LN \left[ \frac{SALE_t}{SALE_{t-1}} \right] + \sum_{n=12}^{17} \beta_n ECONVAR_{n,t} + \varepsilon \quad (3.2a)$$

$$LN \left[ \frac{SG\&A_t}{SG\&A_{t-1}} \right] = \beta_0 + \beta_1 LN \left[ \frac{SALE_t}{SALE_{t-1}} \right] + \beta_2 DECDUM * LN \left[ \frac{SALE_t}{SALE_{t-1}} \right] + \beta_3 TC + \beta_4 TC * LN \left[ \frac{SALE_t}{SALE_{t-1}} \right] + \beta_5 TC * DECDUM * LN \left[ \frac{SALE_t}{SALE_{t-1}} \right] + \sum_{m=6}^{11} \beta_m ECONVAR_{m,t} * DECDUM * LN \left[ \frac{SALE_t}{SALE_{t-1}} \right] + \sum_{n=12}^{17} \beta_n ECONVAR_{n,t} + \varepsilon \quad (3.2b)$$

where *COGS* (Compustat data item COGS) is costs of goods sold, *SG&A* (Compustat data item XSGA) is selling, general and administrative expenses, and *SALE* (Compustat data item SALE) is sales revenue. *DECDUM* takes the value of 1 if sales in year t are less than sales in year t-1, and 0 otherwise. For equations (3.2a) and (3.2b), the coefficient  $\beta_1$  measures the percentage increase in COGS and SG&A respectively, with a 1% increase in sales revenue. The sum of coefficients  $\beta_1$  and  $\beta_2$  measures the percentage decrease in COGS and SG&A with a 1% decrease in sales. A significant positive  $\beta_1$  and a significant negative  $\beta_2$  confirm cost stickiness.

*TC* is the trade credit variable (detailed in subsection 3.2.2). *ECONVAR* are the economic variables, which include successive decrease (*SUDEC*), GDP growth rate (*GDP*), asset intensity (*AIN*), employee intensity (*EIN*), stock performance (*RET*) and operating slack (*OSLACK*). These six economic variables are incorporated in the model, both as interactions with the sticky variable,  $\beta_2$ , and as stand-alone variables.

I discussed in section 3.1.1 that the association between trade credit and cost stickiness could be affected by managerial expectations regarding changes in future sales and/or resource adjustment costs, in addition to agency considerations. I, therefore, include *SUDEC* and *GDP* to proxy for the former; whilst I include *AIN* and *EIN* as proxies for the latter. *SUDEC* is an indicator variable equal to 1 if the revenue in year t-1 is less than the revenue in t-2, and 0 otherwise (Banker & Byzalov, 2014). I expect the coefficient on the interactive variable  $\beta_6$  (*SUDEC*\* $\beta_2$ ) to be positive and significant, indicating that successive decrease in sales revenue diminishes cost stickiness. The coefficient on  $\beta_7$  (*GDP*\* $\beta_2$ ) is expected to be negative, because growing GDP increases managerial optimism regarding future sales, thereby, prompting managers to retain unused resources: actions that should result in more cost stickiness. *GDP* is measured as real GDP growth rate (from Bureau of Economic Analysis). *AIN* is measured as the total assets divided by the sales for year t, and *EIN* is the ratio of the total number of employees over sales. The interactive variables *AIN*\* $\beta_2$  and *EIN*\* $\beta_2$  are expected to be negative because asset and employee intensive firms have high levels of cost stickiness. *RET* is measured as the raw stock return (from the Center for Research in Security Prices (CRSP)). *RET* proxies for stock price performance, and the relation with cost stickiness is unclear. Good stock performance could result in shedding unutilized resources or it could signal future positive earnings leading to retention of unnecessary SG&A costs (Chen et al., 2012). *OSLACK* is defined as the excess of resources over those needed by a firm (see, e.g.

Azadegan et al., 2013; Bourgeois, 1981; Nohria & Gulati, 1996). I measure *OSLACK* using the industry-adjusted cash-to-cash cycle of Hendricks et al. (2009) as follows:

$$\text{Industry-adjusted cash-to-cash} = \text{days in inventory} + \text{days in receivables} - \text{days in payables}$$

where *days in inventory* = 365 (average inventory/ cost of goods sold); *days in receivables* = 365(average accounts receivables/ sales); *days in payables* = 365(average accounts payable/ cost of goods sold). I derive the industry-adjusted cash-to-cash cycle by subtracting the industry mean cash-to-cash cycle from the cash-to-cash cycle of the firm (Hendricks et al., 2009).<sup>8</sup> The expected sign of the interactive variable  $\beta_{11}$  (*OSLACK*\* $\beta_2$ ) is unclear because an optimistic manager may retain unused capacity, or a pessimistic manager may shed unused capacity. The coefficient of primary interest is the sign and significance of the interactive variable,  $\beta_5$ . A positive and significant  $\beta_5$  will support H<sub>1</sub>.

### 3.2.2 Measurement of the independent variable: Trade credit

As there is no consensus on which is the best proxy for trade credit measurement, and the majority of studies use more than one trade credit measure as a proxy, I use three different measures in this study that have been widely used in prior studies. The trade credit measures used are: (i) the ratio of accounts payable to cost of goods sold (*TC1=AP/COGS*) (see, e.g. Afrifa et al., 2018; Garcia-Appendini & Montoriol-Garriga, 2013; Love et al., 2007; Molina & Preve, 2012; Shenoy & Williams, 2017; Wu et al., 2012); (ii) the ratio of accounts payable to sales (*TC2=AP/SALE*) (see,

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<sup>8</sup>I assess the sensitivity of the results by using two alternative measures of *OSLACK*. First, I take the industry-adjusted cash-to-cash cycle and normalize it using the sum of industry mean days of inventory, accounts receivables, and accounts payables as deflator (Hendricks et al., 2009). Second, I use industry-adjusted days in inventory (Hendricks et al., 2009). Our results are robust to these alternative measures of *OSLACK*.

e.g. Aktas et al., 2012; Ferrando & Mulier, 2013), and (iii) the ratio of accounts payable to purchase ( $TC3=AP/PURCHASE$ ) (Agostino & Trivieri, 2019), where purchase is COGS plus the changes in inventory.

### 3.2.3 Moderating variables

To test the prediction of H<sub>2</sub>, I split the sample observations into low and high agency problem groups, based on two different measures that capture agency problem. I do so because the key explanatory variable  $\beta_5$  is a product of the interaction of three terms ( $TC$ ,  $DECDUM$  and  $LN\left[\frac{SALE_t}{SALE_{t-1}}\right]$ ) and, therefore, multiplying this variable by a fourth term would make interpretation of the resulting term extremely difficult. Following prior literature, I use (i) capital expenditure ( $CAPEX$ ) and (ii) acquisition ratio ( $ACQRATIO$ ) as proxies for agency problem. Both of these measures have been used as proxies for the agency problem in prior studies by Chhaochharia et al. (2012), Giroud and Mueller (2010) and Guo et al. (2018). As elucidated in section 3.2.2, one of the consequences of the agency problem is managers' tendency to engage in empire-building. Such managers are likely to overspend in the form of capital expenditure or acquire business to build an empire. Therefore, I have used these two measures that I believe capture the empire-building tendency of managers. The *high agency problem group* consists of observations with values of these variables higher than the median, while the *low agency problem group* consists of observations equal to or below the median value of these variables. Although free cash flow has been used as proxy for the agency problem in many prior studies, including Chen et al. (2012), I avoid this measure because free cash flow is the excess cash resulting from a mismatch between available cash and the firm's growth prospects (Jensen, 1986). However, managers do not necessarily misuse free cash flow for personal benefit. A pessimistic manager might hold on to

more free cash when sales decline. Additionally, this variable has been used in operations management research as a proxy for slack resources, rather than for agency problem.

To test H<sub>3</sub>, I use the Li et al. (2013)<sup>9</sup> measurement of product market competition (*PMC*), which is based on perceptions of management related to competition reflected in the MD&A section of the 10-K filings (Li & Zheng, 2017). Li et al. (2013) count the number of times any of the words “*competition, competitor, competitive, compete, competing*” appears in each 10-K filing, and then scale this number by the total number of words in the filing; thus, a high value of this measure indicates a more competitive environment. The advantage of this text-based measure is that it reflects managers’ perceived intensity of competition and its impact on their deliberate resource adjustments (Li & Zheng, 2017). Using the Li et al. (2013) and Li and Zheng (2017) methodology, I rank the PMC variable into deciles, and then standardize it to lie between 0 and 1, where 0 is a low PMC (below or equal to 0.44) group and 1 is a high PMC (above 0.44) group. One limitation of using this publicly available data is that it reduces the sample size to 27,433 firm-year observations: a significant reduction from the baseline sample. I, therefore, caution readers to consider this sample attrition concern in interpreting the results for this test.

To test the moderating effect of customer concentration (*CC*) (test of H<sub>4</sub>), I use Compustat’s segment customer files to identify suppliers that disclose sales to major corporate customers. Since 1976, the Statement of Financial Accounting Standards No. 14 (SFAS 14) of the Financial Accounting Standards Board (FASB) has required suppliers to disclose external customers that individually account for 10% or more of their revenues. FAS 131 superseded SFAS 14 in 1997, but the requirement to report such customers remains intact for public companies under SEC Regulation S-K Item 101. I measure customer concentration as an indicator variable that is set to

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<sup>9</sup>The data is available from Professor Li’s webpage at <http://webuser.bus.umich.edu/feng/>

one if a supplier discloses at least one corporate customer that accounts for at least 10% of its annual revenues, and zero otherwise (Campello & Gao, 2017; Dhaliwal et al., 2016; Huang et al., 2016).

### **3.2.4 Sample selection and descriptive statistics**

Financial data are collected from Compustat, whilst the stock return data are collected from the CRSP for the years 1977 to 2017. For the cost stickiness regression, I need two years of lag values for SALE; thereby, the main sample period starts from 1979. I deliberately choose a long sample period to provide a richer analysis of the cost stickiness behaviour and, also, because the seminal work by Anderson *et al.* (2003) comprises data from 1979. Panel A, Table 3.1, illustrates the sample selection process, which follows the process used by Anderson et al. (2003). I begin with a total sample of 460,351 firm-year observations during 1977–2017. I then exclude firm-year observations from the regulated industries (two-digit SIC code 48-49) and financial institutions (two-digit SIC codes 60-69). This process eliminates a total of 172,681 firm-year observations. After excluding observations based on missing data on SALE and SG&A for the current and previous periods, zero SALE and SG&A values, negative SALE and SG&A values, as well as  $\text{SALE} < \text{SG\&A}$  and duplicate observations, the sample size drops down to 202,565 observations. I lost 22,775 firm-year observations because of the requirement for one-year lagged revenue and SG&A observations, and a further 4,317 firm-year observations were dropped for years 1977 and 1978. Another 709 firm-year observations were eliminated for missing values on accounts payable, accounts payable higher than total assets, accounts payable higher than current liabilities and accounts payable higher than total liabilities, resulting in a preliminary sample of 174,764 firm-year observations. The sample selection procedure is explained in Panel A, Table 3.1.

To avoid the undesirable influence of outliers, I winsorize all the continuous variables in the extreme 1% of their respective distributions. In the regression models, sample size varies depending on the model-specific data requirements. Firm-year observations come from a wide variety of industries, with two-digit SIC codes, 35–39 (27.55%) and 70-79 (14.32%) commanding the largest industry representation in the sample, as reported in Panel B, Table 3.1. Panel B also reports the industry-wise mean, median and standard deviation for *TCI* because prior studies by Petersen and Rajan (1997) and Fisman and Love (2003) document that use of trade credit varies across industries. The agriculture and mining industry (two-digit SIC 1-14) has the highest *TCI* (a mean of 45%), followed by business services (two-digit SIC 70-79) (a mean 19%), and chemical, petroleum, rubber and allied products (two-digit SIC 28-30) (a mean of 17%). Untabulated results are similar for the *TC2* and *TC3* measures.

**TABLE 3.1: Sample Selection and Industry Distribution**

<b>PANEL A: Sample selection procedure</b>	
Selection Process	Number of Observations
Total observations produced for 1977 to 2017	460,351
Drop: observations for SIC codes between 4800 to 4999	(29,807)
Drop: observations for SIC codes between 6000 to 6999	<u>(142,874)</u>
	287,670
Drop: observations with missing data on sales and SG&A for current period and previous period; sales and SG&A values are zero; sales and SG&A are negative; sales are smaller than SG&A, duplicate observations	<u>(85,105)</u>
	202,565
Drop: one year-lagged variable for Sale and SG&A	<u>(22,775)</u>
	179,790
Drop: observations produced for 1977 and 1978	<u>(4,317)</u>
	175,473
Drop: observations with missing accounts payable; accounts payable higher than total assets; accounts payable higher than current liabilities; accounts payable higher than total liabilities	<u>(709)</u>
<b><i>Preliminary sample without ECONVAR</i></b>	<b><u>174,764</u></b>

<b>PANEL B: Industry distribution</b>						
Code	Industry	Observations	% observations	<i>TCI</i>		
				Mean	Median	Std. Dev.
1-14	Agriculture and mining	16,655	9.53	0.45	0.22	0.49
15-17	Building construction	2,775	1.59	0.13	0.09	0.13
20-21	Food and kindred products	6,028	3.45	0.12	0.10	0.10
22-23	Textile mill products and apparels	3,732	2.14	0.11	0.09	0.08
24-27	Lumber, furniture, paper and printing	8,630	4.94	0.12	0.09	0.10
28-30	Chemical, petroleum, rubber and allied products	15,148	8.67	0.17	0.13	0.16
31-34	Metal	9,839	5.63	0.11	0.10	0.09
35-39	Machinery, electrical, computer equipment	48,145	27.55	0.15	0.12	0.12
40-47	Railroad and other transportation	4,761	2.72	0.15	0.09	0.20
50-52	Wholesale goods, building materials	9,917	5.67	0.13	0.11	0.15
53-59	Store merchandise, auto dealers, home furniture stores	14,758	8.44	0.11	0.09	0.11
70-79	Business services	25,022	14.32	0.19	0.12	0.26
80-99	Other	9,354	5.35	0.13	0.09	0.17
	<b>Total</b>	<b>174,764</b>	<b>100.00</b>			

### 3.3 Empirical Results & Analysis

#### 3.3.1 Descriptive statistics and correlation analysis

Descriptive statistics of the sample are reported in Table 3.2. Over the study period from 1979 to 2017, the mean (median) of  $LN(SALE_t/SALE_{t-1})$ ,  $LN(COGS_t/COGS_{t-1})$  and  $LN(SG\&A_t/SG\&A_{t-1})$  are 0.10 (0.08), 0.11 (0.08) and 0.11 (0.08), respectively. Average sales revenue for the sample is \$2,059.79 million (median \$148.73 million). Average COGS and SG&A expense are \$1,453.38 million (median \$79.46 million) and \$352.09 million (median \$28.68 million), respectively. *TC1* (accounts payable deflated by costs of goods sold), *TC2* (accounts payable deflated by sales) and *TC3* (accounts payable deflated by purchase) have means (medians) of 0.18 (0.11), 0.09 (0.07) and 0.17 (0.11), respectively. Average number of employees per firm is approximately 8,910. On average, sample firms use 0.01 thousand (median 0.01) employees and \$1.27 million (median \$0.88 million) assets to support each million dollars in sales. The median firm of the sample has not experienced a decline in sales for two consecutive years (median 0.00 and mean 0.29). The mean

(median) of *CAPEX* (capital expenditure scaled by total assets) and *ACQRATIO* (sum of the value of all acquisitions made by a firm in a year scaled by firm's total market capitalization) are 0.07 (0.04) and 0.03 (0.00), respectively. The mean of *PMC* and *CC* are 0.60 and 0.44, respectively.

**TABLE 3.2: Descriptive Statistics**

Variables	Observations	Mean	Std.Dev.	25%	Median	75%
$LN(SALE_t/SALE_{t-1})$	174,764	0.10	0.34	-0.03	0.08	0.22
<i>SALE</i> (\$mil)	174,764	2,059.79	1,1545.60	32.07	148.73	732.38
$LN(COGS_t/COGS_{t-1})$	196,241	0.11	0.38	-0.03	0.08	0.23
<i>COGS</i> (\$mil)	196,241	1,453.38	8,886.18	14.09	79.46	453.14
$LN(SG\&A_t/SG\&A_{t-1})$	174,764	0.11	0.31	-0.02	0.08	0.21
<i>SG\&amp;A</i> (\$mil)	174,764	352.09	1,782.97	7.02	28.68	127.77
<i>DECDUM</i>	174,764	0.30	0.46	0.00	0.00	1.00
<i>SUDEC</i>	159,218	0.29	0.45	0.00	0.00	1.00
<i>GDP</i>	174,764	2.74	1.79	1.9	2.9	4.00
<i>AIN</i>	174,738	1.27	1.25	0.59	0.88	1.41
<i>ASSET</i> (\$mil)	174,738	2,275.67	13,700.50	28.74	139.88	726.06
<i>EIN</i>	162,930	0.01	0.01	0.00	0.01	0.01
<i>EMP</i> (thousands)	162,930	8.91	38.07	0.21	0.99	4.50
<i>RET</i>	134,414	0.01	0.05	-0.01	0.01	1.04
<i>OSLACK</i>	152,253	1.67	379.23	-42.42	7.51	47.63
<i>TC1</i>	174,636	0.18	0.23	0.07	0.11	0.18
<i>TC2</i>	174,738	0.09	0.08	0.04	0.07	0.11
<i>TC3</i>	173,104	0.17	0.23	0.07	0.11	0.18
<i>CAPEX</i>	172,893	0.07	0.07	0.02	0.04	0.08
<i>ACQRATIO</i>	152,764	0.03	0.09	0.00	0.00	0.00
<i>PMC</i>	27,433	0.60	0.49	0.00	1.00	1.00
<i>CC</i>	160,679	0.44	0.50	0.00	0.00	1.00

**Note:** *SALE* is sales or revenue. *COGS* is costs of goods sold and *SG\&A* is selling, general and administrative expenses. *ASSET* is total assets. *EMP* is total number of employees. Other variables are defined in the Appendix B.

