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Financial Risk, Main Bank System, and Cost Behavior: Empirical Evidence from Japan

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ABSTRACT

We examine the relationship between financial risk and cost behavior, both theoretically and empirically. We suggest that financial risk will affect the degree of discretion in managerial resource adjustment decisions by its impacts on financial flexibility. As expected, our results show that financial risk increases the degree of cost anti-stickiness in the case of a prior activity decrease. On the other hand, financial risk appears to have no statistically significant influence on cost behavior in the case of a prior activity increase. This result is not consistent with our prediction. We also examine the moderating effect of the close relationships between firms and banks on the association between financial risk and asymmetric cost behavior using data on the main bank system in Japan. Consistent with our prediction, our results show that firms' close ties with the main banks mitigate the adverse impacts of financial risk and allow managers to adjust resources flexibly in response to sales changes, even if the firms face high financial risk.

JEL Classification: M41, D24, D81, G32, G33

Keywords: Cost Stickiness, Cost Behavior, Financial Risk, Main Bank System

1. Introduction

In recent years, the volume of literature on cost behavior based on archival data has grown significantly (e.g., Anderson et al. 2003; Balakrishnan et al. 2004; Banker et al. 2013; Banker et al. 2014a; Banker and Chen 2006; Cannon 2014; Chen et al. 2012; Kama and Weiss 2013; Weiss 2010). The traditional textbook model explains that costs change mechanically in proportion to the level of activity volume. In contrast, recent studies have documented asymmetric cost behavior, in which the magnitude of the changes in costs in response to changes in activity volume depends on the direction of the activity volume changes due to managers' deliberate resource adjustment decisions in order to maximize the value of firms (e.g., Anderson et al. 2003; Banker et al. 2014a; Weiss 2010). Since the seminal work by Anderson et al. (2003), studies have shown the existence of cost stickiness, where costs decrease less in response to decreases in activity volume than they increase for equivalent increases in activity volume. Several studies document an empirical phenomenon of cost anti-stickiness, where decreases in activity volume result in greater changes in costs than do equivalent increases in activity volume, under specific conditions (e.g., Banker et al. 2014a; Weiss 2010). The determinants of asymmetric cost behavior, such as managerial incentives of earnings management, capital utilization, core competence, the direction of prior sales, and corporate governance, have been investigated (e.g., Balakrishnan et al. 2004; Banker et al. 2014a; Chen et al. 2012). Through these investigations, prior researches argue that asymmetric cost behavior is a consequence of deliberate managerial resource adjustment decisions in response to sales changes.

In this study, we focus on the impacts of financial risk on the degree of managerial discretion in resource adjustment decisions. While prior studies have not focused on the degree of managerial discretion in resource adjustment decisions, it is one of an important determinant of managers' deliberate resource adjustment decisions. We show that managers cannot adjust resources deliberately in response to sales changes because they have limited opportunities to do so under certain conditions, even if they want to make such adjustments. Financial risk is defined as the potential future inability of a firm to cover its financial obligations (Holzhacker et al. 2015). Financial risk includes the possibility of a firm defaulting on its debts in future (default risk) and the variability of a firm's profit associated with its liabilities (financial leverage). We predict that financial risk will reduce the degree of discretion in managerial resource adjustment decisions through its impact on financial flexibility.

We also focus on the roles of the close relationships between industrial firms and banks in managerial resource adjustment decisions. Traditionally, large firms in Japan have relied heavily on direct bank finance, rather than equity or bond issues, and have maintained a close relationship with a particular bank, called a "main bank" (e.g., Aoki and Patrick 1995; Hoshi et al. 1990; Hoshi 1996). We predict that such ties with main banks will mitigate the impacts of financial risk on the degree of discretion in resource adjustment decisions, and allow managers to adjust resources flexibly in response to sales changes, even if they face high financial risk.

Understanding the roles of financial risk on asymmetric cost behavior is also important from the point of view of risk management. Since managerial resource adjustment decisions affect the cost structure of a firm, they will also affect the risk of the firm. Therefore, managers take risk into account when they make resource adjustment decisions. Despite the interdependency between risk management and resource adjustment decisions, with a few exceptions, previous studies have not paid sufficient attention to this issue.

We examine the relationship between financial risk and asymmetric cost behavior based on publicly available financial data of Japanese firms. We predict that financial risk restricts financial flexibility by increasing the cost of capital and causing a debt overhang problem, which alters managerial resource adjustment decisions and determines cost behavior. Consistent with this prediction, our results indicate that financial risk increases the degree of cost anti-stickiness in the case of a prior activity decrease. On the other hand, financial risk appears to have no influence on cost behavior in the case of a prior activity increase. We also examine the moderating effect of the close relationships between firms and banks on the association between financial risk and asymmetric cost behavior using data on the main bank system in Japan. We predict that firms' close ties with main banks will mitigate the impacts of financial risk on financial flexibility, as well as increase the degree of managerial discretion when adjusting resources in firms with high financial risk. Our result generally supports this prediction.

We make several contributions to the growing body of literature on cost behavior. First, we emphasize the roles of the degree of managerial discretion in resource adjustment decisions, and financial risk as the determinant of such discretion. Prior studies have not paid sufficient attention to the roles of the degree of managerial discretion in resource adjustment decisions that affect the pattern of asymmetric cost behavior. Our results indicate that the degree of managerial discretion in resource adjustments varies according to the conditions managers face and affects the pattern of asymmetric cost behavior. Second, we show the roles of bank–firm relationships in managerial resource adjustment decisions. We present empirical evidence showing that close ties with main banks mitigate the impact of financial risk on the degree of managerial discretion in resource adjustments and allow managers to adjust resources deliberately, even if they face high financial risk. Thus, we provide a deeper understanding of the roles of corporate financing and bank–firm relationships in managerial resource adjustment decisions.

The remainder of this paper is structured as follows. In section 2, we develop the theory and formulate the hypotheses. In section 3, we describe the data and the empirical model. In subsequent sections, we present and discuss the empirical results. The final section concludes the paper.

2. Literature Review and Hypotheses

2.1. Asymmetric Cost Behavior

Since the seminal work by Anderson et al. (2003), numerous studies have documented how many costs decrease less in response to sales decreases than they rise for equivalent sales increases, which is known as cost stickiness. The cost stickiness mechanism is explained in terms of managers' prospects for future activity, in which resource adjustment costs and retention costs of unused resources play an important role (Anderson et al. 2003). Resource adjustment costs are those required to adjust resources in response to changes in activity volume. These costs include those of dismissing excess employees because of a downturn in activity volume, employing additional workers to meet future activity increases, and so on. On the other hand, the retention costs of unused resources result from not cutting slack resources after a reduction in activity volume, but retaining them until the activity volume recovers. If the resource adjustment costs exceed the retention costs of unused resources, managers will retain unused resources, even if the activity volume decreases. This deliberate managerial decision makes costs sticky. In contrast, if resource adjustment costs fall below the retention costs of unused resources, managers will remove those unused resources.