Table 3.3, Panels A and B show the correlation between all the main variables and  $LN(COGS_t/COGS_{t-1})$  and  $LN(SG\&A_t/SG\&A_{t-1})$ , respectively. I find that majority of the correlations are significant at the conventional level. From Panel A, change in sales is positively correlated with  $LN(COGS_t/COGS_{t-1})$  and *TC1* and negatively correlated with *TC2* and *TC3*. From Panel B, change in sales is positively correlated with  $LN(SG\&A_t/SG\&A_{t-1})$ , *TC1* and *TC3* and negatively correlated with *TC2*.

**TABLE 3.3: Correlation**

<b>PANEL A: LN(COGS/COGS<sub>t-1</sub>)</b>												
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]
<i>LN(SALE<sub>t</sub>/SALE<sub>t-1</sub>) [1]</i>	1											
<i>LN(COGS<sub>t</sub>/COGS<sub>t-1</sub>) [2]</i>	0.876***	1										
<i>DECDUM*</i>												
<i>LN(SALE<sub>t</sub>/SALE<sub>t-1</sub>) [3]</i>	0.698***	0.610***	1									
<i>SUDEC [4]</i>	-0.172***	-0.174***	-0.159***	1								
<i>GDP [5]</i>	0.128***	0.113***	0.081***	0.003	1							
<i>AIN [6]</i>	-0.041***	-0.026***	-0.219***	0.062***	-0.025***	1						
<i>EIN [7]</i>	-0.013***	-0.004	-0.049***	-0.013***	0.047***	0.052***	1					
<i>RET [8]</i>	0.149***	0.079***	0.107***	0.037***	-0.074***	-0.023***	0.003	1				
<i>OSLACK [9]</i>	-0.006*	-0.015***	-0.018***	-0.003	0.001	0.035***	0.019***	0.000	1			
<i>TC1 [10]</i>	0.009**	-0.041***	-0.132***	0.027***	0.013***	0.485***	0.025***	-0.006*	0.098***	1		
<i>TC2 [11]</i>	-0.027***	-0.007*	-0.172***	0.057***	0.026***	0.435***	0.047***	-0.024***	0.070***	0.784***	1	
<i>TC3 [12]</i>	-0.016***	-0.059***	-0.149***	0.034***	0.009***	0.441***	0.001	-0.011***	0.093***	0.925***	0.744***	1

**Note:** \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ . Refer to Appendix B for variable definitions

<b>PANEL B: LN(SGA&amp;A/SG&amp;A<sub>t-1</sub>)</b>												
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]
<i>LN(SALE/SALE<sub>t-1</sub>) [1]</i>	1											
<i>LN(SGA&amp;A<sub>t</sub>/SG&amp;A<sub>t-1</sub>) [2]</i>	0.693***	1										
<i>DECDUM*</i>												
<i>LN(SALE<sub>t</sub>/SALE<sub>t-1</sub>) [3]</i>	0.716***	0.439***	1									
<i>SUDEC [4]</i>	-0.188***	-0.252***	-0.166***	1								
<i>GDP [5]</i>	0.137***	0.101***	0.093***	0.004	1							
<i>AIN [6]</i>	-0.029***	0.026***	-0.167***	0.059***	-0.044***	1						
<i>EIN [7]</i>	0.009**	0.035***	-0.001	-0.023***	0.049***	-0.099***	1					
<i>RET [8]</i>	0.169***	0.046***	0.119***	0.034***	-0.081***	-0.035***	0.004	1				
<i>OSLACK [9]</i>	0.056***	0.031***	0.057***	-0.020***	-0.001	-0.004	-0.024***	0.008**	1			
<i>TC1 [10]</i>	0.052***	0.061***	-0.055***	0.011***	0.018***	0.428***	-0.109***	0.001	0.236***	1		
<i>TC2 [11]</i>	-0.011***	0.017***	-0.137***	0.063***	0.032***	0.330***	-0.077***	-0.031***	0.151***	0.758***	1	
<i>TC3 [12]</i>	0.007*	0.023***	-0.099***	0.024***	0.012***	0.414***	-0.111***	-0.008**	0.248***	0.964***	0.739***	1

**Note:** \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ . Refer to Appendix B for variable definitions

### 3.3.2 Regression results: Trade credit and cost stickiness

#### 3.3.2.1 Trade credit and cost stickiness: baseline regressions

Table 3.4, Panel A, reports the OLS and firm fixed effect results for the association between trade credit and cost stickiness using COGS as the dependent variable. Panel B reports the OLS and firm fixed effect results for the association between trade credit and cost stickiness using SG&A as the dependent variable. To control for unobservable industry and year characteristics associated with trade credit and cost stickiness, I include year and industry dummy variables in all the regression specifications. To take into account the time series and cross-sectional dependence in the error terms of the regressions, I calculate t-statistics using standard errors that are clustered by firm.

Panel A, Column (1), reveals that *COGS* increases by 0.977% for each 1% increase in sales and *COGS* decreases by 0.965% for each 1% decrease in sales. This is consistent with Chen et al. (2019) who find that, compared to SG&A costs, operating costs, which include COGS, are more responsive to fluctuations in sales and, thus, are considered more variable in nature than SG&A costs. The variable of interest is  $\beta_5: (TC * DECDUM * LN \left[ \frac{SALE_t}{SALE_{t-1}} \right])$ . From columns (5), (7) and (9) it is evident that the coefficients on  $\beta_5$  are positive and significant across all three TC measures (coefficients of 0.140 (p<0.01); 0.211 (p<0.01); and 0.124 (p<0.01) for *TC1*, *TC2* and *TC3* measures, respectively). This supports my H<sub>1</sub>, i.e., higher trade credit is associated with lower cost stickiness. Columns (6), (8) and (10) present the fixed effects regression results, with coefficients on  $\beta_5$  of 0.121 (p<0.01), 0.331 (p<0.01) and 0.078 (p<0.05) for the *TC1*, *TC2* and *TC3* measures, respectively, that are consistent with those reported using the OLS procedure. Columns (5) to (10) reveal that the coefficient on  $\beta_4 (TC * LN \left[ \frac{SALE_t}{SALE_{t-1}} \right])$  is negative and significant. This suggests that in periods of declining sales, firms' lower unutilized resource owing to the presence of trade credit.

The negative coefficient on  $\beta_4$  and the positive coefficient on  $\beta_5$ , although opposite in sign, imply the same direction of the effect of trade credit on COGS, i.e., trade credit is related to lower cost stickiness.

The coefficient on *SUDEC*, the proxy for managerial expectations, is positive and significant indicating that successive decreases in sales diminish stickiness. However, the coefficient on *GDP*, another proxy for managerial expectations, is significantly positive. Although this contradicts my expectation, consistent with Hartlieb et al. (2020), Lee et al. (2019), Hartlieb et al. (2019) and Li and Zheng (2017). The coefficient on *AIN*, a proxy for resource adjustment costs, is significantly negative. This indicates that asset intensive firms have higher cost stickiness. However, the coefficient on *EIN* is significantly positive which is similar to Banker et al. (2013b) and Chen et al. (2012). Chen et al. (2012) conjecture that firms in recent times are more likely to employ temporary or contractual employees, thus, lowering resource adjustment costs related to laying off labour when sales decrease or rehiring labour when sales increase. The coefficients on *RET* are positive; but mostly insignificant. Finally, *OSLACK* has a negative but insignificant coefficient that is similar to the finding of Bradbury and Scott (2018).

Panel B, column (1), reports the coefficient on  $\beta_1$  ( $LN \left[ \frac{SALE_t}{SALE_{t-1}} \right]$ ) as positive and significant (coefficient = 0.682; t statistic = 175.23;  $p < 0.01$ ), implying that SG&A expenses increase by 0.682% for a 1% increase in sales. The coefficient on  $\beta_2$  is significantly negative (coefficient = -0.192; t statistic = -27.06;  $p < 0.01$ ). The sum of  $\beta_1$  and  $\beta_2$  is 0.49, which implies that SG&A expenses decrease by 0.49% for a 1% decrease in sales, thereby, confirming cost stickiness in my sample. Anderson et al. (2003) using industrial firms from 1979 to 1998 find that SG&A costs increase by 0.55% for each 1% increase in sales: however, SG&A costs decrease by only 0.35% for each 1% decrease in sales. After controlling for managerial expectations, resource adjustment

costs and operating slack in the sample, column (3) shows that SG&A costs increase by 0.705% for each 1% increase in sales: however, SG&A costs decrease by only 0.481% for each 1% decrease in sales and, thus, continue to provide strong evidence of cost stickiness.

It is evident from columns (5), (7) and (9) that the coefficients on  $\beta_5$  are positive and significant across all three TC measures (coefficients of 0.222 ( $p < 0.01$ ); 0.591 ( $p < 0.01$ ); and 0.270 ( $p < 0.01$ ) for *TC1*, *TC2* and *TC3* measures, respectively). This supports my  $H_1$ , i.e., higher trade credit is associated with lower cost stickiness. Columns (6), (8) and (10) present the fixed effects regression results with coefficients on  $\beta_5$  of 0.274 ( $p < 0.01$ ), 0.706 ( $p < 0.01$ ) and 0.299 ( $p < 0.01$ ) for the *TC1*, *TC2* and *TC3* measures, respectively, which are consistent with those reported using the OLS procedure. Columns (5) to (10) reveal that the coefficient on  $\beta_4$ :  $(TC * LN \left[ \frac{SALE_t}{SALE_{t-1}} \right])$  is negative and significant, as is similar to my findings for the COGS specification.

The coefficients on proxies for managerial expectations (i.e., *SUDEC* and *GDP*), resource adjustment costs (i.e., *AIN* and *EIN*) and operating slack (i.e. *OSLACK*) have the same sign and significance as documented in Panel A for the COGS specification. However, the coefficients on *RET* are positive and significant, indicating that good stock performance results in shedding unutilized resources (Chen et al., 2012).

As mentioned in Section 3.2.4 above, some prior studies provide evidence that use of trade credit varies across industries. It is, therefore, intuitive to expect that the association between trade credit and cost stickiness could also vary across industries. In an untabulated analysis, I find that trade credit is associated with *less* SG&A cost stickiness in the building construction (two-digit SIC 15-17); lumber, furniture, paper and printing (two-digit SIC 24-27); chemical, petroleum, rubber and allied products (two-digit SIC 28-30); machinery, electrical, computer equipment (two-

**TABLE 3.4: OLS and Fixed Effect Regression Results – Trade Credit and Cost Stickiness**

<b>PANEL A: Dependent variable - <math>LN(COGS/COGS_{t-1})</math></b>										
	OLS	FE	OLS	FE	<i>TC1</i>	<i>TC1</i>	<i>TC2</i>	<i>TC2</i>	<i>TC3</i>	<i>TC3</i>
	(1)	(2)	(3)	(4)	OLS	FE	OLS	FE	OLS	FE
$\beta_1: LN(SALE_t/SALE_{t-1})$	0.977***	0.965***	0.985***	0.978***	1.021***	1.015***	0.992***	0.987***	1.020***	1.011***
	[315.86]	[251.99]	[238.33]	[201.13]	[198.48]	[166.67]	[175.87]	[142.84]	[198.75]	[168.45]
$\beta_2: DECDUM * LN(SALE_t/SALE_{t-1})$	-0.012**	0.004	-0.039***	-0.036**	-0.080***	-0.071***	-0.052***	-0.058***	-0.084***	-0.078***
	[-1.99]	[0.56]	[-2.95]	[-2.50]	[-6.07]	[-4.97]	[-3.73]	[-3.61]	[-6.17]	[-5.21]
$\beta_3: TC$	-	-	-	-	-0.042***	-0.155***	0.103***	0.193***	-0.040***	-0.136***
					[-5.16]	[-12.26]	[6.57]	[7.77]	[-4.96]	[-11.06]
$\beta_4: TC * LN(SALE_t/SALE_{t-1})$	-	-	-	-	-0.110***	-0.121***	-0.077**	-0.088*	-0.122***	-0.129***
					[-5.71]	[-5.18]	[-2.02]	[-1.78]	[-6.09]	[-5.45]
$\beta_5: TC * \beta_2$	-	-	-	-	0.140***	0.121***	0.211***	0.331***	0.124***	0.078**
					[4.43]	[3.26]	[3.00]	[3.74]	[4.14]	[2.25]
$\beta_6: SUDEC * \beta_2$	-	-	0.059***	0.061***	0.060***	0.058***	0.058***	0.061***	0.060***	0.059***
			[5.43]	[5.29]	[5.54]	[5.15]	[5.36]	[5.31]	[5.53]	[5.10]
$\beta_7: GDP * \beta_2$	-	-	0.004	0.008***	0.003	0.008***	0.004	0.007**	0.003	0.008***
			[1.41]	[2.65]	[1.09]	[2.82]	[1.40]	[2.52]	[1.19]	[2.72]
$\beta_8: AIN * \beta_2$	-	-	-0.009***	-0.011***	-0.007**	-0.005	-0.012***	-0.016***	-0.004	-0.001
			[-3.39]	[-3.30]	[-2.35]	[-1.42]	[-4.01]	[-4.31]	[-1.47]	[-0.15]
$\beta_9: EIN * \beta_2$	-	-	2.390***	2.700***	1.463***	1.385**	2.345***	2.422***	1.925***	2.198***
			[4.74]	[4.42]	[2.70]	[2.23]	[4.51]	[4.02]	[3.74]	[3.59]
$\beta_{10}: RET * \beta_2$	-	-	0.083	0.186**	0.067	0.135	0.084	0.185**	0.070	0.155*
			[1.01]	[2.04]	[0.82]	[1.55]	[1.02]	[2.03]	[0.85]	[1.71]
$\beta_{11}: OSLACK * \beta_2$	-	-	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
			[-1.46]	[-1.38]	[-0.90]	[-1.06]	[-1.54]	[-1.45]	[-0.78]	[-0.74]
$\beta_{12}: SUDEC$	-	-	-0.009***	-0.011***	-0.009***	-0.010***	-0.010***	-0.011***	-0.009***	-0.010***
			[-7.68]	[-8.60]	[-7.16]	[-8.22]	[-8.02]	[-8.86]	[-7.10]	[-7.88]
$\beta_{13}: GDP$	-	-	-0.004**	-0.001	-0.005***	-0.000	-0.003**	-0.001	-0.005***	-0.001
			[-2.34]	[-0.43]	[-3.41]	[-0.25]	[-2.02]	[-0.71]	[-3.33]	[-0.41]
$\beta_{14}: AIN$	-	-	0.001	0.001	0.008***	0.014***	-0.001	-0.003	0.007***	0.011***
			[1.08]	[0.44]	[8.23]	[7.50]	[-1.10]	[-1.64]	[7.59]	[6.15]
$\beta_{15}: EIN$	-	-	0.398***	1.025***	0.303***	1.385***	0.416***	0.864***	0.292***	1.190***
			[6.72]	[5.74]	[4.91]	[7.51]	[6.96]	[4.86]	[4.72]	[6.64]
$\beta_{16}: RET$	-	-	-0.363***	-0.361***	-0.369***	-0.356***	-0.361***	-0.362***	-0.368***	-0.358***
			[-26.35]	[-24.89]	[-27.16]	[-25.14]	[-26.18]	[-25.02]	[-27.04]	[-25.17]

**PANEL A: Dependent variable -  $LN(COGS_t/COGS_{t-1})$**

	OLS		FE		TC1		TC2		TC3	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
$\beta_{17}$ : OSLACK	-	-	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
			[-1.52]	[-1.39]	[-0.94]	[-1.05]	[-1.58]	[-1.45]	[-0.84]	[-0.78]
Constant	0.009***	0.008***	0.017***	0.005	0.026***	0.010**	0.008*	-0.004	0.028***	0.012***
	[3.38]	[3.53]	[4.31]	[1.30]	[6.02]	[2.36]	[1.69]	[-1.00]	[6.40]	[2.94]
Industry	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	196,241	196,241	129,815	129,815	129,815	129,815	129,815	129,815	129,815	129,815
Adj. R-squared	0.76	0.73	0.77	0.75	0.78	0.76	0.77	0.75	0.78	0.76

**Note:** This table reports the results from the OLS and FE regressions of the association between trade credit and COGS behaviour. Robust t-statistics are in brackets and are based on standard errors that are clustered by firm. \*\*\* p<0.01, \*\* p<0.05, \* p<0.10. Refer to Appendix B for variable definitions.

**PANEL B: Dependent variable -  $LN(SG\&A_t/SG\&A_{t-1})$**

	OLS		FE		TC1		TC2		TC3	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
$\beta_1$ : $LN(SALE_t/SALE_{t-1})$	0.682***	0.630***	0.705***	0.671***	0.733***	0.700***	0.762***	0.730***	0.734***	0.701***
	[175.23]	[134.70]	[137.51]	[113.10]	[114.34]	[93.59]	[102.10]	[83.14]	[115.99]	[94.64]
$\beta_2$ : $DECDUM * LN(SALE_t/SALE_{t-1})$	-0.192***	-0.157***	-0.224***	-0.203***	-0.263***	-0.248***	-0.287***	-0.276***	-0.270***	-0.254***
	[-27.06]	[-18.83]	[-13.58]	[-11.19]	[-15.05]	[-12.89]	[-15.72]	[-13.48]	[-15.43]	[-13.18]
$\beta_3$ : TC	-	-	-	-	0.057***	0.072***	0.147***	0.229***	0.050***	0.050***
					[8.45]	[6.62]	[9.04]	[8.93]	[7.71]	[4.93]
$\beta_4$ : $TC * LN(SALE_t/SALE_{t-1})$	-	-	-	-	-0.146***	-0.155***	-0.578***	-0.608***	-0.155***	-0.160***
					[-6.78]	[-5.95]	[-9.65]	[-8.41]	[-7.00]	[-5.92]
$\beta_5$ : $TC * \beta_2$	-	-	-	-	0.222***	0.274***	0.591***	0.706***	0.270***	0.299***
					[4.45]	[4.67]	[5.47]	[5.36]	[6.54]	[6.19]
$\beta_6$ : $SUDEC * \beta_2$	-	-	0.093***	0.106***	0.093***	0.108***	0.094***	0.108***	0.094***	0.108***
			[7.52]	[8.07]	[7.56]	[8.17]	[7.60]	[8.21]	[7.62]	[8.22]
$\beta_7$ : $GDP * \beta_2$	-	-	0.015***	0.017***	0.015***	0.017***	0.016***	0.017***	0.015***	0.017***
			[5.00]	[5.24]	[4.99]	[5.07]	[5.13]	[5.22]	[4.92]	[5.04]
$\beta_8$ : $AIN * \beta_2$	-	-	-0.046***	-0.042***	-0.047***	-0.046***	-0.040***	-0.038***	-0.048***	-0.045***
			[-10.28]	[-8.48]	[-9.60]	[-8.23]	[-8.51]	[-7.15]	[-10.32]	[-8.64]

**PANEL B: Dependent variable -  $LN(SG\&A_t/SG\&A_{t-1})$**

			<i>TC1</i>		<i>TC1</i>		<i>TC2</i>		<i>TC3</i>	
	OLS	FE	OLS	FE	OLS	FE	OLS	FE	OLS	FE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
$\beta_9: EIN * \beta_2$	-	-	2.958*** [3.59]	4.114*** [4.31]	2.992*** [3.64]	4.069*** [4.28]	3.140*** [3.79]	4.225*** [4.42]	2.924*** [3.57]	4.023*** [4.25]
$\beta_{10}: RET * \beta_2$	-	-	0.358*** [3.73]	0.374*** [3.50]	0.356*** [3.70]	0.371*** [3.46]	0.342*** [3.57]	0.366*** [3.43]	0.356*** [3.71]	0.368*** [3.45]
$\beta_{11}: OSLACK * \beta_2$	-	-	-0.000 [-0.96]	-0.000 [-0.51]	-0.000* [-1.73]	-0.000 [-1.29]	-0.000 [-1.07]	-0.000 [-0.87]	-0.000 [-1.57]	-0.000 [-1.06]
$\beta_{12}: SUDEC$	-	-	-0.058*** [-39.90]	-0.051*** [-33.29]	-0.058*** [-39.70]	-0.051*** [-33.19]	-0.058*** [-39.55]	-0.051*** [-33.19]	-0.058*** [-39.81]	-0.051*** [-33.25]
$\beta_{13}: GDP$	-	-	-0.019*** [-10.39]	-0.031*** [-13.81]	-0.018*** [-10.23]	-0.031*** [-13.77]	-0.019*** [-10.41]	-0.032*** [-14.00]	-0.018*** [-10.31]	-0.031*** [-13.77]
$\beta_{14}: AIN$	-	-	0.009*** [9.87]	0.021*** [12.03]	0.007*** [7.83]	0.019*** [10.78]	0.009*** [9.88]	0.020*** [11.29]	0.008*** [8.50]	0.021*** [11.48]
$\beta_{15}: EIN$	-	-	0.482*** [5.89]	1.861*** [7.84]	0.542*** [6.61]	1.849*** [7.80]	0.523*** [6.39]	1.784*** [7.53]	0.521*** [6.36]	1.857*** [7.84]
$\beta_{16}: RET$	-	-	-0.343*** [-21.39]	-0.350*** [-21.18]	-0.344*** [-21.51]	-0.353*** [-21.35]	-0.346*** [-21.63]	-0.354*** [-21.43]	-0.343*** [-21.45]	-0.351*** [-21.24]
$\beta_{17}: OSLACK$	-	-	-0.000** [-2.28]	-0.000 [-0.91]	-0.000*** [-3.22]	-0.000* [-1.85]	-0.000** [-2.49]	-0.000 [-1.44]	-0.000*** [-2.82]	-0.000 [-1.32]
Constant	0.023*** [6.95]	0.092*** [28.95]	0.013*** [3.09]	0.039*** [8.02]	0.003 [0.75]	0.030*** [6.09]	-0.001 [-0.30]	0.023*** [4.43]	0.005 [1.22]	0.032*** [6.44]
Industry	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	174,764	174,764	118,506	118,506	118,506	118,506	118,506	118,506	118,506	118,506
Adj. R-squared	0.47	0.42	0.52	0.48	0.52	0.48	0.52	0.48	0.52	0.48

**Note:** This table reports the results from the OLS and FE regressions of the association between trade credit and SG&A cost behaviour. Robust t-statistics are in brackets and are based on standard errors that are clustered by firm. \*\*\* p<0.01, \*\* p<0.05, \* p<0.10. Refer to Appendix B for variable definitions.

digit SIC 35-39); business services (two-digit SIC 70-79) and other (two-digit SIC 80-99) industries. However, I also find some industries exhibiting a positive association between trade credit and high cost stickiness: food and kindred products (two-digit SIC 20-21); textile mill products and apparel (two-digit SIC 22-23) and wholesale goods and building materials (two-digit SIC 50-52) industries.

### **3.3.2.2 Trade credit and cost stickiness: moderating effects of agency problem, product market competition, and customer concentration**

I now present the regression results for the moderating effects of agency problem, product market competition and customer concentration on the association between trade credit and cost stickiness. For these tests I use only SG&A as the cost component, because of the endogeneity concerns related to COGS. These stem from the fact that COGS depend on goods production, which responds directly to changes in sales volume. In addition, because of the accrual-based accounting system, firms can recognize only the portion of COGS related to the current period's sales and defer that remaining to a future period, unlike SG&A expenses. Finally, the key explanatory variable trade credit proxies, *TC1* and *TC3*, use COGS as deflator: therefore, econometric concerns are raised if COGS is used as a dependent variable.

Results related to H<sub>2</sub> are reported in Table 3.5. Table 3.5, Panels A1, B1 and C1, report the results using *TC1*, *TC2* and *TC3*, respectively. For brevity, I tabulate only the firm fixed-effect results. OLS regression results, too, are consistent with firm fixed-effect results. The coefficient on  $\beta_5$  is positive and highly significant for both low and high agency problem groups and for both agency problem proxies (i.e., *CAPEX* and *ACQRATIO*) across all three measures of trade credit. From Panel A1, when *CAPEX* is used as proxy for the agency problem (columns 1 and 2), the

coefficients on  $\beta_5$  are positive and significant for both low agency problem (coefficient = 0.183;  $t$  statistic = 2.11,  $p < 0.05$ ) and high agency problem firms (coefficient = 0.157;  $t$  statistic = 1.95;  $p < 0.10$ ). Results using the *ACQRATIO* proxy (columns 3 and 4) reveal that the coefficients on  $\beta_5$  are positive and significant for both low agency problem (coefficient = 0.162;  $t$  statistic = 2.44;  $p < 0.05$ ) and high agency problem sub-groups (coefficient = 0.553;  $t$  statistic = 3.96;  $p < 0.01$ ) for the *TC1* measure. I find similar results using *TC2* and *TC3*.

Panels A2, B2 and C2 report the  $Z$ -test for difference in coefficients on cost stickiness ( $\beta_5$ ) between the high versus low agency problem sub-groups. It is evident from Panel A2 that the coefficients are statistically different for the *ACQRATIO* proxy (coefficient 0.162 in the low agency group versus 0.553 in the high agency group, significant at  $p < 0.02$  using *TC1*), but insignificant for the *CAPEX*-based agency measure. A similar finding is evident from Panel C2 using the *TC3* measure. In Panel B2, using *TC2* as the trade credit proxy, I find that the difference in coefficients on  $\beta_5$  is statistically insignificant between high versus low agency problem groups for both *CAPEX* and *ACQRATIO* proxies. Taken together, the results provide evidence that the monitoring role of trade credit in inducing lower cost stickiness is more pronounced for firms with high, compared with low, agency problem. However, such a finding is conditional on the proxies used to operationalize agency problem.

**TABLE 3.5: Agency Problem, Trade Credit and Cost Stickiness**

**PANEL A1: Fixed effect regression results – TCI**

	<i>CAPEX_D</i> <b>Low Agency</b> ( <i>CAPEX</i> ≤Median)	<i>CAPEX_D</i> <b>High Agency</b> ( <i>CAPEX</i> >Median)	<i>ACQRATIO_D</i> <b>Low Agency</b> ( <i>ACQRATIO</i> ≤ Median)	<i>ACQRATIO_D</i> <b>High Agency</b> ( <i>ACQRATIO</i> >Median)
	(1)	(2)	(3)	(4)
$\beta_1$ : $LN(SALE_t/SALE_{t-1})$	0.693*** [63.41]	0.667*** [62.36]	0.568*** [53.46]	0.788*** [73.04]
$\beta_2$ : <i>DECNUM</i> * $LN(SALE_t/SALE_{t-1})$	-0.236*** [-9.32]	-0.230*** [-7.35]	-0.103*** [-4.27]	-0.359*** [-9.73]
$\beta_3$ : <i>TCI</i>	0.070*** [4.11]	0.070*** [4.86]	0.043*** [3.30]	0.110*** [5.46]
$\beta_4$ : <i>TCI</i> * $LN(SALE_t/SALE_{t-1})$	-0.019 [-0.46]	-0.172*** [-5.39]	-0.101*** [-3.11]	-0.184*** [-3.61]
$\beta_5$ : <i>TCI</i> * $\beta_2$	0.183** [2.11]	0.157* [1.95]	0.162** [2.44]	0.553*** [3.96]
<i>ECONVAR</i> * $\beta_2$	Yes	Yes	Yes	Yes
<i>ECONVAR</i>	Yes	Yes	Yes	Yes
Constant	0.013 [1.55]	0.038*** [5.43]	0.042*** [6.57]	0.059*** [6.08]
Industry	No	No	No	No
Year	Yes	Yes	Yes	Yes
Observations	58,457	58,992	75,705	37,508
Adj. R-squared	0.51	0.40	0.39	0.59

**Note:** Robust t-statistics are in brackets and are based on standard errors that are clustered by firm. \*\*\* p<0.01, \*\* p<0.05, \* p<0.10. Refer to Appendix B for variable definitions.

**PANEL A2: Z-test of difference in coefficient**

TC Proxy	Agency Proxies	<i>Low Agency</i> Coefficient (Std.Error)	<i>High Agency</i> Coefficient (Std.Error)	Z-stat
<i>TCI</i>	<i>CAPEX_D</i>	0.183 (0.087)	0.157 (0.081)	0.218
	<i>ACQRATIO_D</i>	0.162 (0.066)	0.553 (0.139)	2.529

**Note:** Panel A2 reports the Z-test of difference in coefficients of FE regression reported in Panel A1. Refer to Appendix B for variable definitions. Z-statistic to test for differences across groups is computed as follows (see, e.g. Cohen, 1983; Clogg *et al.*, 1995; Holzhaecker *et al.*, 2015):

$$z = \frac{\hat{\beta}_1 - \hat{\beta}_2}{\sqrt{\text{se}(\hat{\beta}_1)^2 + \text{se}(\hat{\beta}_2)^2}}$$

**PANEL B1: Fixed effect regression results – TC2**

	<i>CAPEX_D</i> <b>Low Agency</b> ( <i>CAPEX</i> ≤Median)	<i>CAPEX_D</i> <b>High Agency</b> ( <i>CAPEX</i> >Median)	<i>ACQRATIO_D</i> <b>Low Agency</b> ( <i>ACQRATIO</i> ≤ Median)	<i>ACQRATIO_D</i> <b>High Agency</b> ( <i>ACQRATIO</i> >Median)
	(1)	(2)	(3)	(4)
$\beta_1: LN(SALE_t/SALE_{t-1})$	0.724*** [57.02]	0.702*** [54.78]	0.605*** [46.68]	0.817*** [67.07]
$\beta_2: DECDUM * LN(SALE_t/SALE_{t-1})$	-0.262*** [-9.73]	-0.266*** [-8.07]	-0.141*** [-5.29]	-0.385*** [-9.77]
$\beta_3: TC2$	0.154*** [4.03]	0.291*** [7.40]	0.180*** [5.57]	0.238*** [4.51]
$\beta_4: TC2 * LN(SALE_t/SALE_{t-1})$	-0.366*** [-3.34]	-0.689*** [-6.92]	-0.571*** [-5.53]	-0.649*** [-5.55]
$\beta_5: TC2 * \beta_2$	0.481** [2.57]	0.640*** [3.36]	0.639*** [3.82]	0.760** [2.52]
<i>ECONVAR</i> * $\beta_2$	Yes	Yes	Yes	Yes
<i>ECONVAR</i>	Yes	Yes	Yes	Yes
Constant	0.009 [1.03]	0.027*** [3.75]	0.034*** [5.18]	0.054*** [5.37]
Industry	No	No	No	No
Year	Yes	Yes	Yes	Yes
Observations	58,457	58,992	75,705	37,508
Adj. R-squared	0.51	0.41	0.39	0.59

**Note:** Robust t-statistics are in brackets and are based on standard errors that are clustered by firm. \*\*\* p<0.01, \*\* p<0.05, \* p<0.10. Refer to Appendix B for variable definitions.

**PANEL B2: Z-test of difference in coefficient**

TC Proxy	Agency Proxies	<i>Low Agency</i>	<i>High Agency</i>	Z-stat
		Coefficient (Std.Error)	Coefficient (Std.Error)	
<i>TC2</i>	<i>CAPEX_D</i>	0.481 (0.187)	0.640 (0.190)	0.597
	<i>ACQRATIO_D</i>	0.639 (0.167)	0.760 (0.301)	0.350

**Note:** Panel B2 reports the Z-test of difference in coefficients of FE regression reported in Panel B1. Refer to Appendix B for variable definitions. Z-statistic to test for differences across groups is computed as follows (see, e.g. Cohen, 1983; Clogg *et al.*, 1995; Holzhaecker *et al.*, 2015):

$$z = \frac{\hat{\beta}_1 - \hat{\beta}_2}{\sqrt{\text{se}(\hat{\beta}_1)^2 + \text{se}(\hat{\beta}_2)^2}}$$

<b>PANEL C1: Fixed effect regression results – TC3</b>				
	<i>CAPEX_D</i> <b>Low Agency</b> ( <i>CAPEX</i> ≤Median)	<i>CAPEX_D</i> <b>High Agency</b> ( <i>CAPEX</i> >Median)	<i>ACQRATIO_D</i> <b>Low Agency</b> ( <i>ACQRATIO</i> ≤Median)	<i>ACQRATIO_D</i> <b>High Agency</b> ( <i>ACQRATIO</i> >Median)
	(1)	(2)	(3)	(4)
$\beta_1: LN(SALE_t/SALE_{t-1})$	0.692*** [63.52]	0.668*** [63.19]	0.569*** [53.99]	0.787*** [72.33]
$\beta_2: DECDUM * LN(SALE_t/SALE_{t-1})$	-0.239*** [-9.36]	-0.230*** [-7.25]	-0.109*** [-4.49]	-0.374*** [-10.04]
$\beta_3: TC3$	0.040** [2.50]	0.055*** [3.97]	0.021* [1.70]	0.099*** [4.88]
$\beta_4: TC3 * LN(SALE_t/SALE_{t-1})$	0.002 [0.05]	-0.183*** [-5.68]	-0.105*** [-3.20]	-0.172*** [-3.08]
$\beta_5: TC3 * \beta_2$	0.147** [2.08]	0.218*** [2.96]	0.185*** [3.27]	0.559*** [5.47]
<i>ECONVAR</i> * $\beta_2$	Yes	Yes	Yes	Yes
<i>ECONVAR</i>	Yes	Yes	Yes	Yes
Constant	0.015* [1.80]	0.039*** [5.60]	0.044*** [6.85]	0.060*** [6.15]
Industry	No	No	No	No
Year	Yes	Yes	Yes	Yes
Observations	58,457	58,992	75,705	37,508
Adj. R-squared	0.51	0.40	0.39	0.59

**Note:** Robust t-statistics are in brackets and are based on standard errors that are clustered by firm. \*\*\* p<0.01, \*\* p<0.05, \* p<0.10. Refer to Appendix B for variable definitions.