Following Anderson et al. (2003), a substantial number of studies have shown that cost stickiness is prevalent in various contexts, and that the degree of cost stickiness is dependent on various factors, such as capital utilization, core competence, and corporate governance (e.g., Balakrishnan et al. 2004; Chen et al. 2012; Kama and Weiss 2013). Several studies also document an empirical phenomenon of cost anti-stickiness, in which decreases in activity volume result in greater changes to costs than do equivalent increases in activity volume (e.g., Banker et al. 2014a; Weiss 2010). Banker et al. (2014a) complement and refine the theoretical development of asymmetric cost behavior in Anderson et al. (2003).

We follow the argument of Banker et al. (2014a) that cost behavior is affected by the direction of prior activity volume, which determines the amount of unused resources carried over from the prior period and managerial expectations for future activity volume.[1] If activity increased in period t - 1 (relative to period t - 2), the amount of unused resources carried over into the current period t will be very low. Even if unused resources had been carried over from period t - 2, managers would consume them to deal with the increase in activity volume during period t - 1, and would not secure more resources than required. Therefore, if activity increased in period t - 1, the resources carried over into the current period will be minimal. Then, if the activity increases in the current period, managers will increase resources in order to meet the resource requirements.[2] This is because if managers do not acquire these resources, they will be unable to respond to an increase in demand and, consequently, will miss an opportunity for profit. On the other hand, if activity decreases in the current period, costs will not decrease proportionately to activity decreases. This is because managers will likely retain some unused resources between the resource requirement and the maximum resource level at a certain activity

[1] While Banker et al. (2014a) use sales as a proxy for activity, we develop our argument without using a proxy for activity.
[2] Resource requirements refer to the minimum resources technically necessary to meet a certain activity volume.

volume.[3] Therefore, in the case of a prior activity increase, costs will be sticky in the current period. Figure 1 shows this scenario.

If activity decreased in the previous period *t* - 1, then managers retained unused resources in that period, which are then carried over into the current period *t*. If activity increases in the current period, costs will not increase significantly because managers can utilize the unused resources to deal with the increased activity. In contrast, if activity decreases further in the current period, managers will reduce resources that exceed the acceptable amount of unused resources. Therefore, in the case of a prior activity decrease, costs will be anti-sticky (see Figure 2).

The direction of changes in prior activity also affect managers' prospects for future activity volumes. Since prior activity volume is good predictor of future activity volume, managers tend to believe that the future volume is more likely to increase (decrease) when they face a prior activity volume increase (decrease). Therefore, an increase (decrease) in the previous period's activity volume causes managerial optimism (pessimism) with regard to future activity volume.

When managers are optimistic about the future activity volume following a prior activity increase, they are more likely to retain unused resources in the event of a current decrease and are more willing to acquire additional resources in the event of a current increase. This is because optimistic managers tend to believe there is a high probability of a future activity volume increase, and that any current decrease will not continue for long. Therefore, optimistic managers will judge that a current resource reduction will mean higher future resource reacquisition costs,

[3] While Banker et al. (2014a) do not state it explicitly, we assume that managers determine firms' resource levels at their discretion, within the range of the minimum required resource level to the sum of the minimum resource level and the acceptable slack resources. Therefore, we see Figures 1 and 2 as extreme cases of asymmetric cost behavior.

and that the current acquisition of extra resources will mean saving on future acquisition costs. In conclusion, optimistic prospects of future activity following a prior sales increase strengthen the degree of cost stickiness.

On the other hand, when managers are pessimistic about future activity volume following an activity decrease, they are likely to cut unused resources in the event of a current decrease, and hesitate to acquire additional resources in the event of a current increase. This is because pessimistic managers will anticipate needing to reduce resources further in the near future. Therefore, compared with optimistic managers, pessimistic managers reduce costs further in response to a current activity decrease. In conclusion, pessimistic prospects of future activity following a sales decrease reinforce the degree of cost anti-stickiness.

As in Banker et al. (2014a), we summarize these hypotheses as follows:

H1a: Conditional on a prior activity increase, costs in the current period are sticky, on average.

H1b: Conditional on a prior activity decrease, costs in the current period are anti-sticky, on average.

(Insert Figure 1 here)

(Insert Figure 2 here)

2.2. Financial Risk and Cost Behavior

The explanation of the patterns of cost behavior by Banker et al. (2014a) imply that managers determine firms' resource levels at their discretion within the range of the minimum required resource level to the sum of the minimum resource level and the acceptable slack resources. Therefore, this range is the room in which a manager can adjust resources at his/her discretion. If the difference is small, the degree of managerial resource adjustments will be constrained. On the other hand, a larger range for discretional adjustments will allow managers to change their resource level more flexibly in response to an activity volume change.

Thus, we suggest that this range will depend on a variety of conditions that firms face. Since the minimum required resource level is determined technologically by a firm's production function, the difference is determined by the acceptable slack resources. We explore the effect of financial risk on the level of acceptable slack resources. Since firms with high financial risk do not have sufficient internal reserves, their resource adjustment decisions are significantly affected by the availability of outside funds. However, high financial risk makes it more difficult to get outside funds due to an increase in the cost of capital, and debt overhang problem. Since creditors bearing higher risk require larger repayments, the cost of capital for firms with high financial risk will increase to reflect their creditors' expectations. In addition, an increase in financial risk causes a debt overhang problem (Myers, 1977). These effects mean that firms with high financial risk will not be able to adjust resources flexibly. Consequently, an increase in financial risk decreases the degree of managerial discretion, restricting their financial flexibility. In Figures 3 and 4, this effect is shown as the shift in acceptable unused resource levels downwards (from AS1 to AS2).

Through the above effect, financial risk will alleviate (strengthen) the degree of cost stickiness (cost anti-stickiness). Let us consider the case of a prior activity increase. In this case, the amount of resources carried over from the prior period is low. Then, managers must decide on resource levels, over and above the requirements for the current period, in response to changes in activity volume. Without the effects of financial risk, costs will be sticky, because managers are more likely to retain unused resources for future activity increases in the event of a current decrease, and are willing to increase resources in the event of a current activity increase. For firms with high financial risk, the acceptable amount of unused resources will decrease because of the restriction on financial flexibility, irrespective of the direction of a change in current activity. Higher resource retention costs will restrict the amount of unused resources that managers retain for a future activity increase. Furthermore, higher resource acquisition costs mean managers will hesitate to obtain additional unused resources. These effects will constrain the firm's resource levels close to its minimum resource requirements at a certain activity volume. In Figure 3, these effects are shown in the change of resource adjustment decisions from R_{iia} to R_{iih}, and from R_{ida} to R_{idh}. Hence, we predict that increases in financial risk will reduce the degree of cost stickiness following a prior activity increase (see Figure 3).

H2a: Conditional on a prior activity increase, the degree of costs stickiness in the current period has a negative association with financial risk.