<b>PANEL C2: Z-test of difference in coefficient</b>				
		<i>Low Agency</i>	<i>High Agency</i>	
TC Proxy	Agency Proxies	Coefficient (Std.Error)	Coefficient (Std.Error)	Z-stat
<i>TC3</i>	<i>CAPEX_D</i>	0.147 (0.071)	0.218 (0.074)	0.691
	<i>ACQRATIO_D</i>	0.185 (0.057)	0.559 (0.102)	3.195

**Note:** Panel C2 reports the Z-test of difference in coefficients of FE regression reported in Panel C1. Refer to Appendix B for variable definitions. Z-statistic to test for differences across groups is computed as follows (see, e.g. Cohen, 1983; Clogg *et al.*, 1995; Holzhacker *et al.*, 2015):

$$z = \frac{\hat{\beta}_1 - \hat{\beta}_2}{\sqrt{\text{se}(\hat{\beta}_1)^2 + \text{se}(\hat{\beta}_2)^2}}$$

Table 3.6, Panel A reports results related to H<sub>3</sub> i.e., the moderating effect of product market competition on the association between trade credit and cost stickiness. When *TCI* is used as the proxy for trade credit (columns 1 and 2), the coefficients on  $\beta_5$  are positive and significant for the low *PMC* group (coefficient = 0.457; t statistic = 2.74; p<0.01), and insignificant for the high *PMC*

group (coefficient = 0.209; t statistic = 1.02). Similar results are evident for the other two measures of trade credit (*TC2* and *TC3*). For the *TC3* measure, the coefficients on  $\beta_5$  are significantly larger for the low *PMC* group (coefficient = 0.609; t statistic = 4.15;  $p < 0.01$ ) as opposed to the high *PMC* group (coefficient = 0.335; t statistic = 1.95;  $p < 0.10$ ).

Panel B reports the Z-test for difference in coefficients on  $\beta_5$  between the high versus low *PMC* sub-groups. Although the low *PMC* group shows significant and positive coefficients, and the high *PMC* group mostly insignificant coefficients, there is a lack of evidence for statistical significance using the z-test for difference in coefficients. Therefore, the reported findings, albeit consistent with  $H_3$ , need to be evaluated considering this lack of a statistically significant difference in coefficients.

Table 3.7, Panel A shows the results related to  $H_4$ , i.e., the moderating effects of customer concentration on the association between trade credit and cost stickiness. The coefficients on  $\beta_5$  are positive and significant for *both* the low customer concentration group (coefficient = 0.334; t statistic = 3.15;  $p < 0.01$ ) and the high customer concentration group (coefficient = 0.177; t statistic = 2.24;  $p < 0.05$ ), when *TC1* is used as the proxy for trade credit (columns 1 and 2). *TC2* and *TC3* show similar results, i.e., the low customer concentration group shows lower cost stickiness compared to the high customer concentration group. In all these tests, the magnitude of the coefficients is greater for the low- as compared to the high-customer concentration group. Although the reported findings are generally consistent with  $H_4$ , the difference in coefficients on  $\beta_5$  is statistically *insignificant* between the low- and high-customer concentration groups (Panel B). Therefore, I am unable to assert conclusively that, because of their customers' lack of bargaining power and high switching costs, suppliers play a more prominent role in monitoring firms in the low customer concentration group.

**Table 3.6: Product Market Competition, Trade Credit and Cost Stickiness**

<b>PANEL A: Fixed effect regression results</b>						
	<i>TC1</i>	<i>TC1</i>	<i>TC2</i>	<i>TC2</i>	<i>TC3</i>	<i>TC3</i>
	<b>Low PMC</b>	<b>High PMC</b>	<b>Low PMC</b>	<b>High PMC</b>	<b>Low PMC</b>	<b>High PMC</b>
	(1)	(2)	(3)	(4)	(5)	(6)
$\beta_1: LN(SALE_t/SALE_{t-1})$	0.699*** [26.45]	0.739*** [36.47]	0.739*** [23.13]	0.765*** [30.96]	0.700*** [26.60]	0.740*** [37.58]
$\beta_2: DECDUM * LN(SALE_t/SALE_{t-1})$	-0.186*** [-2.99]	-0.384*** [-6.95]	-0.203*** [-2.90]	-0.400*** [-6.02]	-0.209*** [-3.42]	-0.405*** [-7.53]
$\beta_3: TC$	0.165*** [3.68]	0.011 [0.33]	0.511*** [4.23]	0.152* [1.67]	0.131*** [2.73]	-0.019 [-0.63]
$\beta_4: TC * LN(SALE_t/SALE_{t-1})$	-0.258*** [-3.23]	-0.132 [-1.48]	-0.953*** [-3.55]	-0.575** [-2.31]	-0.261*** [-3.23]	-0.149 [-1.64]
$\beta_5: TC * \beta_2$	0.457*** [2.74]	0.209 [1.02]	0.877* [1.88]	0.508 [0.94]	0.609*** [4.15]	0.335* [1.95]
<i>ECONVAR</i> * $\beta_2$	Yes	Yes	Yes	Yes	Yes	Yes
<i>ECONVAR</i>	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-0.013 [-0.90]	-0.020** [-2.06]	-0.027* [-1.71]	-0.029*** [-2.77]	-0.012 [-0.85]	-0.018* [-1.84]
Industry	No	No	No	No	No	No
Year	Yes	Yes	Yes	Yes	Yes	Yes
Observations	10,422	15,652	10,422	15,652	10,422	15,652
Adj. R-squared	0.43	0.52	0.43	0.53	0.43	0.53

**Note:** Robust t-statistics are in brackets and are based on standard errors that are clustered by firm. \*\*\* p<0.01, \*\* p<0.05, \* p<0.10. Refer to Appendix B for variable definitions.

<b>PANEL B: Z-test of difference in coefficient</b>			
	<i>Low PMC</i>	<i>High PMC</i>	
TC Proxies	Coefficient (Std.Error)	Coefficient (Std.Error)	Z-stat
<i>TC1</i>	0.457 (0.167)	0.209 (0.204)	0.939
<i>TC2</i>	0.877 (0.466)	0.508 (0.543)	0.514
<i>TC3</i>	0.609 (0.147)	0.335 (0.172)	1.212

**Note:** Panel B reports the Z-test of difference in coefficients of FE regression reported in Panel A. Refer to Appendix B for variable definitions. Z-statistic to test for differences across groups is computed as follows (see, e.g. Cohen, 1983; Clogg *et al.*, 1995; Holzhacker *et al.*, 2015):

$$z = \frac{\hat{\beta}_1 - \hat{\beta}_2}{\sqrt{\text{se}(\hat{\beta}_1)^2 + \text{se}(\hat{\beta}_2)^2}}$$

**Table 3.7: Customer Concentration (CC), Trade Credit and Cost Stickiness**  
**PANEL A: Fixed effect regression results**

	<i>TC1</i> Low CC (1)	<i>TC1</i> High CC (2)	<i>TC2</i> Low CC (3)	<i>TC2</i> High CC (4)	<i>TC3</i> Low CC (5)	<i>TC3</i> High CC (6)
$\beta_1: LN(SALE_t/SALE_{t-1})$	0.780*** [75.90]	0.630*** [56.30]	0.807*** [65.97]	0.661*** [47.28]	0.779*** [76.47]	0.632*** [57.28]
$\beta_2: DECDUM * LN(SALE_t/SALE_{t-1})$	-0.218*** [-6.85]	-0.241*** [-9.40]	-0.244*** [-7.41]	-0.270*** [-9.33]	-0.220*** [-6.73]	-0.253*** [-9.95]
$\beta_3: TC$	0.100*** [5.46]	0.053*** [3.07]	0.305*** [6.83]	0.161*** [3.84]	0.081*** [4.42]	0.029* [1.79]
$\beta_4: TC * LN(SALE_t/SALE_{t-1})$	-0.184*** [-4.73]	-0.119*** [-2.94]	-0.648*** [-5.84]	-0.533*** [-4.44]	-0.183*** [-4.54]	-0.132*** [-3.20]
$\beta_5: TC * \beta_2$	0.334*** [3.15]	0.177** [2.24]	0.810*** [3.49]	0.550*** [2.74]	0.336*** [3.99]	0.261*** [3.74]
<i>ECONVAR</i> * $\beta_2$	Yes	Yes	Yes	Yes	Yes	Yes
<i>ECONVAR</i>	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.030*** [4.52]	0.040*** [4.01]	0.021*** [3.09]	0.034*** [3.33]	0.032*** [4.72]	0.042*** [4.17]
Industry	No	No	No	No	No	No
Year	Yes	Yes	Yes	Yes	Yes	Yes
Observations	56,288	52,497	56,288	52,497	56,288	52,497
Adj. R-squared	0.54	0.42	0.54	0.42	0.54	0.42

**Note:** Robust t-statistics are in brackets and are based on standard errors that are clustered by firm. \*\*\* p<0.01, \*\* p<0.05, \* p<0.10. Refer to Appendix B for variable definitions.

**PANEL B: Z-test of difference in coefficient**

	<i>Low CC</i> Coefficient (Std.Error)	<i>High CC</i> Coefficient (Std.Error)	Z-stat
<i>TC1</i>	0.334 (0.106)	0.177 (0.079)	1.189
<i>TC2</i>	0.810 (0.232)	0.550 (0.201)	0.846
<i>TC3</i>	0.336 (0.084)	0.261 (0.069)	0.687

**Note:** Panel B reports the Z-test of difference in coefficients of FE regression reported in Panel A. Refer to Appendix B for variable definitions. Z-statistic to test for differences across groups is computed as follows (see, e.g. Cohen, 1983; Clogg *et al.*, 1995; Holzacker *et al.*, 2015):

$$z = \frac{\hat{\beta}_1 - \hat{\beta}_2}{\sqrt{\text{se}(\hat{\beta}_1)^2 + \text{se}(\hat{\beta}_2)^2}}$$

### 3.3.2.3 Robustness test

In order to mitigate the endogeneity concern in this study I have conducted a robustness check by replacing the *TC* level measure with the change in *TC*. The endogeneity concern could stem from the fact that both the choice of obtaining trade credit and the decision to adjust resources are endogenously determined, and some unobserved variables could be driving both the decisions. I perform the change specification to address the endogeneity concern following Xu and Zheng (2018), who investigate the relationship between tax avoidance and cost stickiness. The result from Table 3.8 shows that the coefficients on  $\beta_5 (\Delta TC_t * DECDUM * LN \left[ \frac{SALE_t}{SALE_{t-1}} \right])$  are still positive and significant across all three *TC* specifications for both the OLS and the FE regressions models: results that are consistent with my main findings. The results, therefore, alleviate the endogeneity concerns, if any.

**Table 3.8: Change in Trade Credit and Cost Stickiness**

	<i>TC1</i> OLS (1)	<i>TC1</i> FE (2)	<i>TC2</i> OLS (3)	<i>TC2</i> FE (4)	<i>TC3</i> OLS (5)	<i>TC3</i> FE (6)
$\beta_1: LN(SALE_t/SALE_{t-1})$	0.713*** [138.10]	0.677*** [112.76]	0.719*** [142.66]	0.683*** [115.30]	0.714*** [137.84]	0.678*** [112.28]
$\beta_2: DECDUM * LN(SALE_t/SALE_{t-1})$	-0.229*** [-13.70]	-0.204*** [-11.12]	-0.233*** [-14.01]	-0.207*** [-11.28]	-0.232*** [-14.06]	-0.210*** [-11.57]
$\beta_3: (\Delta TC_t)$	0.105*** [7.87]	0.092*** [6.60]	0.448*** [14.51]	0.417*** [12.72]	0.101*** [7.97]	0.088*** [6.62]
$\beta_4: (\Delta TC_t) * LN(SALE_t/SALE_{t-1})$	0.005 [0.19]	-0.022 [-0.74]	-0.047 [-0.65]	-0.157** [-2.02]	0.032 [1.06]	0.009 [0.28]
$\beta_5: (\Delta TC_t) * \beta_2$	0.121* [1.71]	0.186** [2.41]	0.277 [1.62]	0.398** [2.10]	0.116** [2.00]	0.158** [2.52]
<i>ECONVAR</i> * $\beta_2$	Yes	Yes	Yes	Yes	Yes	Yes
<i>ECONVAR</i>	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.015*** [3.76]	0.042*** [8.72]	0.018*** [4.44]	0.048*** [9.89]	0.015*** [3.52]	0.041*** [8.45]
Industry	No	No	No	No	No	No
Year	Yes	Yes	Yes	Yes	Yes	Yes
Observations	118,505	118,505	118,506	118,506	118,381	118,381
Adj. R-squared	0.52	0.48	0.52	0.48	0.52	0.48

**Note:** This table reports the results from OLS and FE regressions of the association between change in trade credit and SG&A cost behaviour. Robust t-statistics are in brackets and are based on standard errors that are clustered by firm. \*\*\* p<0.01, \*\* p<0.05, \* p<0.10. Refer to Appendix B for variable definitions.

### **3.4 Chapter Summary**

In this study, I examine the association between trade credit and cost behaviour in the U.S. listed companies, and the moderating effect of agency problem, product market competition and customer concentration. I find that costs are, in general, sticky in the U.S., and is consistent with previous studies. Trade credit is an important source of external finance for many firms, and can perform a governance role. Suppliers have an interest in monitoring customers' overall operation and cost management activities actively because, by extending credit to customers, suppliers are undertaking the risk that customers might default on payment. Therefore, studying the relation between trade credit and cost behaviour is of significant importance. Using three different trade credit proxies, I document that trade credit lowers cost stickiness. This finding I interpret as illustrating the monitoring power of suppliers over the resource management decisions made by client firm managers to ensure shareholder value-maximization. Moreover, such lower cost stickiness is more prevalent in the high agency problem sub-sample. Further investigation reveals that the external monitoring role of trade credit decreases cost stickiness for firms operating in non-competitive product markets. However, the monitoring role of suppliers is limited for those firms having a more concentrated customer base.

## **CHAPTER FOUR**

### **COST STICKINESS AND FIRM VALUE (ESSAY THREE)**

Investors make their investment decisions based primarily on the financial health of a firm, and this is determined by the future earnings and cash flow potential of the firm. Investors consider current earnings as a key firm performance indicator, as it can reliably predict future earnings (Finger, 1994; Nissim & Penman, 2001), future cash flows (Dechow et al., 1998; Barth et al., 2001), and firm equity performance (Dechow, 1994) or, in other words, the future wealth of the firm (Callen et al., 2009). More volatile earnings, and increased analysts' earnings forecast errors stemming from greater cost stickiness when sales decline, increase investors' investment risk (Weiss, 2010). Also, such risk increases because firms with greater cost stickiness have less analyst coverage (Weiss, 2010). An increase in investment risk requires investors to demand a higher return on their investments, thereby, increasing the cost of equity for the firm. Furthermore, retaining slack resources when sales decline incurs adjustment costs: an effect that also reduces cash flows. Thus, I investigate the association between cost stickiness and firm value. Since, cost of equity and future cash flows are the components of firm value, I further propose that the association between cost stickiness and firm value is mediated by these two components.

## 4.1 Literature Review & Hypotheses Development

### 4.1.1 Cost stickiness and firm value

Research related to asymmetric cost behaviour has gained popularity because to generate and sustain profit, efficient cost management plays a vital role. Moreover, cost management has wider repercussions for both debt and equity investors in the areas of risk assessment, trust of customers, employees (with respect to job security) and other stakeholders in the community. Investors consider current earnings as a key firm performance indicator that has been found to predict reliably future earnings (Finger, 1994; Nissim & Penman, 2001), future cash flows (Dechow et al., 1998; Barth et al., 2001), and firm equity performance (Dechow, 1994) or, in other words, the future wealth of the firm (Callen et al., 2009). It, therefore, follows that cost behaviour that profoundly affects accounting earnings should be related to firm value. However, the empirical relationship is expected to be conditional on the theory driving the cost behaviour of a firm.

I posit that *resource adjustment* and *managerial expectation* considerations may not affect firm value adversely. Resource adjustment theory is based on the notion that many costs arise from managers' deliberate resource commitment decisions. Once committed, it is not easy to scale back resources without incurring some kind of adjustment cost. For instance, labour adjustment costs have been found to induce cost stickiness (Banker et al., 2013; Golden et al., 2020). Managers are likely to enter into contracts for resources, which are costly to renegotiate; thus, when demand falls, managers are bound to retain those slack resources, because discarding them would incur obligatory costs such as severance payments (Calleja et al., 2006). This view, therefore, suggests that rational investors should be able to incorporate such 'adjustment costs' into their valuations without putting downward pressure on stock prices. Managerial expectation theory posits that when managers are optimistic (pessimistic) about future demand, they are likely to retain (reduce)

slack resources in the event of declining demand (Venieris et al., 2015; Banker & Byzalov, 2014; Banker et al., 2014a). Optimistic managers consider a declining demand as ‘temporary’ and prefer to retain slack resources to minimize the downward adjustment costs. If investors are concerned about long-term value creation by the company, then retaining slack resources by optimistic managers in the event of a declining demand *should not* necessarily lead to a decrease in firm value.

Agency theory, on the other hand, predicts a negative relationship between cost stickiness and firm value. Agency problem occurs because of a misalignment of interests between shareholders and managers. An implication of the agency problem, is that managers engage in empire-building activities, e.g., growing the firm beyond its optimal size by retaining unutilized resources, for status, power, compensation, and prestige (see, e.g. Chen et al., 2012; Hope & Thomas, 2008; Jensen, 1986; Masulis et al., 2007; Stulz, 1990). Prior studies have documented that managers with empire-building tendencies are likely to add excessive resources when sales increase and are *unlikely* to reduce unutilized resources when demand falls, resulting in cost stickiness (Banker et al., 2018; Chen et al., 2012). Therefore, self-serving managers might be less tempted to shed unused resources, because downsizing by disposing resources reduces their chance of maximizing private benefits. However, such activity is likely to be value-destroying for the firm. Based on the more rational premise that retaining unutilized resources is detrimental for firm, thereby, I predict the following:

***H<sub>1</sub>: Cost stickiness affects firm value adversely.***

#### **4.1.2 Mediating effect of cost of equity and cash flow on cost stickiness and firm value**

So far, I have discussed the plausible direct relationship between cost stickiness and firm value. A related issue to be examined is whether this direct relation between cost stickiness and firm value is mediated through the cost of equity and cash flow channels. Since firm value consists of cost of equity and expected future cash flow components (Penman, 2011, 2016; Plumlee et al., 2015; Bachoo et al., 2013), investigating the mediating effect of these two components would provide critical insights into the cost stickiness and firm value relationship.

As discussed before, cost stickiness increases earnings volatility, analysts' forecast error (Weiss, 2010; Ciftci et al., 2016) and credit risk (Homburg et al., 2016): precursors to heightened investment risks. Such heightened risks, in turn, require investors to demand a higher return from their investments, thereby, increasing the firm-level cost of equity capital. With respect to future cash flows, holding onto unutilized resources during the period of declining demand incurs cost. Many such obligations, for instance, wages to workers, maintenance and repair costs of equipment, rents on leased equipment and storage/warehouse fees, have to be paid during the period with cash to avoid contractual violations. A decline in cash during period of declining sales would, therefore, affect firm value adversely. Furthermore, cost stickiness makes the accurate prediction of future cash flows a difficult task, which again affects firm value adversely, since investors consider future cash flows when making investment decisions. Thus, I hypothesize as follows:

*H<sub>2</sub>: The association between cost stickiness and firm value postulated in H<sub>1</sub> above is mediated through the cost of equity and cash flow channels.*

## 4.2 Research Design

### 4.2.1 Empirical model

In order to test the relation between cost stickiness and firm value (H<sub>1</sub>), I adopt the following cross-sectional regression model:

$$\begin{aligned} TOBINQ_{i,t} = & \beta_0 + \beta_1 OC\_STICKY_{i,t} + \beta_2 RISK_{i,t} + \beta_3 SIZE_{i,t} + \beta_4 LEV_{i,t} + \beta_5 PROFIT_{i,t} \\ & + \beta_6 GROWTH_{i,t} + \beta_7 IOWN_{i,t} + \varepsilon \end{aligned} \quad (4.1)$$

I use Tobin's Q ( $TOBINQ_{i,t}$ )<sup>10</sup> for the year t as the proxy for firm value following previous literature (e.g., Konijn et al., 2011; Henry, 2008; Villalonga & Amit, 2006; Jin & Jorion, 2006; Maury & Pajuste, 2005). I measure  $TOBINQ$  as book value of assets plus market value of equity minus book value of equity minus deferred tax, scaled by the book value of assets. I control for firm risk ( $RISK_{i,t}$ ), firm size ( $SIZE_{i,t}$ ), leverage ( $LEV_{i,t}$ ), firm profitability ( $PROFIT_{i,t}$ ), firm growth or investment opportunities ( $GROWTH_{i,t}$ ) and institutional ownership ( $IOWN_{i,t}$ ). All variables are defined in the Appendix C.

The main independent variable in the analysis is  $OC\_STICKY_{i,t}$ . I use the firm-level cost stickiness measure developed by Weiss (2010). Weiss (2010) defines cost stickiness for firm  $i$  in quarter  $q$  ( $STICKY_{i,q}$ ) as the difference in the slope of the cost function between the two most recent quarters from quarter  $q-3$  to  $q$ , such that sales decrease in one quarter and sales increase in the other.

$$STICKY_{i,q} = LN(\Delta COST/\Delta SALES)_{i,\check{T}} - LN(\Delta COST/\Delta SALES)_{i,\check{T}} \quad \check{T}, \check{T} \in \{q, \dots, q-3\} \quad (4.2)$$

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<sup>10</sup>I have taken  $TOBINQ$  at period t because  $STICKY$  is the annualized mean value of the quarterly  $STICKY$  measure. Since the market updates its values based on quarterly information, I consider the end-of-year market value as an appropriate measure.

where  $\check{T}(\check{T})$  is the most recent of the last four quarters with an increase (decrease) in sales,  $\Delta COST = COST_{i,q} - COST_{i,q-1}$  and  $\Delta SALES = SALE_{i,q} - SALE_{i,q-1}$ . I obtain  $OC\_STICKY_{i,t}$  by taking the mean of  $STICKY_{i,q}$  values for firm  $i$  and in year  $t$  following Kim et al. (2019). I multiply Weiss's (2010) original measure by -1 following Rouxelin et al. (2018) and Golden et al. (2020), so that higher values imply more cost stickiness.  $H_1$  predicts a negative and significant coefficient on  $OC\_STICKY_{i,t}$ . I take operating costs (OC)<sup>11</sup> because it is more comprehensive, as it includes costs related to both internal and external financing. Moreover, operating costs are incurred for everyday business operations, and failure to meet these contractual obligations could lead to early bankruptcy (Chen et al., 2019b). In additional tests, I use the stickiness of selling, general and administrative cost ( $SGA\_STICKY$ ) and cost of goods sold ( $COGS\_STICKY$ ) as alternative cost components.

#### **4.2.2 Resource adjustment cost, managerial expectation and agency problem proxies**

I include asset intensity ( $AIN$ ) and employee intensity ( $EIN$ ) as two proxies for resource adjustment costs.  $AIN$  is measured as the total assets divided by the sales for year  $t$ , and  $EIN$  is the ratio of the total number of employees over sales. Based on the median value of  $AIN$ , I create two sub-groups with the high (low)  $AIN$  group representing firms incurring high (low) resource adjustment costs. I follow a similar procedure for the  $EIN$  proxy.

For managerial expectation I use two proxies (i) an internal proxy, successive decrease in sales ( $SUCDEC$ ) and (ii) an external proxy (macro-economic business cycle measure) ( $OECD$ ).  $SUCDEC$  is a dummy variable which is an indicator variable that is equal to 1 if revenue in year  $t-1$  is less than revenue in  $t-2$ , and 0 otherwise, and has been commonly used in asymmetric cost

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<sup>11</sup>Compustat data item SALEQ minus IBQ as sticky is measured using quarterly data.

behaviour literature. Managers are likely to be pessimistic about a future with successive decreases in sales. As an external proxy, I use the OECD Composite Leading Indicators to measure managerial expectation<sup>12</sup>. Banker et al. (2016) has used business cycle as a proxy managerial expectation. During recession (expansion) managers are likely to be pessimistic (optimistic) about future demand.

Based on prior literature, I use three proxies for agency problem (i) capital expenditure (*CAPEX*), (ii) acquisition ratio (*ACQ*) and (iii) fixed pay (*FXP*). Both *CAPX* and *ACQ* have been used as proxies for the agency problem in prior studies by Chhaochharia et al. (2012), Giroud and Mueller (2010) and Guo et al. (2018). As elucidated in subsection 4.1.1, one of the consequences of the agency problem is managers' tendency to engage in empire-building. Such managers are likely to overspend in the form of capital expenditure, or acquire business to build an empire. Therefore, I have used these two measures that I believe capture the empire-building tendency of managers. The *high agency problem group* consists of observations with values of these variables higher than the median, while the *low agency problem group* consists of observations equal to or below the median value of these variables. According to Chen et al. (2012) and Kanninen (2000), a manager's empire-building incentives can be restrained by paying fixed salaries (*FXP*). Banker et al. (2011) document that fixed (cash) compensation is used to penalize wasteful spending on SG&A costs. I divide the sample into high and low agency problem groups based on the median value of the *FXP*. Following Chen et al. (2012) I calculate *FXP* as ratio of salary plus bonus divided by total compensation during the year where *FXP* lower (higher) than median *FXP* is high (low) agency problem group. Following Hartlieb et al. (2020), I split the sample into high and low

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<sup>12</sup>According to this time series, the recession begins at the midpoint of the period of the peak and ends at the midpoint of the period of the trough. I define a recession dummy accordingly.

‘resource adjustment’ ‘managerial expectations’ and ‘agency problem’ groups to conduct the empirical tests.

### 4.2.3 Mediating effect variables

To test the mediating effects of cost of equity and cash flows on the association between cost stickiness and firm value (H<sub>2</sub>), I follow the mediation test approach of Baron and Kenny (1986). Following Baron and Kenny (1986), I use the following four steps to establish these mediation channels (Eqs. (4.3a)-(4.3c)). First, I show that variations in the independent variable (i.e., *OC\_STICKY*, in this study) are correlated with the dependent variable (i.e., *TOBINQ*; Eq. (4.3a)), to confirm the possibility that a mediation effect is present. Second, I show how variations in the independent variable (i.e., *OC\_STICKY*) account for variations in the mediators (Eq. (4.3b)). Third, I show that the mediators have a significant effect on the dependent variable (i.e., *TOBINQ*; Eq. (4.3c)). Finally, I show that the significant relationship between *OC\_STICKY* and *TOBINQ* (Eq. (4.3a)) either becomes insignificant after controlling for the mediators (full mediation) or that the significance level shrinks after doing so (partial mediation). In order to test the mediation effect (H<sub>3</sub>) I use the following set of equations:

$$TOBINQ_{i,t} = \beta_0 + \beta_1 OC\_STICKY_{i,t} + \Sigma CONTROLS_{i,t} + \varepsilon \quad (4.3a)$$

$$MV_{i,t} = \alpha_0 + \alpha_1 OC\_STICKY_{i,t} + \Sigma CONTROLS_{i,t} + \varepsilon \quad (4.3b)$$

$$TOBINQ_{i,t} = \lambda_0 + \lambda_1 OC\_STICKY_{i,t} + \lambda_2 MV\_COE_{i,t} + \lambda_3 MV\_FCF_{i,t} + \Sigma CONTROLS_{i,t} + \varepsilon \quad (4.3c)$$

where *MV* are the mediating variables, with *MV\_COE<sub>i,t</sub>* being the mediating variable representing cost of equity capital (*COE<sub>i,t</sub>*), and *MV\_FCF<sub>i,t</sub>* being the mediating variable pertaining to free cash flow (*FCF<sub>i,t</sub>*). Based on prior studies (Gupta et al., 2018; El Ghouli et al., 2011; Easton,

2004) I use implied approaches to estimate the cost of equity. Equation (4.3a) is the original baseline regression model or equation (4.1). For equation (4.3b) I include *SIZE*, *LEV*, *IOWN*, *BETA* (market beta), *BTM* (book-to-market value), *ZSCORE* (Altman's Z-score) and *DAC* (discretionary accrual) as the control variables for the test using *COE* as the mediating channel (Gupta et al., 2018; Hasan et al., 2015; El Ghouli et al., 2011). Owing to lack of prior literature on the determinants of free cash flow, I included the control variables used in the baseline model as some of the potential determinants of FCF. For equation (4.3c) I use the same control variables as in equation (4.1). The total effect of cost stickiness (i.e. *OC\_STICKY*) on firm value (i.e. *TOBINQ*) can be decomposed into direct and indirect effects. The direct effect is  $\lambda_1$  from Equation (4.3c) above, while the indirect effect is  $\alpha_1 * \lambda_2$  for the proposed mediators. The core of the mediation effect is testing the null hypothesis  $H_0: \alpha_1 * \lambda_2 = 0$ . I use a simultaneous equation model for defining and estimating the direct and indirect effects. Variables are defined in the Appendix C.

#### **4.2.4 Sample selection and descriptive statistics**

The sample period spans from 1982 to 2016. I deliberately choose a long sample period to provide a richer analysis of the cost stickiness behaviour and firm value. I collect both yearly and quarterly financial data from Compustat, whilst the stock return data are collected from the CRSP and the institutional ownership data from Thomson Reuter's F13 File. To estimate the implied cost of equity capital I collect analyst forecast data from IBES. I begin with an initial sample of 413,585 firm-years observations. I then exclude 36,192 firm-year observations from the regulated industries (two-digit SIC code 48-49) and 96,226 firm-year observations from the financial institutions industry (two-digit SIC codes 60-69). The final sample consists of 85,521 firm-year observations. Table 4.1, panel A, reports the sample selection process. In the regression models, sample size

varies depending on the model-specific data requirements. Firm-year observations come from a wide variety of industries, with two-digit SIC codes, 35–39 (30.13%) and 70-79 (13.83%) commanding the largest industry representation in my sample, as reported in Table 4.1, panel B. To avoid the undesirable influence of outliers, I winsorize all the continuous variables in the extreme 1% of their respective distributions.

**Table 4.1: Sample Selection and Industry Distribution**

**Panel A: Sample selection procedure**

Selection Process	Number of Observations
Total observations produced for 1982 to 2016	413,585
Drop: duplicate observations	<u>(36,192)</u>
	377,393
Drop: observations for SIC codes between 4800 to 4999	(26,300)
Drop: observations for SIC codes between 6000 to 6999	<u>(96,226)</u>
Preliminary sample	254,867
Drop: missing values for calculating TOBINQ	<u>(49,309)</u>
Non-missing sample for TOBINQ	205,558
Non-missing sample for OC_STICKY (mean of $STICKY_{i,q}$ values for firm $i$ and in year $t$ )	180,500
Final sample (after merging TOBINQ with OC_STICKY and dropping missing control variables)	<b>85,521</b>

**Panel B: Industry distribution**

Code	Industry	Observations	% observations
1-14	Agriculture and mining	5,666	6.63
15-17	Building construction	1,327	1.55
20-21	Food and kindred products	2,681	3.13
22-23	Textile mill products and apparels	1,754	2.05
24-27	Lumber, furniture, paper and printing	4,111	4.81
28-30	Chemical, petroleum, rubber and allied products	9,529	11.14
31-34	Metal	4,727	5.53
35-39	Machinery, electrical, computer equipment	25,766	30.13
40-47	Railroad and other transportation	2,643	3.09
50-52	Wholesale goods, building materials	4,300	5.03
53-59	Store merchandise, auto dealers, home furniture stores	6,973	8.15
70-79	Business services	11,831	13.83
80-99	Other	4,213	4.93
	Total	<b>85,521</b>	<b>100.00</b>

## 4.3 Empirical Results & Analysis

### 4.3.1 Descriptive statistics and correlation analysis

Descriptive statistics of the baseline regression variables are reported in Panel A of Table 4.2. Over the study period from 1982 to 2016, the mean (median) of *TOBINQ* and *OC\_STICKY* are 1.87 (1.96) and 0.05 (0.95), respectively. The average firm may be considered as moderately large (*SIZE*=5.40), with moderate risk (*RISK*=0.14), and moderate leverage (*LEV* = 0.23). On average, firms are profitable (*PROFIT* = 0.10) and exhibit high growth opportunities (*GRWOTH* = 0.01)<sup>13</sup>. Institutional ownership (*IOWN*) averages 39 percent. Panel B reports the descriptive statistics of the variables used in the mediating test. The mean (median) of the mediating variables: *COE\_PEG*, *COE\_MPEG* and *FCF* are 0.11 (0.10), 0.12 (0.10) and 0.08 (0.08), respectively.

Panel C, Table 4.2 shows the correlation between all the main variables. I find that the majority of the correlations are significant at the conventional level. From the correlation matrix it is apparent that firm value (*TOBINQ*) is significant and negatively correlated with *OC\_STICKY* (-0.021, p-value < 0.001). Though only suggestive of the underlying association, the highly significant negative correlation coefficient indicates that firms with higher cost stickiness have lower market values. *Qtot*, an alternative measure of firm value (discussed in section 4.3.2), is positively correlated with *TOBINQ* (0.570, p-value < 0.001) and negatively correlated with *OC\_STICKY* (-0.021, p-value < 0.001). *RISK*, *PROFIT* and *IOWN* are positively correlated with *TOBINQ*; whereas, *LEV* and *GROWTH* are negatively correlated.

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<sup>13</sup>*GROWTH* is measured as dividend yield following Henry (2008) and firms paying higher dividend yields are considered to have less growth opportunities thus, a negative association with those firms is expected.