(Insert Figure 3 here)

Next, we consider the case of a prior activity decrease. In this case, managers retain unused resources close to the acceptable amount at the beginning of the current period. Without the effects of financial risk, costs will be anti-sticky because managers will reduce unused resources in the event of a current activity decrease, and will use unused resources in a current activity increase. As discussed above, in general, high financial risk will reduce the acceptable amount of unused resources, irrespective of the direction of changes in current activity. In the event of a current activity increase, managers with high financial risk will avoid securing excess resources. Instead, they will use unused resources carried over from the previous period, because high financial risk makes additional resource acquisition more difficult. Moreover, in the event of a current activity decrease, managers will reduce the amount of unused resources retained for future activity increases. In Figure 4, these effects are shown as a change in resource adjustment decisions from R_{dia} to R_{dih}, and from R_{dda} to R_{ddh}. Thus, we predict that high financial risk will increase the degree of cost anti-stickiness (see Figure 4).

H2b: Conditional on a prior activity decrease, the degree of cost anti-stickiness in the current period has a positive association with financial risk.

(Insert Figure 4 here)

2.3. The Roles of the Main Bank System

Traditionally, large firms in Japan have relied heavily on direct bank finance rather than on equity or bond issues, and have maintained a close relationship with a particular bank, called a "main bank." Prior studies show that the main bank system in Japan has several positive advantages for corporate finance. For example, main banks mitigate informational asymmetry problems between lenders and borrowers by producing information on client firms, which they share with other lenders and investors. Main banks also serve as insurance for clients in financial distress by providing funds, a lower interest ratio, or intervening in their management policies[4] (e.g., Aoki and Patrick 1995; Hoshi et al. 1990; Hoshi 1996). We expect that an increase in financial risk will decrease the degree of managerial discretion in making resource adjustments by increasing the cost of capital and restricting financial flexibility. However, we also expect that their close ties with main banks will allow managers to adjust resources more flexibly in response to sales changes, even if they face high financial risk.

First, close ties with main banks reduce informational asymmetry between lenders and borrowers. Since the main banks hold the major payment settlement account of their client firms, they can monitor clients' business activities carefully through their account (Aoki 1994). Main banks also send key bank personnel to the top management teams in client firms to monitor their activities (Hoshi et al. 1990). These close ties with client firms allow the main banks to generate valuable information about their clients' business activities. Since main banks tend to share such information with other lenders and investors, the degree of information asymmetry between borrowers and lenders decreases, preventing the cost of capital of the client firms from increasing, even if they face high financial risk.

Second, strict corporate monitoring activities by main banks discourage moral hazards in

[4] However, the main bank system in Japan also has drawbacks. For example, by examining the effects of bank–firm relationships on firm performance in Japan, Weinstein and Yafeh (1998) show that when access to capital markets is limited, the close ties with main banks increase the availability of capital to borrowing firms, but do not lead to higher profitability or growth. They argue that the slow growth rates of bank clients suggest that banks discourage firms from investing in risky, but profitable projects. In addition, because of their long-term relationships, main banks are more likely to respond to renegotiation offers from clients in financial distress in the expectation of recovering their loans in the long term (Boot 2000). In some cases, recent studies have argued that main banks give rise to "zombie" firms, which are kept alive by bank loans, even though they are less likely to reconstruct management. Kobayashi and Osano (2011) show that the threat of withdrawal of non-main banks forces main banks to perform efficiently in handling troubled loans. In other words, main banks do not necessarily give rise to zombie firms (Caballero et al. 2008; Hoshi and Kashyap 2004; Peek and Rosengren 2005).

client firms. If firms behave opportunistically, investors and lenders will require a high risk premium, which increases the cost of capital. However, because the strict monitoring by main banks prevents client firms from behaving opportunistically, the cost of capital for such firms will not increase.[5]

Third, the main banks also provide a form of insurance for client firms in financial distress and for other lenders. When firms are in financial distress, their lenders are likely to stop providing financing and will make financial constraints more severe. However, since main banks are likely to rescue such clients in order to maintain their reputation as main banks, other lenders will not stop providing financing. Therefore, by having a relationship with a main bank, firms can provide a signal of a low possibility of bankruptcy to the financial market. This signal also alleviates increases in the cost of capital for firms with main banks.

Fourth, by providing additional cash or by applying lower interest rates for their client firms in financial distress, the main banks alleviate the financial constraints caused by increased financial risk. Therefore, close ties with main banks allow firms with high financial risk to maintain unused resources in preparation for future activity increases, even if they face high financial risk.

For the above-mentioned reasons, we predict that the association between financial risk and cost behavior will be weaker in firms with close ties to main banks.

H3: The associations between financial risk and cost behavior will be weaker in firms with close ties to main banks.

[5] Client firms of a main bank may have other lenders, called non-main banks. Because monitoring activities in Japan are delegated to the main banks, they are responsible for monitoring their clients. Therefore, Japanese banks are interdependent with non-main banks in terms of monitoring their borrowers (Sheard 1994).

3. Empirical Models and Sample Data

3.1 The Empirical Model and Variables

We employ the empirical model developed by Banker et al. (2014a) to examine H1a and H1b. We use sales as a proxy for activity; selling, general, and administrative (SG&A) costs as a proxy for costs; and the debt ratio and simple analysis of failure (SAF) value as proxies for financial risk. The SAF value measures the risk of bankruptcy based on the SAF2002 model (Shirata 2003). Other models have certain predictive powers for the data used to formulate the models. In contrast, the SAF2002 model considers the relation between real managerial behavior and financial figures, which enables us to capture the behavior of managers facing bankruptcy. The SAF2002 model is given as follows:

$$SAF_{i,t} = 0.01036 \cdot Retained\ Earnings\ to\ Total\ Assets\ _{i,t} + 0.02682 \cdot Net\ Income\ before\ tax\ to\ Total\ Assets_{i,t} + 0.06610 \cdot Inventory\ Turnover\ Period_{i,t} - 0.02368 \cdot Interest\ Expenses\ to\ Sales_{i,t} + 0.70773.$$

If the SAF value is below 0.70, the bankruptcy risk is high (Shirata 2003). That is, a lower SAF value means a greater risk of bankruptcy. Conversely, a higher SAF value means a lower bankruptcy risk. The empirical model of Banker et al. (2014a) is expressed in Eq. (1):

$$\Delta \ln SGA_{i,t} = \beta_0 + I_{i,t-1}\ (\beta_1^{PIncr} \Delta \ln SALES_{i,t} + \beta_2^{PIncr} D_{i,t} \Delta \ln SALES_{i,t}) + D_{i,t-1}\ (\beta_1^{PDecr} \Delta \ln SALES_{i,t} + \beta_2^{PDecr} D_{i,t} \Delta \ln SALES_{i,t}) + \varepsilon_{i,t}. \quad (1)$$

Here, $\Delta \ln SGA_{i,t}$ is the difference between firm i's SG&A costs in year t relative to year $t-1$; $\Delta \ln SALES_{i,t}$ is the difference between firm i's sales in year t relative to year $t-1$; $D_{i,t}$ is a dummy variable that takes 1 if firm i's sales decrease in year t relative to year $t-1$, and 0 otherwise; $D_{i,t-1}$ ($I_{i,t-1}$) is a dummy variable that takes 1 if firm i's sales increase in year $t-1$ relative to $t-2$, and 0 otherwise; and $\varepsilon_{i,t}$ is an error term.

The coefficient of β_1^{PIncr} expresses the proportionate increase in SG&A costs for a 1% increase in sales in the current period in the case of a prior sales increase; $\beta_1^{PIncr} + \beta_2^{PIncr}$ expresses the proportionate decrease in SG&A costs for a 1% decrease in sales in the current period in the case of a prior sales increase; and β_1^{PDecr} and β_2^{PDecr} can be interpreted in the same way, respectively, in the case of a prior sales decrease. Therefore, H1a and H1b imply that β_2^{PIncr} is positive and β_2^{PDecr} is negative, which indicate cost stickiness and anti-stickiness, respectively.

Eq. (2) shows an empirical model that examines the influence of financial risk on cost behavior.

$$\Delta \ln SGA_{i,t} = \beta_0 + I_{i,t-1}\ (\beta_1^{PIncr}\Delta \ln SALES_{i,t} + \beta_2^{PIncr} D_{i,t}\Delta \ln SALES_{i,t} + \delta_1^{PIncr}\Delta \ln SALES_{i,t} FINRISK_{i,t} + \delta_2^{PIncr} D_{i,t}\Delta \ln SALES_{i,t} FINRISK_{i,t})\ + D_{i,t-1}\ (\beta_1^{PDecr}\Delta \ln SALES_{i,t} + \beta_2^{PDecr} D_{i,t}\Delta \ln SALES_{i,t} + \delta_1^{PDecr}\Delta \ln SALES_{i,t} FINRISK_{i,t} + \delta_2^{PDecr} D_{i,t}\Delta \ln SALES_{i,t} FINRISK_{i,t})\ + \beta_3 \Delta \ln SALES_{i,t}\, ASINT_{i,t} + \beta_4 \Delta \ln SALES_{i,t}\, EMPINT_{i,t} + \varepsilon_{i,t}. \quad (2)$$

Here, $FINRISK_{i,t}$ is a variable denoting the log-ratio of total liabilities to the equity of firm i in year t, or the SAF value of firm i in year t; $ASINT_{i,t}$ is a control variable denoting the log-ratio of the total assets of firm i to sales in year t; and $EMPINT_{i,t}$ is also a control variable, denoting the log-ratio of the number of regular employees of firm i to sales in year t. All remaining variables are the same as those in Eq. (1).

If $\delta_1^{PIncr} + \delta_2^{PIncr}$ or $\delta_1^{PDecr} + \delta_2^{PDecr}$ is 0, financial risk has no influence on cost behavior. If $\delta_1^{PIncr} + \delta_2^{PIncr}$ is positive (negative), the degree of stickiness of SG&A costs in the current period following a prior sales increase has been alleviated (strengthened). On the other hand, if $\delta_1^{PDecr} + \delta_2^{PDecr}$ is positive (negative), the degree of anti-stickiness of SG&A costs in the current period following a prior sales decrease has strengthened (alleviated). We test H2a and H2b using these coefficients.

We further divide our sample into two sub-samples based on the value of the main bank ratio ($MBRATIO_{i,t}$). We measure $MBRATIO_{i,t}$ as the fraction of the loan amounts from firm i's main bank to total assets. One sub-sample includes firms with a main bank ratio that is higher than the median value in the full sample. The other sub-sample contains the remaining firms. To examine H3, we estimate Eq. (2) using these two sub-samples.

3.2 Sample and Descriptive Statistics

We use financial data collected from Nikkei NEEDS-Financial QUEST 2.0. We extracted the financial data for the period 2000–2014 from the consolidated financial statements of Japanese listed firms (in all industries other than banking, insurance, and stockbrokers) that follow Japanese accounting standards. The data also include the financial data of delisted firms. We require firms to have valid sales data for years t to t - 2, valid SG&A cost data for years t to t - 1, and valid debt ratio data for year t. We removed observations if a firm's accounting period was not 12 months, its financial year did not begin in March, its SG&A costs exceeded sales, or its total liabilities were not positive. We winsorize the data at the top and bottom 1 percent. The final sample comprised 19,447 firm-year observations.

Table 1 presents the descriptive statistics. The mean (median) sales value is 187,931 (52,804) million yen. The mean (median) value of SG&A costs is 29,929 (7,841) million yen. The mean (median) ratio of SG&A costs to sales is 19.5% (16.1%). Finally, the mean (median) debt ratio, a measure of financial risk, is 0.191 (0.176), while the mean (median) SAF value, another measure of financial risk, is 0.947 (0.955).

(Insert Table 1 here)

4. Empirical Results

The left-hand column in Table 2 shows the estimated coefficients of Eq. (1). As expected, β_1^{PIncr} is 0.669 (p < .001) and β_2^{PIncr} is -0.402 (p < .001), supporting H1a. The SG&A costs in the current period are sticky following a prior sales increase. In addition, β_1^{PDecr} is 0.401 (p < .001) and β_2^{PDecr} is 0.104 (p < .001), supporting H1b. The SG&A costs in the current period exhibit anti-stickiness in the case of a prior sales decrease. These results are consistent with those of Banker et al. (2014a).

(Insert Table 2 here)

The central column in Table 2 shows the estimates of Eq. (2), using debt ratios as a proxy for financial risk. Eq. (2) extends Eq. (1) in order to examine the effect that financial risk has on cost behavior. As with Eq. (1), the results indicate that SG&A costs are sticky in the case of a prior sales increase and, in contrast, anti-sticky in the case of a prior sales decrease. In addition, neither δ_1^{PIncr} nor δ_2^{PIncr} are statistically significant, suggesting that financial risk has no effect on SG&A cost changes in the case of a prior sales increase. Therefore, H2a is not supported. While δ_1^{PDecr} is not statistically significant, δ_2^{PDecr} is 0.065 ($p < .05$). Thus, financial risk does strengthen the degree of anti-stickiness following a prior sales decrease. Consequently, H2b is supported.

The right-hand column in Table 2 shows the estimates of Eq. (2), using SAF values as a proxy for financial risk. As with Eq. (1), these results exhibit stickiness in the case of a prior sales increase and anti-stickiness in the case of a prior sales decrease. In addition, neither δ_1^{PIncr} nor δ_2^{PIncr} are statistically significant, suggesting that financial risk has no effect on SG&A cost changes following a prior sales increase. This result is consistent with the estimation of Eq. (2), which use debt ratios to measure financial risk. Furthermore, δ_1^{PDecr} is 0.127 ($p < .001$) and δ_2^{PDecr} is -0.141 ($p < .001$), indicating that a lower financial risk means a greater alleviation of the anti-stickiness in the current period following a prior sales decrease. In other words, greater financial risk means greater anti-stickiness in the current period, following a prior sales decrease. Hence, both results for Eq. (2), using either the debt ratio or SAF values, support H2b.