**Table 4.2: Descriptive Statistics and Correlation****Panel A: Descriptive statistics**

Variables	Observations	Mean	Std.Dev.	25%	Median	75%
<i>TOBINQ</i>	85521	1.87	1.96	1.05	1.38	2.05
<i>Qtot</i>	83279	1.31	2.66	0.23	0.66	1.44
<i>OC_STICKY</i>	85521	0.05	0.95	-0.28	0.03	0.40
<i>RISK</i>	85521	0.14	0.09	0.08	0.12	0.17
<i>SIZE</i>	85521	5.40	2.07	3.87	5.24	6.81
<i>LEV</i>	85521	0.23	0.24	0.04	0.19	0.34
<i>PROFIT</i>	85521	0.10	0.29	0.05	0.13	0.20
<i>GROWTH</i>	85521	0.01	0.02	0.00	0.00	0.01
<i>IOWN</i>	85521	0.39	0.30	0.11	0.34	0.64

**Note:** Refer to Appendix C for variable definitions.

**Panel B: Descriptive statistics related to mediating test**

Variables	Observations	Mean	Std.Dev.	25%	Median	75%
<i>COE_PEG</i>	21909	0.11	0.06	0.07	0.10	0.14
<i>COE_MPEG</i>	21909	0.12	0.07	0.07	0.10	0.14
<i>FCF</i>	21909	0.08	0.08	0.05	0.08	0.13
<i>BETA</i>	21909	1.13	0.80	0.64	1.06	1.53
<i>BTM</i>	21909	0.55	0.47	0.28	0.46	0.71
<i>ZSCORE</i>	21909	56.05	225.82	3.26	5.36	11.71
<i>DAC</i>	21909	0.18	0.40	0.03	0.07	0.17

**Note:** Refer to Appendix C for variable definitions.

**Panel C: Correlation**

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
<i>TOBINQ</i> [1]	1								
<i>Qtot</i> [2]	0.570***	1							
<i>OC_STICKY</i> [3]	-0.021***	-0.021***	1						
<i>RISK</i> [4]	0.125***	0.049***	-0.005	1					
<i>SIZE</i> [5]	-0.114***	0.006	-0.020***	-0.369***	1				
<i>LEV</i> [6]	0.005	-0.057***	0.005	0.071***	0.093***	1			
<i>PROFIT</i> [7]	-0.182***	-0.062***	-0.026***	-0.256***	0.236***	-0.049***	1		
<i>GROWTH</i> [8]	-0.089***	-0.059***	0.005	-0.251***	0.242***	0.031***	0.111***	1	
<i>IOWN</i> [9]	0.014***	0.073***	-0.013***	-0.265***	0.606***	-0.052***	0.169***	0.025***	1

**Note:** \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ . Refer to Appendix C for variable definitions.

### 4.3.2 Regression results: Cost stickiness and firm value

Table 4.3 reports the OLS and firm fixed effect (FE) results for the association between cost stickiness and firm value for H<sub>1</sub>. To control for unobservable industry and year characteristics associated with firm value and cost stickiness, I include year and industry dummy variables in all the regression specifications. To take into account the time series and cross-sectional dependence in the error terms of the regressions, I calculate t-statistics using standard errors that are clustered by firm.

Column (1) shows the OLS regression results for the relationship between *OC\_STICKY* and *TOBINQ*, whilst column (2) shows the FE regression results. I find a negative and significant relationship between cost stickiness and firm value under both the OLS and the FE specifications. For example, the coefficient on *OC\_STICKY* is -0.048 (p<0.01) in the OLS specification. In terms of economic magnitude, the estimated coefficient implies that a one standard deviation increase in cost stickiness decreases firm value by 2.44 percent relative to its mean (coefficient -0.048\* SD of *OC\_STICKY* (0.95)/mean of *TOBINQ* (1.87)\*100).

The sign and significance of the control variables are generally consistent with prior studies (e.g., Konijn et al., 2011; Henry, 2008; Villalonga & Amit, 2006; Maury & Pajuste, 2005). The coefficients on *LEV* (0.66, p<0.05), *PROFIT* (0.68, p<0.01), and *IOWN* (1.19, p<0.01) are positive and significant. The coefficients on *SIZE* (-0.54, p<0.01)<sup>14</sup> and *GROWTH* (-3.04, p<0.01) are negative and significant. Based on prior studies (Henry, 2008) *RISK* should have a negative relation with firm value although my result shows the opposite (coefficient 0.99, p<0.01). One plausible reason could be that higher risk implies higher return which, in turn, increases firm value.

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<sup>14</sup>Konijn et al. (2011), Henry (2008), Milelong and Amit (2006) and Maury and Pajuste (2005) document a negative coefficient on firm size.

As a robustness test, I use an alternative measure of firm value ( $Q_{tot}$ ). Results using the alternative measure of firm value ( $Q_{tot}$ ) are also reported in Table 4.3 (columns 3 and 4). I calculate  $Q_{tot}$  as follows, based on Peters and Taylor (2017):

$$Q_{tot_{i,t}} = V_{i,t} / (K_{phy_{i,t}} + K_{int_{i,t}}) \quad (4.4)$$

where  $Q_{tot}$  is measured by scaling firm value by the sum of the physical and intangible capital (Peters and Taylor, 2017).  $V$  is firm's market value defined as market value of equity (Compustat data item PRCC\_F times CSHO) plus book value of debt (Compustat data item DLTT plus DLC), minus current assets (Compustat data item ACT).  $K_{phy}$  is the replacement value of physical capital (Compustat data item PPEGT).  $K_{int}$  is the replacement cost of intangible capital, which is the sum of a firm's externally purchased (Compustat data item INTAN) and internally created intangible capital. If INTAN is missing, I set the value to zero. Internally created intangible capital is the sum of knowledge capital ( $G$ ) and organizational capital ( $O$ ).

$$G_{i,t} = (1 - \hat{\partial}_{R\&D}) G_{i,t-1} + R\&D_{i,t} \quad (4.5)$$

$$O_{i,t} = (1 - \hat{\partial}_{SG\&A}) O_{i,t-1} + SG\&A_{i,t} \quad (4.6)$$

In equation (4.5)  $G_{i,t}$  is the end-of-period stock of knowledge capital,  $\hat{\partial}_{R\&D}$  is depreciation rate, and  $R\&D_{i,t}$  is the real research and development expenditure (Compustat data item XRD) for the year. I replace missing XRD with zero following Peters and Taylor (2017) and Lev and Radhakrishnan (2005). Following Peters and Taylor (2017) I use a 15% depreciation rate for  $\hat{\partial}_{R\&D}$ . Based on the suggestion Peters and Taylor (2017), I set  $G_{i,0} = 0$ .

In equation (4.6)  $O_{i,t}$  is the organizational capital,  $\hat{\partial}_{SG\&A}$  is depreciation rate, and  $SG\&A_{i,t}$  is the selling, general and administrative expenses (Compustat data item XSGA minus XRD minus

RDIP) for the year. If XRD is higher than XSGA but is less than COGS, or XGA missing, I measure  $SG\&A_{i,t}$  as XSGA with no additional adjustments. I set XSGA, XRD and RDIP to zero if missing, following Peters and Taylor (2017) and Hasan and Cheung (2018). Following Peters and Taylor (2017) I use a 20% depreciation rate for  $\hat{\partial}_{SG\&A}$ . I further set  $O_{i,0} = 0$  following Peters and Taylor (2017). Although the main sample period starts from 1982, I measure the  $Q_{toti,t}$  using data from 1950 consistent with Peters and Taylor (2017). Results using this alternative proxy for firm value is very consistent with the  $TOBINQ$  measure. The coefficients on  $OC\_STICKY$  are negative and significant in both the OLS (coefficient -0.042,  $p < 0.01$ ) and in the FE (coefficient -0.029,  $p < 0.01$ ). Taken together, the evidence reveals a detrimental effect of cost stickiness on firm value, which supports  $H_1$ . In the next section I provide further tests in this regard.

**Table 4.3: OLS and Fixed Effect Regression Results – Cost Stickiness and Firm Value**

Dependent Variable:	<i>TOBINQ</i>		<i>Q<sub>tot</sub></i>	
	OLS (1)	FE (2)	OLS (3)	FE (4)
<i>OC_STICKY<sub>t</sub></i>	-0.048*** [-4.59]	-0.022*** [-2.77]	-0.042*** [-3.50]	-0.029*** [-2.85]
<i>RISK<sub>t</sub></i>	1.592*** [8.58]	0.991*** [5.73]	1.715*** [8.28]	1.379*** [8.31]
<i>SIZE<sub>t</sub></i>	-0.145*** [-11.75]	-0.537*** [-11.79]	-0.049*** [-4.09]	-0.062** [-2.15]
<i>LEV<sub>t</sub></i>	0.231 [1.23]	0.661** [2.17]	-0.657*** [-6.13]	-0.650*** [-6.45]
<i>PROFIT<sub>t</sub></i>	-0.888*** [-6.83]	0.680*** [4.19]	-0.358*** [-3.28]	0.876*** [5.57]
<i>GROWTH<sub>t</sub></i>	-0.772 [-1.64]	-3.042*** [-8.78]	-1.929** [-2.05]	-3.129*** [-5.98]
<i>IOWN<sub>t</sub></i>	0.885*** [14.96]	1.188*** [13.73]	0.714*** [10.40]	0.874*** [10.08]
Constant	1.765*** [21.87]	3.685*** [22.06]	1.106*** [10.29]	1.468*** [11.08]
Firm fixed effect	No	Yes	No	Yes
Industry	Yes	No	Yes	No
Year	Yes	Yes	Yes	Yes
Observations	85,521	85,521	83,279	83,279
Adj. R-squared	0.09	0.06	0.05	0.04

**Note:** This table reports the results from OLS and FE regressions of the association between cost stickiness and firm value. Robust t-statistics are in brackets and are based on standard errors that are clustered by firm. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.10$ . Refer to Appendix C for variable definitions.

Columns (1) to (4), Table 4.4 reports fixed effect results for the ‘resource adjustments’, whilst columns (5) to (8) report results for the ‘managerial expectations’ arguments for the documented relationship in Table 4.3. I hypothesized that rational investors might understand managerial decision to retain slack resources in the presence of declining demand to minimize resource adjustment costs and, hence, may not penalize the firm. However, I find no such evidence. If anything, I find a value-destroying effect of retaining slack resources for all but the low AIN group for which the coefficient on *OC\_STICKY* is insignificant. The coefficients are negative and significant for the *high* AIN group (coefficient -0.025,  $p < 0.05$ ) and for both the *low* EIN (coefficient -0.017,  $p < 0.05$ ) and the *high* EIN (coefficient -0.025,  $p < 0.10$ ) groups.

With respect to the ‘managerial expectation’ hypothesis, I again fail to find evidence supporting ‘rational investor behaviour’. Greater cost stickiness during both the optimistic (coefficient -0.025,  $p < 0.05$ , column (5)) and pessimistic (coefficient -0.025,  $p < 0.010$ , column (6)) scenarios appear to affect firm value adversely when *SUCDEC* is used as the proxy for managerial expectation. However, when I use the macro-economic business cycle (*OCED*) as the proxy for managerial expectation, I find the decline in firm value due to cost stickiness is prevalent only during the recessionary period (coefficients -0.026,  $p < 0.01$ ). This could indicate that rational investors penalize firms retaining slack resources during a recessionary period only. Overall, the findings from Panel A, Table 4.4 supports  $H_1$ .

The FE regression results related to  $H_1$ , on whether the existence of agency problem affect the association between firm value and cost stickiness, are reported in panel B of Table 4.4. For agency problem proxies *CAPX* and *ACQ* I find evidence that cost stickiness destroys firm value for *high agency problem* groups only. For example, the coefficient on *OC\_STICKY* is -0.024 ( $p < 0.10$ , column 2) and -0.022 ( $p < 0.05$ , column 4) for the *CAPX* and *ACQ*-based agency measures,

respectively. However, I fail to find significant result using *FXP*, probably owing to a much smaller sample size as well as the inherent limitation of the proxy used. For example, Hall and Liebman (1998) and Brügggen and Zehnder (2014) show that *more variable pay* of executives is *better* at aligning the interests of managers and shareholders. The result indicates that agency problem strengthens the negative association between cost stickiness and firm value. Thereby, the result implies that retention of slack resources for managerial empire-building reasons instead of disposing of them when demand decreases, destroys firm value. For brevity I report only the FE regression results in Table 4.4. The untabulated OLS regression results are similar to the FE results.

**Table 4.4: Cost Stickiness and Firm Value**

**Panel A: Test of cost stickiness and firm value: resource adjustment and managerial expectation**

	Resource Adjustment				Managerial Expectation			
	<i>AIN</i> Low	<i>AIN</i> High	<i>EIN</i> Low	<i>EIN</i> High	<i>SUCDEC</i> =0 Optimistic	<i>SECDEC</i> =1 Pessimistic	OECD Expansion	OECD Recession
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>OC_STICKY<sub>t</sub></i>	0.002 [0.23]	-0.025** [-2.35]	-0.017** [-2.05]	-0.025* [-1.81]	-0.025** [-2.53]	-0.025* [-1.89]	-0.018 [-1.28]	-0.026*** [-2.60]
<i>RISK<sub>t</sub></i>	0.830*** [4.47]	1.508*** [5.92]	1.110*** [7.14]	1.103*** [4.12]	1.521*** [7.83]	0.639 [1.64]	1.177*** [3.82]	1.091*** [5.55]
<i>SIZE<sub>t</sub></i>	-0.396*** [-5.13]	-0.587*** [-11.43]	-0.473*** [-11.41]	-0.624*** [-10.31]	-0.509*** [-9.23]	-0.544*** [-6.66]	-0.551*** [-6.72]	-0.451*** [-11.63]
<i>LEV<sub>t</sub></i>	0.553 [1.41]	0.417 [1.57]	0.528 [1.40]	0.371 [1.20]	0.191 [0.64]	1.163** [2.35]	0.316 [0.59]	0.544* [1.71]
<i>PROFIT<sub>t</sub></i>	2.940*** [15.24]	-0.151 [-0.99]	2.717*** [11.42]	0.022 [0.11]	1.143*** [2.82]	0.289 [0.81]	0.700** [2.17]	1.017*** [5.47]
<i>GROWTH<sub>t</sub></i>	-2.653*** [-6.52]	-3.234*** [-6.31]	-2.919*** [-6.87]	-2.470*** [-4.76]	-4.098*** [-8.17]	-1.693*** [-3.83]	-3.080*** [-6.57]	-3.363*** [-8.01]
<i>IOWN<sub>t</sub></i>	0.794*** [8.04]	1.365*** [11.24]	0.841*** [9.56]	1.407*** [10.54]	0.997*** [11.44]	1.192*** [7.68]	1.106*** [8.69]	1.089*** [11.14]
Constant	2.432*** [8.61]	4.529*** [20.24]	3.121*** [16.97]	4.072*** [19.16]	3.484*** [15.97]	3.381*** [12.13]	3.800*** [12.92]	3.197*** [23.82]
Firm fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry	No	No	No	No	No	No	No	No
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	48,333	37,188	45,015	40,506	59,759	23,133	41,493	44,028
Adj. R-squared	0.14	0.07	0.15	0.06	0.08	0.06	0.06	0.08

**Note:** This table reports the results from FE regressions of the association between cost stickiness and firm value. Robust t-statistics are in brackets and are based on standard errors that are clustered by firm. \*\*\* p<0.01, \*\* p<0.05, \* p<0.10. Refer to Appendix C for variable definitions.

**Panel B: Test of cost stickiness and firm value: agency perspective**

	<i>CAPX</i>		<i>ACQ</i>		<i>FXP</i>	
	Low agency	High Agency	Low agency	High Agency	Low agency	High Agency
	(1)	(2)	(3)	(4)	(5)	(6)
<i>OC_STICKY<sub>t</sub></i>	-0.014 [-1.31]	-0.024* [-1.95]	-0.065 [-0.46]	-0.022** [-2.55]	-0.019 [-1.36]	-0.015 [-1.34]
<i>RISK<sub>t</sub></i>	1.401*** [6.61]	0.681** [2.57]	-0.772 [-0.32]	0.994*** [5.62]	0.572 [1.29]	0.500 [1.59]
<i>SIZE<sub>t</sub></i>	-0.499*** [-11.36]	-0.553*** [-6.09]	-1.131** [-2.09]	-0.533*** [-11.21]	-0.496*** [-5.60]	-0.565*** [-10.36]
<i>LEV<sub>t</sub></i>	0.395* [1.79]	1.201* [1.95]	0.689 [0.40]	0.533* [1.81]	0.677 [0.67]	-0.190 [-0.85]
<i>PROFIT<sub>t</sub></i>	0.328 [1.54]	1.376*** [5.01]	-0.601 [-0.35]	0.666*** [3.92]	2.631*** [3.75]	4.194*** [13.63]
<i>GROWTH<sub>t</sub></i>	-1.702*** [-3.68]	-4.509*** [-8.91]	-9.989 [-1.31]	-2.858*** [-8.24]	-5.033*** [-4.14]	-5.328*** [-6.45]
<i>IOWN<sub>t</sub></i>	1.260*** [11.32]	1.022*** [7.84]	0.261 [0.15]	1.178*** [13.54]	0.692*** [3.00]	0.336** [2.49]
Constant	3.584*** [19.28]	3.599*** [10.81]	5.624*** [3.52]	3.662*** [21.06]	4.089*** [9.15]	5.050*** [13.43]
Firm fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Industry	No	No	No	No	No	No
Year	Yes	Yes	Yes	Yes	Yes	Yes
Observations	40,066	44,626	1,136	81,226	11,293	11,594
Adj. R-squared	0.06	0.08	0.35	0.06	0.16	0.30

**Note:** This table reports the results from FE regressions of the association between cost stickiness and firm value. Robust t-statistics are in brackets and are based on standard errors that are clustered by firm. \*\*\* p<0.01, \*\* p<0.05, \* p<0.10. Refer to Appendix C for variable definitions.