Table 3 shows the estimates of Eq. (2) using the two sub-samples, which indicate firms with high and low main bank ratios. In the sample with a high main bank ratio, financial risk, proxied by either the debt ratio or SAF value, has no influence on cost behavior. On the other hand, in the sample with low main bank ratios, in the case of using the debt ratio as a proxy for financial risk, δ_2^{PDecr} is 0.095 ($p < .05$). Furthermore, when using the SAF value as a proxy for financial risk, δ_1^{PDecr} is 0.265 ($p < 0.05$) and δ_2^{PDecr} is -0.285 ($p < 0.001$). These results suggest that in the sample with low main bank ratios, an increase in financial risk strengthens the degree of cost anti-stickiness after a prior sales decrease. Therefore, consistent with H3, we conclude that the association between financial risk and cost behavior is weaker in firms with close ties to a main bank after a prior sales decrease.

(Insert Table3 here)

Furthermore, as a robustness check, we estimate Eq. (2) using the two sub-samples, which are divided based on the median of the ratio of the loan amount from firm i's main bank to the total loan amount. Table 4 shows the estimates of (2) using the sub-samples. The results in Table 4 are similar to those in Table 3.

(Insert Table 4 here)

5. Discussion

Consistent with the findings of Banker et al. (2014a), our results show that the direction of changes in activity in the previous period influence the cost behavior. More specifically, the amount of unused resources carried over from the prior period and the managers' prospects for future activity, determined by the direction of the activity volume changes in the previous period, have an important influence on managers' discretionary resource adjustment decisions.

The results of the study indicate that financial risk has some influence on cost behavior. We predict that since financial risk influences cost behavior by reducing the degree of managerial discretion through its impacts on financial flexibility, firms with higher (lower) financial risk weaken (strengthen) the degree of cost stickiness (anti-stickiness). Consistent with our prediction, our results indicate that when activity decreases in both the previous and current periods, managers are willing to reduce resources. This result supports H2b, suggesting that financial risk strengthens the degree of cost anti-stickiness by reducing the acceptable amount of unused resources.[6]

In contrast, in the case of a prior activity increase, there is no statistically significant relationship between financial risk and cost behavior and, thus, H2a is not supported. One of the reasons for this result might be the effect of managerial overconfidence on resource adjustment decisions. People are often susceptible to overconfidence when predicting the future (Weinstein 1980). Overconfidence refers to a tendency to overestimate one's own ability, underestimate the influence of other factors on an outcome, overestimate one's own predictive powers, and underestimate variance of an outcome (Chen et al. 2013). Managerial overconfidence will affect judgment and decision-making. In the finance literature, managers with a higher debt ratio are more likely to be overconfident about their future (Malmendier et al. 2011). However, the accounting literature has shown that overconfident top managers are more optimistic about future earnings forecasts (Hilary and Hsu 2011; Libby and Rennekamp 2012). Furthermore, Chen et al. (2013) demonstrated that cost behavior becomes sticky in the case of overconfident CEOs, because they will not reduce unused resources, even in the face of activity decreases. According

[6]However, there was no statistically significant influence of financial risk on managerial resource adjustment decisions when activity decreased in the previous period and increases in the current period. This may be because managers become pessimistic towards future activity after the activity decreased during the previous period. Pessimistic managers will not proactively acquire resources in response to increased activity in this period (Banker et al. 2014a). Therefore, irrespective of the degree of financial risk, when the previous period's activity decreases and the current period's activity increases, managers avoid acquiring new resources, instead using unused resources carried over from the previous period.

to Banker et al. (2014a), following a prior activity increase, managers will be optimistic about future activity. Therefore, we can assume that a prior activity increase further strengthens managerial optimism on future activity in firms with high financial risk. If optimism about future activity increases, any increases in activity volume in the current period will cause a rapid expansion in resources, while decreases in activity volume in the current period leads managers to retain unused resources. These effects may strengthen the degree of cost stickiness. Therefore, in the case of a prior activity increase, higher financial risk can both strengthen and weaken the degree of cost stickiness in the current period. We infer that these two effects of financial risk on cost behavior may offset each other, and fail to find evidence supporting H2a.

Here, we found the moderating effects of the close relationships with main banks on the association between financial risk and asymmetric cost behavior. Specifically, our results show that for firms with a low main bank ratio, financial risk strengthens the degree of cost anti-stickiness in the case of a prior sales decrease. However, in firms with a high main bank ratio, the increase in financial risk is not associated with cost behavior. While previous studies have not paid adequate attention to the impacts of bank–firm relationships on cost behavior, the results of our study suggest that bank loans from main banks have a significant impact on the association between financial risk and cost behavior by alleviating the adverse effects of financial risk on the degree of managerial discretion in resource adjustment decisions.

6. Conclusion

We examined the association between financial risk and cost behavior and the moderating effects of the impacts of bank–firm relationships on this association. We proposed theoretical predictions about the effect of financial risk on cost behavior, and presented empirical evidence using financial data collected from Japanese firms. Our results indicate that financial risk affects the degree of managers' discretion in resource adjustment decisions through its impacts on financial flexibility. Our results also show that close ties with main banks have a significant impact on the association between financial risk and cost behavior by allowing managers to adjust resources more flexibly in response to sales changes. In summary, our study shows that although the increase in financial risk will reduce the degree of managerial discretion in resource adjustment decisions, the close ties with main banks will mitigate this adverse impact of financial risk.

Our study contributes to the existing body of literature as follows. First, we extend the literature on asymmetric cost behavior. We demonstrated empirical evidence showing how financial risk affects the degree of managerial discretion in resource adjustment decisions, and determined the pattern of asymmetric cost behavior. By focusing on the roles of financial risk, we provide deeper insight into the relationship between risk and resource adjustment decisions. As already noted, the managerial decisions of resource retention, reduction, and acquisition in response to changes in activity volume ultimately influence cost structures. Therefore, managers need to adjust their resources, taking risks into account. Our results show that, in firms with high financial risk, the degree of cost anti-stickiness is strengthened in the case of a prior activity decrease. Cost anti-stickiness in the case of a prior activity decrease implies that the degree of cost elasticity in response to activity changes is greater when the activity decreases rather than increases in the current period. Therefore, our analysis suggests that when activity decreases in both the previous and current periods, managers with high financial risk choose a more elastic cost structure by significantly reducing unused resources. Thus, managers' resources adjustment decisions are interdependent of risk management. Future research needs to explore the interdependency between managers' resources adjustment decisions and risk management.

Second, we help to explain the relationship between cost behavior and bank–firm relationships. While prior studies on banking have shown various potential roles of the close ties with main banks, it has not discussed their implications for cost behavior. We shed light on new aspects of roles of long-term relationships between main banks and their clients in terms of cost behavior. Previous studies on relational banking argue that there are various types of relational banking other than the Japanese main bank system (Berger and Udel 2002). Future research should explore the roles of other types of relational banking on cost behavior.

The limitations of our study have to be considered when interpreting our results. First, while we use the debt ratio and the SAF values as proxies for financial risk, there are other measures of financial risk, such as those of Ohlson (1980) and Altman (1968). Second, we were unable to find a statistically significant relationship between financial risk and cost behavior when activity increased in the previous period. As discussed above, we infer that one of the reasons is the contradictory effects of financial risk on cost behavior. Future research can distinguish between these two effects, which would deepen our understanding of the influence of financial risk on cost behavior. Third, our study implies that risk management and managerial resource adjustment decisions in response to changes in activity volume have an interdependent relationship. Future research can explore these associations between cost behavior and a variety of risks, such as those stemming from diversification or global supply chains.

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Appendix. Variable Definitions

Variable	Definition
$\Delta \ln SGA_{i,t}$	Difference between firm *i*'s SG&A in period $t-1$ and period *t*
$\Delta \ln SALES_{i,t}$	Difference between firm *i*'s sales in period $t-1$ and period *t*
$D_{i,t}$	A dummy variable that takes the value 1 when firm *i*'s sales decrease between period $t-1$ and period *t* , and 0 otherwise
$D_{i,t-1}$	A dummy variable that takes the value 1 when firm *i*'s sales decrease from period $t-2$ to $t-1$, and 0 otherwise
$I_{i,t-1}$	A dummy variable that takes the value 1 when firm *i*'s sales increase from period $t-2$ to $t-1$, and 0 otherwise
$FINRISK_{i,t}$; $debt\ \ ratio$	Log-ratio of total liabilities to equity value of firm *i* in year *t*
$FINRISK_{i,t}$; SAF value	*SAF* value of firm *i* in year *t*
$ASINT_{i,t}$	Log-ratio of total assets of firm *i* to sales in year *t*
$EMPINT_{i,t}$	Log-ratio of number of regular employees of firm *i* to sales in year *t*.

FIGURE 1
Cost Stickiness Conditional on a Prior Activity Increase

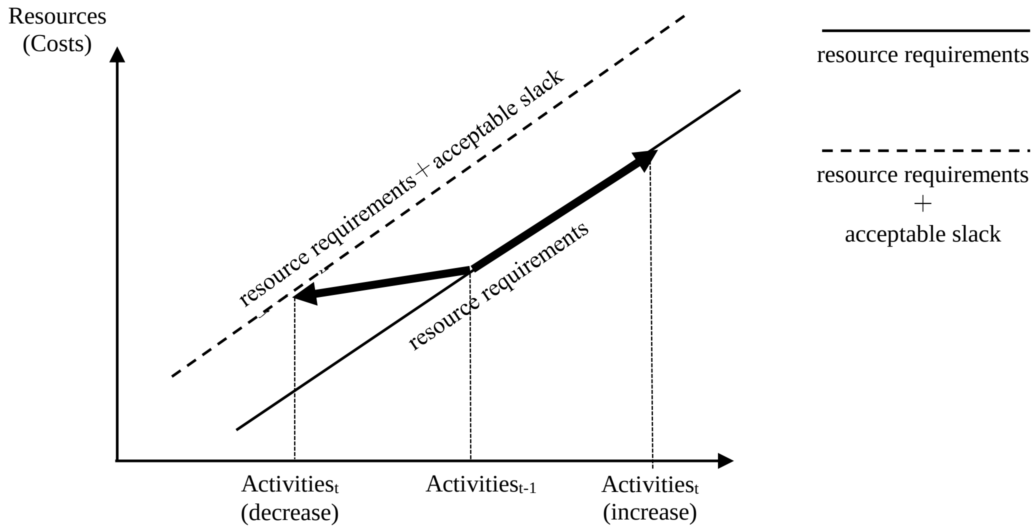

FIGURE 2
Cost Anti-Stickiness Conditional on a Prior Activity Decrease

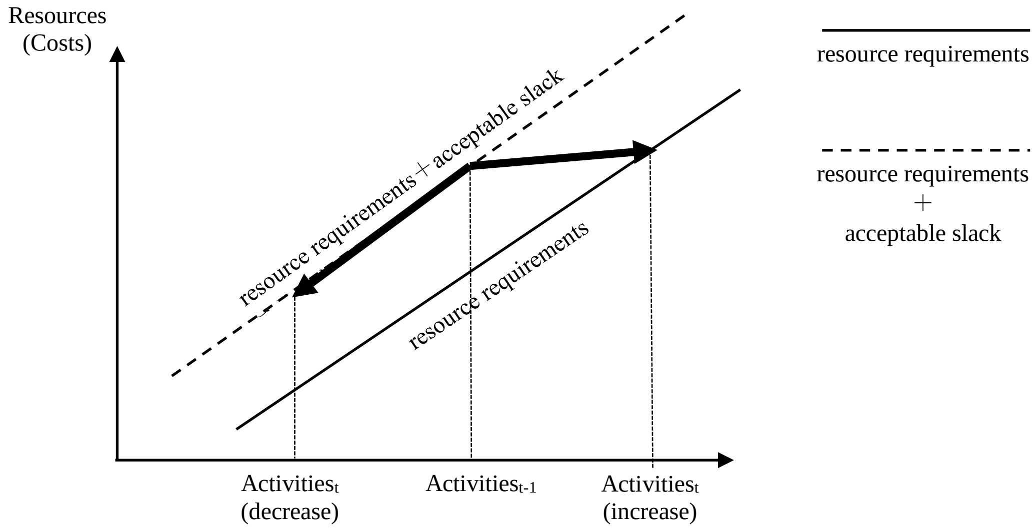

FIGURE 3
Effect of Financial Risk on Cost Behavior Conditional on a Prior Activity Increase