I report the mediating test results (H<sub>2</sub>) in Table 4.5. Column (1) reports regression result of equation (4.3a) whilst columns (2) to (4) report results for equations (4.3b) and (4.3c). The same approach is followed in columns (5) to (7) with the only difference being in column (2) where I have used *COE\_PEG* as the *MV\_COE* proxy; whereas, in column (5) I have used *COE\_MPEG* as the *MV\_COE* proxy. Column (1) shows that the coefficient on *OC\_STICKY* is negative and significant (coefficient -0.028,  $p < 0.10$ ), consistent with results in column (1), Table 4.3 (note that the coefficient is smaller than -0.048 reported in Table 4.3 because of a substantial drop in the sample size). Column (2) documents a significant positive relation between cost stickiness (*OC\_STICKY*) and *COE\_PEG* (coefficient 0.002,  $p < 0.01$ ), indicating that cost stickiness induces a higher cost of equity. This is justified because, as earnings become more volatile, investors are unable to use current earnings to predict future earnings and, therefore, require higher return on their investments. Column (3) shows a significant negative relation between *OC\_STICKY* and FCF (coefficient -0.002,  $p < 0.01$ ) implying that cost stickiness decreases free cash flow. A decrease in cash flow is expected when slack resources are retained in the face of declining demand because obligatory contractual payments continue to be paid off. Column (4) shows the coefficient on *OC\_STICKY* is negative and significant but smaller in magnitude than that reported in column (1), implying a partial mediation effect. Overall, I find evidence supporting H<sub>2</sub> that the decrease in firm value due to cost stickiness is partially mediated through both the cost of equity and free cash flow channels.

**Table 4.5: Mediating Effect of Cost of Equity and Cash Flow**

	<i>TOBINQ</i>	<i>COE_PEG</i>	<i>FCF</i>	<i>TOBINQ</i>	<i>COE_MPEG</i>	<i>FCF</i>	<i>TOBINQ</i>
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>OC_STICKY<sub>t</sub></i>	-0.028* [-1.92]	0.002*** [3.67]	-0.002*** [-2.59]	-0.021** [-2.46]	0.002*** [4.53]	-0.002*** [-2.58]	-0.019** [-2.23]
<i>COE<sub>t</sub></i>	-	-	-	-4.838*** [-37.22]	-	-	-4.586*** [-37.33]
<i>FCF<sub>t</sub></i>	-	-	-	-0.501*** [-5.30]	-	-	-0.433*** [-4.59]
<i>RISK<sub>t</sub></i>	1.710*** [5.43]	-	-0.117*** [-12.52]	2.292*** [17.13]	-	-0.121*** [-12.96]	2.243*** [16.78]
<i>SIZE<sub>t</sub></i>	0.029** [2.51]	-0.010*** [-39.22]	0.004*** [11.18]	-0.013*** [-2.65]	-0.009*** [-35.56]	0.004*** [10.91]	-0.014*** [-2.75]
<i>LEV<sub>t</sub></i>	-0.715*** [-3.54]	0.068*** [33.49]	-0.066*** [-24.67]	-0.465*** [-12.08]	0.072*** [33.50]	-0.065*** [-24.62]	-0.463*** [-12.01]
<i>PROFIT<sub>t</sub></i>	5.872*** [25.40]	-	0.322*** [66.19]	5.390*** [69.16]	-	0.325*** [66.64]	5.342*** [68.09]
<i>GROWTH<sub>t</sub></i>	-2.814*** [-4.80]	-	-1.152*** [-35.90]	-3.348*** [-7.26]	-	-1.134*** [-35.32]	-2.013*** [-4.33]
<i>IOWN<sub>t</sub></i>	0.150*** [2.80]	-0.034*** [-21.76]	0.016*** [7.36]	-0.018 [-0.60]	-0.039*** [-23.31]	0.016*** [7.33]	-0.027 [-0.90]
<i>BETA<sub>t</sub></i>	-	0.007*** [14.99]	-	-	0.006*** [12.10]	-	-
<i>BTM<sub>t</sub></i>	-	0.045*** [56.04]	-	-	0.051*** [59.67]	-	-
<i>ZSCORE<sub>t</sub></i>	-	-0.000*** [-5.48]	-	-	-0.000*** [-5.12]	-	-
<i>DAC<sub>t</sub></i>	-	0.002** [2.06]	-	-	0.002** [1.99]	-	-
Constant	-0.102 [-0.80]	0.143*** [29.19]	0.063*** [8.98]	0.839*** [8.34]	0.150*** [28.88]	0.063*** [9.05]	0.854*** [8.48]
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	21,909	21,909	21,909	21,909	21,909	21,909	21,909
Adj. R-squared	0.31	0.28	0.28	0.32	0.28	0.28	0.32
Direct effect	-	-	-	-0.021**	-	-	-0.019**
Indirect effect (COE)	-	-	-	-0.008***	-	-	-0.009***
Indirect effect (FCF)	-	-	-	0.001**	-	-	0.001**
Total effects	-	-	-	-0.028***	-	-	-0.028***

**Note:** This table reports regressions results of the mediation effect of cost of equity and cash flow on the association between cost stickiness and firm value. Robust t-statistics are in brackets and are based on standard errors that are clustered by firm. \*\*\* p<0.01, \*\* p<0.05, \* p<0.10. Refer to Appendix C for variable definitions.

### 4.3.3 Additional test

I conduct additional analyses for each of the main components of operating costs, i.e. SGA and COGS, using equation (1). Results are reported in Table 4.6. Columns (1) to (4) use *TOBINQ*, whilst columns (5) to (8) use *Q<sub>tot</sub>* as the proxy for firm value. Both the OLS and FE results are reported in the table. From columns (3) and (7) I find the *SGA\_STICKY* is significant and negatively related to both *TOBINQ* (coefficients -0.012,  $p < 0.01$ ) and *Q<sub>tot</sub>* (coefficients -0.010,  $p < 0.05$ ). Results reported in columns (4) and (8) demonstrate that *COGS\_STICKY* is also significant and negatively related to both *TOBINQ* (coefficients -0.036,  $p < 0.01$ ) and *Q<sub>tot</sub>* (coefficients -0.033,  $p < 0.01$ ). Thus, I find further evidence that both SGA and COGS stickiness destroys firm value.

### 4.3.4 Robustness test

To mitigate the endogeneity concern in this study I have conducted a robustness check by replacing all the variables with the change version of the respective variable. The endogeneity concern could stem from some unobservable factors driving both cost stickiness and firm value simultaneously. In Table 4.7 I use change in *TOBINQ* (Panel A) and *Q<sub>tot</sub>* (Panel B) as the dependent variable. The results from both panels show that the coefficients on  $\Delta$ *STICKY* continue to be negative and significant across all three *STICKY* (*OC\_STICKY*, *SGA\_STICKY* and *COGS\_STICKY*) specifications. For example, the OLS coefficients are (-0.020,  $p < 0.01$ ; -0.011,  $p < 0.01$  and -0.017,  $p < 0.01$ ) and the FE coefficients are (-0.015,  $p < 0.05$ ; -0.007,  $p < 0.05$  and -0.011,  $p < 0.10$ ) for the regression models: results that are consistent with the main findings. The results, therefore, alleviate the endogeneity concerns, if any.

**Table 4.6: Cost Stickiness and Firm Value: Alternative cost components**

Dependent Variable:	<i>TOBINQ</i>				<i>Q<sub>tot</sub></i>			
	OLS		FE		OLS		FE	
	SGA	COGS	SGA	COGS	SGA	COGS	SGA	COGS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>STICKY<sub>t</sub></i>	-0.004 [-0.68]	-0.079*** [-8.05]	-0.012*** [-3.01]	-0.036*** [-4.64]	-0.002 [-0.30]	-0.062*** [-5.50]	-0.010** [-2.46]	-0.033*** [-3.18]
<i>RISK<sub>t</sub></i>	1.356*** [7.16]	1.566*** [8.67]	0.833*** [4.26]	1.056*** [6.03]	1.231*** [8.19]	1.634*** [8.87]	1.088*** [7.92]	1.443*** [8.22]
<i>SIZE<sub>t</sub></i>	-0.100*** [-7.54]	-0.147*** [-12.37]	-0.445*** [-10.05]	-0.529*** [-12.10]	-0.000 [-0.05]	-0.046*** [-4.19]	-0.045* [-1.74]	-0.076*** [-2.66]
<i>LEV<sub>t</sub></i>	0.179 [0.83]	0.196 [1.18]	0.617 [1.54]	0.483* [1.77]	-0.454*** [-5.00]	-0.637*** [-6.49]	-0.477*** [-5.68]	-0.728*** [-8.16]
<i>PROFIT<sub>t</sub></i>	-0.403** [-1.98]	-0.861*** [-8.36]	0.943*** [3.94]	0.632*** [4.88]	0.308** [2.38]	-0.383*** [-3.66]	1.266*** [5.75]	0.727*** [4.78]
<i>GROWTH<sub>t</sub></i>	-0.497 [-0.97]	-0.628 [-1.31]	-2.977*** [-7.79]	-2.714*** [-8.04]	-1.549** [-2.00]	-2.574*** [-3.66]	-2.721*** [-7.64]	-2.956*** [-5.97]
<i>IOWN<sub>t</sub></i>	0.713*** [11.88]	0.885*** [15.35]	1.025*** [10.31]	1.140*** [13.87]	0.486*** [9.60]	0.694*** [10.60]	0.665*** [10.05]	0.818*** [9.48]
Constant	1.507*** [18.30]	1.777*** [23.00]	3.170*** [21.17]	3.685*** [23.11]	0.710*** [8.03]	1.078*** [10.52]	0.996*** [8.40]	1.536*** [11.52]
Firm fixed effect	No	No	Yes	Yes	No	No	Yes	Yes
Industry	Yes	Yes	No	No	Yes	Yes	No	No
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	65,621	84,171	65,621	84,171	64,244	82,003	64,244	82,003
Adj. R-squared	0.06	0.09	0.07	0.07	0.05	0.06	0.07	0.04

**Note:** This table reports the results from OLS and FE regressions of the association between cost stickiness and firm value. Robust t-statistics are in brackets and are based on standard errors that are clustered by firm. \*\*\* p<0.01, \*\* p<0.05, \* p<0.10. Refer to Appendix C for variable definitions.

**Table 4.7: Change in Cost Stickiness and Firm Value**  
**Panel A: Dependent variable - *TOBINQ***

	OLS			FE		
	OC (1)	SGA (2)	COGS (3)	OC (4)	SGA (5)	COGS (6)
$\Delta STICKY_t$	-0.020*** [-2.94]	-0.011*** [-3.33]	-0.017*** [-2.98]	-0.015** [-2.44]	-0.007** [-2.42]	-0.011* [-1.88]
$\Delta RISK_t$	1.089*** [8.41]	0.848*** [6.49]	1.095*** [9.10]	1.137*** [8.84]	0.872*** [6.98]	1.164*** [9.60]
$\Delta SIZE_t$	-1.258*** [-7.98]	-1.040*** [-6.85]	-1.082*** [-11.01]	-1.402*** [-6.70]	-1.074*** [-5.36]	-1.221*** [-9.25]
$\Delta LEV_t$	1.507*** [2.60]	1.681** [2.26]	1.100** [2.47]	1.374** [2.31]	0.978 [1.36]	1.211** [2.35]
$\Delta PROFIT_t$	0.998*** [7.56]	1.027*** [5.72]	0.993*** [6.05]	1.478*** [9.85]	1.510*** [4.85]	1.547*** [7.74]
$\Delta GROWTH_t$	-2.617*** [-9.36]	-2.639*** [-7.44]	-2.117*** [-8.45]	-2.712*** [-8.55]	-2.370*** [-6.11]	-2.217*** [-7.52]
$\Delta IOWN_t$	1.431*** [11.41]	1.294*** [9.73]	1.390*** [13.29]	1.318*** [10.53]	1.123*** [8.62]	1.300*** [11.91]
Constant	0.141*** [4.95]	0.110*** [3.71]	0.131*** [4.32]	0.194*** [6.66]	0.164*** [5.86]	0.165*** [5.98]
Firm fixed effect	No	No	No	Yes	Yes	Yes
Industry	Yes	Yes	Yes	No	No	No
Year	Yes	Yes	Yes	Yes	Yes	Yes
Observations	68,585	47,097	66,794	68,585	47,097	66,794
Adj. R-squared	0.10	0.10	0.09	0.11	0.09	0.11

**Note:** This table reports the results from OLS and FE regressions of the association between change in cost stickiness and firm value. Robust t-statistics are in brackets and are based on standard errors that are clustered by firm. \*\*\* p<0.01, \*\* p<0.05, \* p<0.10. Refer to Appendix C for variable definitions.

**Panel B: Dependent variable –  $Q_{tot}$**

	OLS			FE		
	OC (1)	SGA (2)	COGS (3)	OC (4)	SGA (5)	COGS (6)
$\Delta STICKY_t$	-0.032*** [-4.25]	-0.009*** [-3.25]	-0.026*** [-3.95]	-0.028*** [-3.59]	-0.007** [-2.43]	-0.025*** [-3.64]
$\Delta RISK_t$	1.366*** [10.51]	0.887*** [8.88]	1.373*** [11.07]	1.364*** [10.70]	0.872*** [8.29]	1.406*** [11.26]
$\Delta SIZE_t$	0.151*** [2.72]	0.108* [1.79]	0.130** [2.29]	0.194*** [2.76]	0.081 [1.08]	0.184*** [2.60]
$\Delta LEV_t$	-0.275*** [-3.62]	-0.228*** [-3.34]	-0.306*** [-4.14]	-0.189* [-1.91]	-0.225*** [-2.60]	-0.283*** [-2.84]
$\Delta PROFIT_t$	0.601*** [4.66]	0.776*** [4.54]	0.575*** [4.90]	1.028*** [6.53]	1.291*** [5.37]	0.817*** [5.75]
$\Delta GROWTH_t$	-1.920*** [-7.49]	-1.620*** [-6.40]	-1.497*** [-5.79]	-1.842*** [-6.56]	-1.283*** [-4.82]	-1.501*** [-5.68]
$\Delta IOWN_t$	1.126*** [12.51]	0.886*** [11.25]	1.105*** [11.76]	1.123*** [11.97]	0.868*** [10.74]	1.131*** [11.33]
Constant	-0.013 [-0.33]	0.004 [0.11]	-0.001 [-0.01]	-0.129*** [-2.98]	-0.026 [-0.90]	-0.093** [-2.41]
Firm fixed effect	No	No	No	Yes	Yes	Yes
Industry	Yes	Yes	Yes	No	No	No
Year	Yes	Yes	Yes	Yes	Yes	Yes
Observations	65,580	45,303	63,949	65,580	45,303	63,949
Adj. R-squared	0.05	0.06	0.04	0.05	0.08	0.05

**Note:** This table reports the results from OLS and FE regressions of the association between change in cost stickiness and firm value. Robust t-statistics are in brackets and are based on standard errors that are clustered by firm. \*\*\* p<0.01, \*\* p<0.05, \* p<0.10. Refer to Appendix C for variable definitions.

#### **4.4 Chapter Summary**

In this study, I investigate the association between cost stickiness and firm value of U.S. listed companies from 1982 to 2016, and the mediating effects of cost of equity and cash flow channels on this association. The overall finding is that cost stickiness affects firm value adversely, and is prevalent in firms with marked agency problems. Further, I find evidence that this negative association between cost stickiness and firm value is partially mediated through both the cost of equity channel and the cash flow channel. This study not only contributes to the existing limited literature related to implications of cost stickiness (management accounting) but also extends that literature by integrating financial accounting (firm value) and corporate finance (cost of equity and free cash flow) concepts.

## CHAPTER FIVE

### CONCLUSION

#### 5.1 Conclusion

This research aims to offer insight into the extant literature on cost stickiness. I investigate when firms face financial constraint how the managers manage cost during declining sales. Similarly, when firms rely heavily on trade credit to finance operations how the managers manage cost during declining sales. It also offers insight into the implication of such cost management on overall firm value.

As resources drive the cost of a business, and financial constraints affect resource availability, my study (Essay One) also enriches the financing constraints literature. This study challenges the notion that cost stickiness/less stickiness is always either good or bad, instead shows that such judgements are dependent on the managerial incentives for managing unutilized resources. For instance, Kama and Weiss (2013) show that managers cut back resources to meet earnings benchmarks; whereas, I document that this incentive does not force financially constrained firms to reduce slack resources. In line with the assertions by Caggese et al. (2019) and Musso and Schiavo (2008), I show, empirically, that constrained firms shed value-creating SG&A costs for survival, which might be efficient (good) in the short-term, but detrimental (bad) for their growth in the long-term. In this study, I could not find any relationship between cost stickiness and agency problem, in financially constrained firms. I encourage future research to further investigate this important issue. The overall conjecture is that for constrained firms, survival takes precedence over empire building. However, how this cost-cutting affects a constrained firm's future growth and financial performance, remains a fruitful avenue for future research.