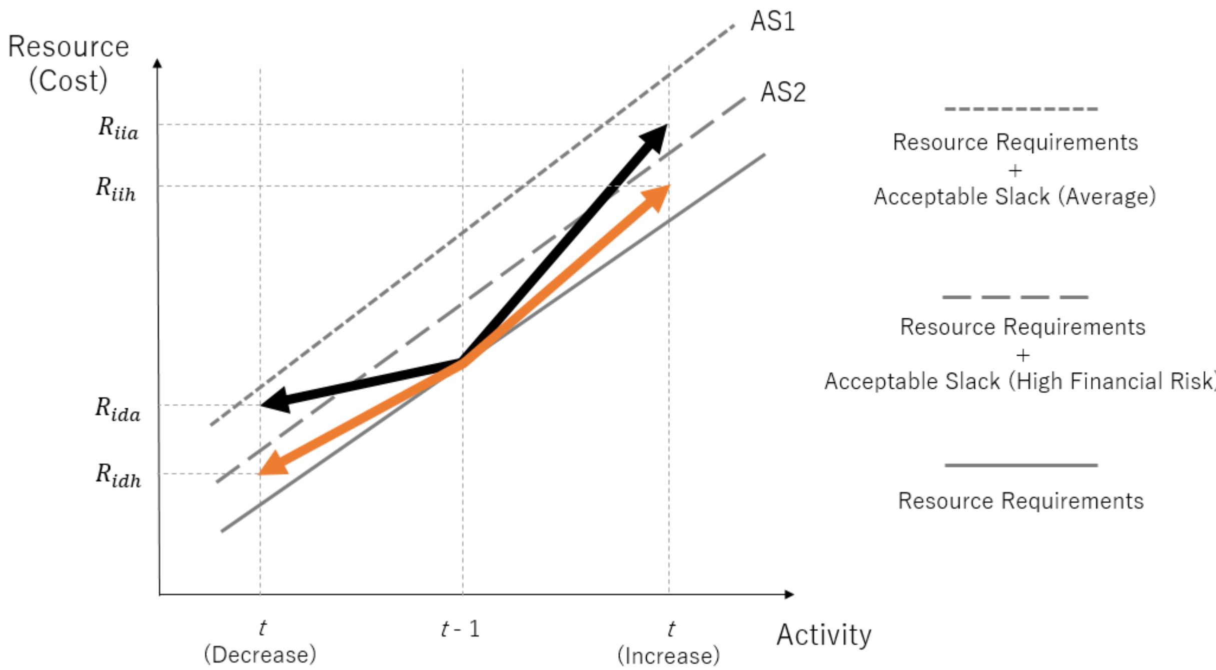

FIGURE 4

Effect of Financial Risk on Cost Behavior Conditional on a Prior Activity Decrease

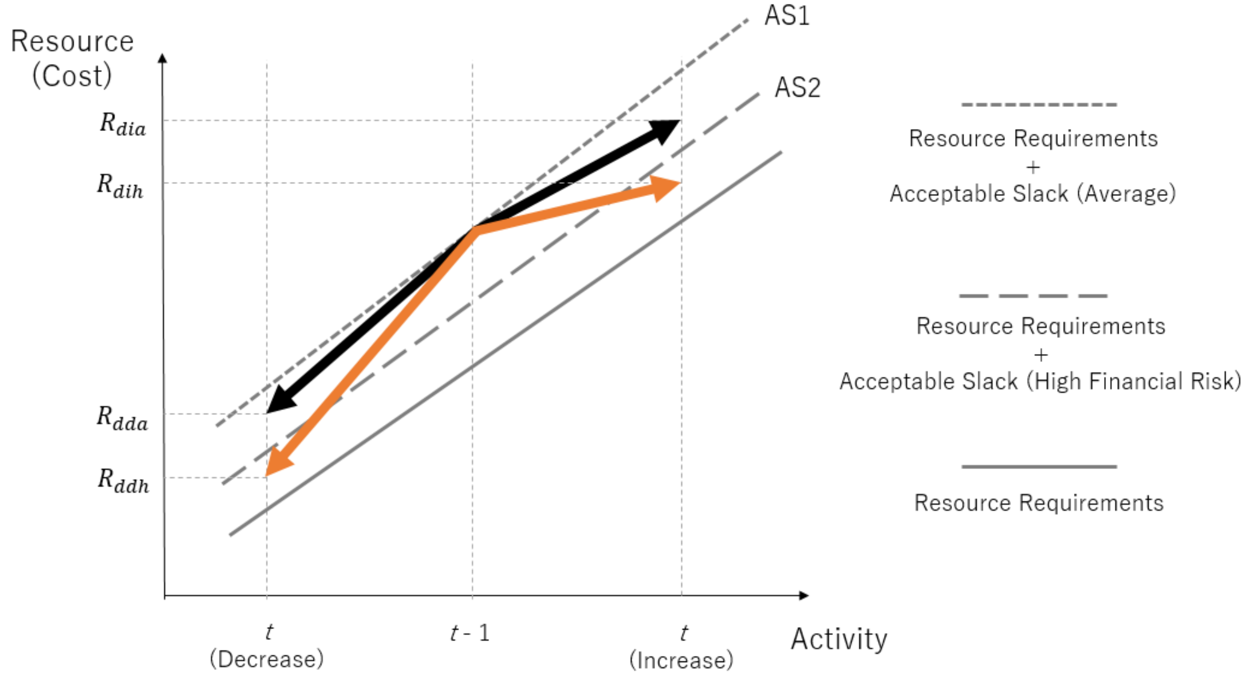

TABLE 1
Descriptive Statistics

Variables	Mean	Standard Deviation	Lower Quartile	Median	Upper Quartile
$SALES_{i,t}$, Yen million	187,931	383,577	21,296	52,804	160,762
$SGA_{i,t}$, Yen million	29,929	61,542	3,262	7,841	24,958
$SGA_{i,t}$ / $SALES_{i,t}$	19.5	13.7	10.0	16.1	24.1
$FINRISK_{i,t}$ (Debt Ratio)	0.191	1.050	-0.496	0.176	0.843
$FINRISK_{i,t}$ (SAF Value)	0.947	0.346	0.749	0.955	1.172
$MBRATIO_{i,t}$	0.178	0.140	0.063	0.148	0.261
$EMPINT_{i,t}$	-3.761	0.786	-4.234	-3.704	-3.238

TABLE 2
Estimates for Eq. (1) and (2) Using Full Sample

Coefficients	Variables	Estimates		
		(1)	(2): Debt Ratio	(2): SAF Value
β_1^{PIncr}	$I_{i,t-1}\Delta \ln SALES_{i,t}$	0.669*** (0.018)	0.920*** (0.048)	0.880*** (0.072)
β_2^{PIncr}	$I_{i,t-1}D_{i,t}\Delta \ln SALES_{i,t}$	-0.402*** (0.027)	-0.409*** (0.027)	-0.370*** (0.054)
δ_1^{PIncr}	$I_{i,t-1}\Delta \ln SALES_{i,t}\ FINRISK_{i,t}$		-0.013 (0.011)	0.026 (0.042)
δ_2^{PIncr}	$I_{i,t-1}D_{i,t}\Delta \ln SALES_{i,t}\ FINRISK_{i,t}$		0.024 (0.016)	-0.047 (0.050)
β_1^{PDecr}	$D_{i,t-1}\Delta \ln SALES_{i,t}$	0.401*** (0.025)	0.650*** (0.060)	0.543*** (0.080)
β_2^{PDecr}	$D_{i,t-1}D_{i,t}\Delta \ln SALES_{i,t}$	0.104*** (0.027)	0.072* (0.034)	0.192*** (0.051)
δ_1^{PDecr}	$D_{i,t-1}\Delta \ln SALES_{i,t}\ FINRISK_{i,t}$		-0.002 (0.021)	0.127*** (0.035)
δ_2^{PDecr}	$D_{i,t-1}D_{i,t}\Delta \ln SALES_{i,t}\ FINRISK_{i,t}$		0.065* (0.029)	-0.141*** (0.036)
β_3	$\Delta \ln SALES_{i,t}\ ASINT_{i,t}$		-0.048* (0.022)	-0.031 (0.020)
β_4	$\Delta \ln SALES_{i,t} EMPINT_{i,t}$		0.062*** (0.012)	0.060*** (0.013)
	N	19,447	19,447	17,924
	Adjusted R^2	0.432	0.440	0.441
	AIC	-43,308	-43,559	-40,897

***p<.001, **p<.01, *p<.05. () Indicates standard error. A two-way cluster-robust standard error *t*-test was undertaken on the two primary factors of firms and financial years in order to confirm the significance of the estimated factors.

TABLE 3
Estimates for Eq. (2) Using Sub-Samples on the Basis of the Fraction of Loan Amount from Main Bank to Total Assets

Coefficients	Variables	Estimates			
		High Main Bank Ratio		Low Main Bank Ratio	
		Debt Ratio	SAF	Debt Ratio	SAF
β_1^{PIncr}	$I_{i,t-1}\Delta \ln SALES_{i,t}$	0.920*** (0.077)	0.860*** (0.067)	1.073*** (0.068)	1.058*** (0.097)
β_2^{PIncr}	$I_{i,t-1}D_{i,t}\Delta \ln SALES_{i,t}$	-0.489*** (0.042)	-0.502*** (0.072)	-0.422*** (0.043)	-0.318*** (0.092)
δ_1^{PIncr}	$I_{i,t-1}\Delta \ln SALES_{i,t}\ FINRISK_{i,t}$	-0.017 (0.025)	0.014 (0.019)	0.019 (0.017)	0.026 (0.049)
δ_2^{PIncr}	$I_{i,t-1}D_{i,t}\Delta \ln SALES_{i,t}\ FINRISK_{i,t}$	0.043 (0.042)	0.066 (0.103)	-0.043 (0.049)	-0.122 (0.079)
β_1^{PDecr}	$D_{i,t-1}\Delta \ln SALES_{i,t}$	0.594*** (0.088)	0.540*** (0.091)	0.785*** (0.074)	0.550*** (0.131)
β_2^{PDecr}	$D_{i,t-1}D_{i,t}\Delta \ln SALES_{i,t}$	0.100 (0.065)	0.057 (0.057)	0.053 (0.045)	0.294*** (0.082)
δ_1^{PDecr}	$D_{i,t-1}\Delta \ln SALES_{i,t}\ FINRISK_{i,t}$	0.056 (0.037)	0.088*** (0.025)	-0.060 (0.040)	0.265** (0.091)
δ_2^{PDecr}	$D_{i,t-1}D_{i,t}\Delta \ln SALES_{i,t}\ FINRISK_{i,t}$	0.010 (0.051)	0.065 (0.085)	0.095* (0.045)	-0.285*** (0.079)
β_3	$\Delta \ln SALES_{i,t}\ ASINT_{i,t}$	-0.053 (0.032)	-0.006 (0.038)	-0.070*** (0.016)	-0.071*** (0.018)
β_4	$\Delta \ln SALES_{i,t} EMPINT_{i,t}$	0.055** (0.018)	0.045** (0.017)	0.105*** (0.016)	0.106*** (0.019)
	n	7729	7404	7729	7499
	Adjusted R^2	0.410	0.432	0.434	0.438
	AIC	-16118	-16093	-18384	-18063

***p<.001, **p<.01, *p<.05. () Indicates standard error. A two-way cluster-robust standard error *t*-test was undertaken on the two primary factors of firms and financial years in order to confirm the significance of the estimated factors.

TABLE 4
Robustness Check: Estimates for Eq. (2) Using Sub-Samples on the Basis of the Fraction of Loan Amount from Main Bank to Total Loan Amount

Coefficients	Variables	Estimates			
		High Main Bank Ratio		Low Main Bank Ratio	
		Debt Ratio	SAF	Debt Ratio	SAF
β_1^{PIncr}	$I_{i,t-1}\Delta\ln SALES_{i,t}$	1.040*** (0.060)	1.021*** (0.064)	0.915*** (0.072)	0.815*** (0.124)
β_2^{PIncr}	$I_{i,t-1}D_{i,t}\Delta\ln SALES_{i,t}$	-0.428*** (0.045)	-0.435*** (0.097)	-0.443*** (0.043)	-0.384*** (0.127)
δ_1^{PIncr}	$I_{i,t-1}\Delta\ln SALES_{i,t}\ FINRISK_{i,t}$	0.026 (0.024)	-0.035 (0.065)	-0.041 (0.027)	0.082 (0.088)
δ_2^{PIncr}	$I_{i,t-1}D_{i,t}\Delta\ln SALES_{i,t}\ FINRISK_{i,t}$	-0.026 (0.049)	-0.033 (0.114)	0.064 (0.033)	-0.051 (0.116)
β_1^{PDecr}	$D_{i,t-1}\Delta\ln SALES_{i,t}$	0.787*** (0.087)	0.707*** (0.132)	0.615*** (0.069)	0.344*** (0.103)
β_2^{PDecr}	$D_{i,t-1}D_{i,t}\Delta\ln SALES_{i,t}$	0.042 (0.061)	0.121 (0.097)	0.068 (0.036)	0.425*** (0.085)
δ_1^{PDecr}	$D_{i,t-1}\Delta\ln SALES_{i,t}\ FINRISK_{i,t}$	0.006 (0.047)	0.054 (0.082)	-0.016 (0.027)	0.300*** (0.081)
δ_2^{PDecr}	$D_{i,t-1}D_{i,t}\Delta\ln SALES_{i,t}\ FINRISK_{i,t}$	0.060 (0.054)	-0.092 (0.084)	0.116** (0.038)	-0.425*** (0.097)
β_3	$\Delta\ln SALES_{i,t}\ ASINT_{i,t}$	-0.064** (0.022)	-0.047* (0.022)	-0.058 (0.031)	-0.038 (0.035)
β_4	$\Delta\ln SALES_{i,t} EMPINT_{i,t}$	0.090*** (0.013)	0.073*** (0.013)	0.063*** (0.016)	0.058*** (0.017)
	n	7,729	7397	7,729	7506
	Adjusted R^2	0.427	0.447	0.421	0.421
	AIC	-16,578	-16557	-17,769	-17378

***p<.001, **p<.01, *p<.05. () Indicates standard error. A two-way cluster-robust standard error *t*-test was undertaken on the two primary factors of firms and financial years in order to confirm the significance of the estimated factors.

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