One of the critical implications of my findings is that managers should be cautious in using the assumptions of the traditional cost model, as this study provides evidence for SG&A cost stickiness. Moreover, managers should consider the macroeconomic cycle when estimating and planning product costs, as the study provides strong evidence that SG&A cost behaviour is *less sticky* during both economic expansion and economic contraction periods, although the effect is more pronounced during contraction.

Essay Two reconfirms the suppliers' monitoring role attributable to their access to the internal information of customers through trade credit financing. The results of my study have important implications for shareholders. Prior studies document that suppliers extend trade credit, even to unprofitable firms, if they believe clients have high sales potential, because that would bring them higher future profit (see, e.g. Goto et al., 2015; Petersen & Rajan, 1997). Therefore, managers should try to build long-term relations with suppliers, as this will not only boost their operation, but will also ensure efficient cost management through suppliers' external governance role. Investors should consider the use of trade credit as a signal of efficient cost management and, hence, better firm performance. Other stakeholders, such as customers and employees, too, may place increased trust in firms with more trade credit, because of its associated monitoring benefit, i.e., efficient cost management. Therefore, while trade credit is an expensive source of finance, managers should use it more, because this will help to attract external capital at a cheaper cost, owing to investors' increased confidence.

Essay Three explores the relationship between cost stickiness and firm value and, to the best of my knowledge, this is the first study to do so. Weiss (2010) finds that forecast accuracy decreases for firms with cost stickiness, thereby, increasing forecast dispersion emanating from more uncertainty in estimating firm earnings. Because forecast dispersion increases the cost of

equity capital (Dhaliwal et al., 2016), it is intuitive to argue that, by reducing cost stickiness, firms are likely to reduce the cost of capital as well. Although, Weiss (2010) shows that investors understand cost stickiness, the three-day CAR surrounding the earnings announcement as proxy for market response can be noisy, as stock prices adjust slowly to the new information that such a short-time window is unable to capture (Kothari, 2001; Fama, 1998). I, therefore, test for a long-term effect, and also test whether existing theories on asymmetric cost behaviour help explain the adverse effect of cost stickiness on firm value. This study, therefore, provides insight and understanding into how managers' deliberate resource adjustment decisions affect firms' overall financial health and value. Perhaps, managers need to be more transparent about their resource adjustment decisions, so that investors can incorporate both resource adjustment costs and managerial expectations of future demand, when doing risk assessments related to their investment decisions.

## **5.2 Limitations & Scope**

My study is subject to a few limitations which future research might attempt to overcome. One shortcoming relates to the timing of when firms become financially constrained. It might be construed that firms with resources to shed when facing sales declines, would not have been constrained in the prior period. Severely constrained firms, on the other hand, may not even have had the resources in the first place and, therefore, would not exhibit a decrease in costs. This suggests a nonlinear effect of financial constraints, which might be addressed in future research.

Although several variables were included to ensure that results reflect the monitoring aspects of trade credit, rather than resource adjustments and/or managerial expectations, it is acknowledged that omitted correlated variables could affect the findings reported in this study. For

example, I did not include *managerial overconfidence* as a possible factor moderating the trade credit-cost stickiness relationship, owing to the lack of accessible data. Future research could explore the substitutive versus the complementary relationship between trade credit and other informal corporate governance mechanisms. For example, in a recent study, Hasan and Habib (2019) document that firms domiciled in high social capital counties rely less on trade credit. This evidence, therefore, appears to suggest that the monitoring effect of trade credit in inducing less cost stickiness would be stronger for firms domiciled in low social capital counties.

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## APPENDIX A

### VARIABLE DEFINITIONS – ESSAY ONE

Variables	Definition
$LN(SG\&A_t/SG\&A_{t-1})$	Natural log of change in selling, general and administrative expenses (Compustat data item XSGA)
$LN(SALE_t/SALE_{t-1})$	Natural log of change in sales or revenue (Compustat data item SALE)
<i>DECDUM</i>	A dummy variable which takes the value of one when sales in year t are less than those in year t-1 and zero otherwise
<i>SA</i>	I follow Hadlock and Pierce (2010) and use SA Index as my financing constraint measure. They find that leverage, cash flow and, particularly, firm size and firm age are useful predictors of financial constraints. SA index is derived using the formula: $-0.737*SIZE+0.043*SIZE^2-0.040*AGE$ .
<i>SIZE</i>	Natural log of total assets (Compustat data item AT)
<i>AGE</i>	Number of years the firm is listed on Compustat
<i>WW</i>	The financing constraints measure developed by Whited and Wu (2006). The WW index is a linear combination of six empirical factors: cash flow to total assets (-), sales growth (-), long-term debt to total assets (+), log of total assets (-), dividend policy indicator (-), and the firm's three-digit industry sales growth (+)
<i>CF</i>	Cash flow (Compustat data item IB plus DP) divided by total assets (Compustat data item AT)
<i>DIVPOS</i>	A dummy variable equal to 1 if the firm pays dividends (Compustat data item DVC plus DVP) and 0 otherwise
<i>TLTD</i>	Long-term debt (Compustat data item DLTT) divided by total assets (Compustat data item AT)
<i>LNTA</i>	Natural log of total assets (Compustat data item AT)
<i>ISG</i>	Firm's three-digit SIC code industry annual sales growth
<i>SG</i>	Firm's annual sales growth
<i>BLM</i>	Bondnaruk et al. (2015) text based measure of financial constraint.
<i>SUDEC</i>	Successive decrease is a dummy variable which is an indicator variable that is equal to 1 if revenue in year t-1 is less than revenue in t-2, and 0 otherwise
<i>AIN</i>	Asset intensity calculated total assets (Compustat data item AT) divided by sales (Compustat data item SALE)
<i>EIN</i>	Employee intensity is the ratio of total number of employees (Compustat data item EMP) over sales
<i>RET</i>	Stock performance or raw stock return from CRSP
<i>AVOID</i>	Dummy variable that equals 1 if annual earnings (Compustat data item NI) deflated by market capitalization of shareholders' equity (Compustat data item PRCC_F x CSHO) at prior year end is in the interval [0, 0.01], and 0 otherwise
<i>EDEC</i>	Dummy variable that equals 1 if the change in annual earnings (Compustat data item NI) deflated by market capitalization of shareholders' equity (Compustat data item PRCC_F x CSHO) at prior year end is in the interval [0, 0.01], and 0 otherwise
<i>FXP</i>	Ratio of salary plus bonus (ExecuComp data item SALARY plus BONUS) divided by total compensation (ExecuComp data item TDC1) during the year. A dummy variable was created which takes the value of one when $FXP < \text{median } FXP$ (high agency problem group) and zero otherwise (low agency problem group).
<i>TAGRWOTH</i>	Total asset growth, measured as total assets (Compustat data item AT) in year t minus total assets in year t-1, deflated by total assets in year t-1. A dummy variable was created which takes the value of one when $TAGROWTH \geq \text{median } TAGROWTH$ (high agency problem group) and zero otherwise (low agency problem group).

Variables	Definition
<i>SG&amp;A_FV</i>	Industry-specific future value creation of SG&A, obtained from Table 2 of Banker et al. (2011). A dummy variable was created which takes the value of one when $SG\&A\_FV > \text{median } SG\&A\_FV$ and zero otherwise. One indicates high future value-creating SG&A group and zero indicates future value-creating SG&A group.

## APPENDIX B

### VARIABLE DEFINITIONS – ESSAY TWO

Variables	Definition
$LN(COGS_t/COGS_{t-1})$	Natural log of change in costs of goods sold (Compustat data item COGS)
$LN(SG\&A_t/SG\&A_{t-1})$	Natural log of change in selling, general and administrative expenses (Compustat data item XSGA)
$LN(SALE_t/SALE_{t-1})$	Natural log of change in sales or revenue (Compustat data item SALE)
<i>DECDUM</i>	A dummy variable which takes the value of one when sales in year t are less than those in year t-1 and zero otherwise
<i>SUDEC</i>	Successive decrease is a dummy variable which is an indicator variable that is equal to 1 if revenue in year t-1 is less than revenue in t-2, and 0 otherwise
<i>GDP</i>	GDP growth in year t. Data available at <a href="https://www.bea.gov/">https://www.bea.gov/</a>
<i>AIN</i>	Asset intensity calculated total assets (Compustat data item AT) divided by sales (Compustat data item SALE)
<i>EIN</i>	Employee intensity is the ratio of total number of employees (Compustat data item EMP) over sales (Compustat data item SALE)
<i>RET</i>	Stock performance or raw stock return from CRSP
<i>OSLACK</i>	Industry-adjusted cash-to-cash = days in inventory + days in receivables – days in payables where days in inventory = 365 (average inventory/ cost of goods sold); days in receivables = 365(average accounts receivables/ sales); days in payables = 365 (average accounts payable/ cost of goods sold). Then industry-adjusted cash-to-cash cycle is calculated by taking the difference between industry mean cash-to-cash cycle and the cash-to-cash cycle of the firm
<i>TC1</i>	Ratio of accounts payable (Compustat data item AP) to cost of goods sold (Compustat data item COGS)
<i>TC2</i>	Ratio of accounts payable (Compustat data item AP) to sales (Compustat data item SALE)
<i>TC3</i>	Ratio of accounts payable (Compustat data item AP) to purchase (PURCHASE)
<i>PURCHASE</i>	Purchase is COGS (Compustat data item COGS) added with difference between end (year t) and beginning (year t-1) of the year inventory (Compustat data item INVT)
<i>CAPEX</i>	Capital expenditures, measured as capital expenditure (Compustat data item CAPX) scaled by total assets (Compustat data item AT)
<i>CAPEX_D</i>	A dummy variable which takes the value of one when CAPEX>median CAPEX and zero otherwise. One indicates high agency problem and zero indicates low agency problem.
<i>ACQRATIO</i>	Acquisition ratio, measured as the sum of the value of all acquisitions made by a firm in a year (Compustat data item AQC), scaled by firm's total market capitalization (Compustat data item PRCC_F x CSHO)
<i>ACQRATIO_D</i>	A dummy variable which takes the value of one when ACQRATIO>median ACQRATIO and zero otherwise. One indicates high agency problem and zero indicates low agency problem.
<i>PMC</i>	Following the Li <i>et al.</i> (2013) and Li and Zheng (2017) methodology, the PMC variable is ranked into deciles, and then standardized to lie between 0 and 1, where 0 is a low PMC and 1 is a high PMC. Data is available at <a href="http://webuser.bus.umich.edu/feng/">http://webuser.bus.umich.edu/feng/</a>
<i>CC</i>	Customer concentration is an indicator variable coded 1 if a supplier discloses at least one customer that accounts for at least 10% of its annual revenues and zero otherwise.

## APPENDIX C

### VARIABLE DEFINITIONS – ESSAY THREE

Variables	Definition of measurement
<b><u>Firm value variables</u></b>	
<i>TOBINQ</i>	Tobin's Q, measured as Compustat data item [AT+(CSHOxPRCC_F)-CEQ-TXDB]/AT
<i>Qtot</i>	Measured by scaling firm value by the sum of physical and intangible capital using Peters and Taylor (2017) methodology (explained in detail in section 4.2)
<b><u>Sticky variables</u></b>	
<i>OC_STICKY</i>	Sticky measure of operating cost (OC) using equation (2) explained in section 3.1. OC is calculated as Compustat data item SALEQ minus IBQ
<i>SGA_STICKY</i>	Sticky measure of selling, general and administrative cost (Compustat data item XSGAQ) using equation (2) explained in section 3.1
<i>COGS_STICKY</i>	Sticky measure of cost of goods sold (Compustat data item COGSQ) using equation (2) explained in section 3.1
<b><u>Control variables</u></b>	
<i>RISK</i>	Firm risk, calculated as the standard deviation of monthly share returns (CRSP)
<i>SIZE</i>	Firm size, calculated as the natural logarithm of total assets (Compustat data item AT)
<i>LEV</i>	Leverage, measured as book debt (Compustat data item DLC plus DLTT) divided by total assets (Compustat data item AT)
<i>PROFIT</i>	Profit, measured as operating income before depreciation (Compustat data item OIBDP) divided by total assets (Compustat data item AT)
<i>GROWTH</i>	Firm growth or investment opportunities calculated as dividend per share (Compustat data item [DVC/CSHO]) dividend by end-of year share price (Compustat data item PRCC_F)
<i>IOWN</i>	Percentage of common shares held by institutional investors retrieved from Thomson Reuter's F13 File
<b><u>Mediating variables</u></b>	
<i>COE_PEG</i>	Implied cost of equity, estimated by PEG model of Easton (2004). Data collected from IBES and Compustat. $PEG = \sqrt{(FEPS_{t+2} - FEPS_{t+1})/P_t} \quad (A.1)$ where $P_t$ = the market price per share at time t (Compustat data item PRCC_F); $FEPS_{t+i}$ = median forecasted earnings per share (EPS) of a firm for the year i at time t..
<i>COE_MPEG</i>	Implied cost of equity, estimated by MPEG model of Easton (2004). Data collected from IBES and Compustat. $MPEG = \sqrt{(FEPS_{t+2} + MPEG * DPS_t - FEPS_{t+1})/P_t} \quad (A.2)$ where $DPS$ = the current payout ratio (Compustat data item [DVPSP_F] dividend by [IBCOM/CSHO]) following Gupta et al. (2018). Following Gupta et al. (2018) I use a return on assets of 6% if the denominator is negative. I winsorize to be within 0 and 1. Other variables are defined as before.
<i>FCF</i>	Free cash flow is measured as cash flow from operating activities less common and preferred dividends scaled by total assets (Compustat data item OANCF minus DVC minus DVP over AT)
<b><u>Control variables for COE</u></b>	
<i>BETA</i>	Market beta calculated from regression using monthly returns with returns of the CRSP value weighted index (including dividends) as the return on the market index using at least 36 months

*BTM* Book value to market value of equity measured as Compustat data item [CEQ/(CSHOxPRCC\_F)]

*ZSCORE* Altman's Z score calculated as 1.2(Compustat data item ACT minus LCT over AT) + 1.4 (Compustat data item RE over AT) + 3.3(Compustat data item EBIT over AT) + 0.6 (Compustat data item [CSHOxPRCC\_F] over [DLTT+DLC]) + 1 (Compustat data itemSALE over AT)

*DAC* The absolute value of discretionary accrual, generated from the performance-matched modified Jones model (Kothari et al., 2005). I estimate the model for all firms in the same industry with at least eight observations in an industry-year pair using the following equation:

$$\frac{ACC_{i,t}}{TA_{i,t-1}} = \delta_0 \left( \frac{1}{TA_{i,t-1}} \right) + \delta_1 \left( \frac{\Delta SALE_{i,t} - \Delta REC_{i,t}}{TA_{i,t-1}} \right) + \delta_2 \left( \frac{PPE_{i,t}}{TA_{i,t-1}} \right) + \delta_3 (ROA_{i,t-1}) + \varepsilon_{i,t} \quad (A.3)$$

where *ACC* is the total accruals calculated as (Compustat data item IB minus OANCF) in year *t* and *TA* is total assets (Compustat data item AT) in year *t-1*.  $\Delta SALE$  is the change in sales (Compustat data item SALE) in year *t*;  $\Delta REC$  is the change in accounts receivables (Compustat data item RECT) in year *t*; *PPE* is the value of property, plant and equipment (Compustat data item PPEGT) at year *t*; and *ROA* is return on assets calculated as (Compustat data item IB scaled by AT) in year *t-1*. Non-discretionary accruals is the predicted value from the above equation, with *DAC* representing the residuals

#### **Resource adjustment proxies**

*AIN* Asset intensity calculated as total assets (Compustat data item AT) divided by sales (Compustat data item SALE)

*EIN* Employee intensity is the ratio of total number of employees (Compustat data item EMP) over sales

#### **Managerial expectation proxies**

*SUCDEC* A dummy variable which is an indicator variable that is equal to 1 if revenue in year *t-1* is less than revenue in *t-2*, and 0 otherwise

*OECD* OECD Composite Leading Indicators

#### **Agency problem proxies**

*CAPX* Capital expenditure, measured as capital expenditure (Compustat data item CAPX) scaled by total assets (Compustat data item AT)

*ACQ* Acquisition ratio, measured as the sum of the value of all acquisitions made by a firm in a year (Compustat data item AQC), scaled by firm's total market capitalization (Compustat data item PRCC\_F x CSHO)

*FXP* Ratio of salary plus bonus (ExecuComp data item SALARY plus BONUS) divided by total compensation (ExecuComp data item TDC1) during the year

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## **APPENDIX D**



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## STATEMENT OF CONTRIBUTION DOCTORATE WITH PUBLICATIONS/MANUSCRIPTS

We, the candidate and the candidate's Primary Supervisor, certify that all co-authors have consented to their work being included in the thesis and they have accepted the candidate's contribution as indicated below in the *Statement of Originality*.

Name of candidate:	
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Please indicate:	
<ul style="list-style-type: none"> <li>The percentage of the manuscript/Published Work that was contributed by the candidate:</li> </ul>	
and	
<ul style="list-style-type: none"> <li>Describe the contribution that the candidate has made to the Manuscript/Published Work:</li> </ul>	
For manuscripts intended for publication please indicate target journal:	
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and	
<ul style="list-style-type: none"> <li>• Describe the contribution that the candidate has made to the Manuscript/Published Work:</li> </ul>	
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and	
<ul style="list-style-type: none"> <li>Describe the contribution that the candidate has made to the Manuscript/Published Work:</li> </ul>	
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