International Journal of Economics and Finance; Vol. 17, No. 4; 2025
ISSN 1916-971X E-ISSN 1916-9728
Published by Canadian Center of Science and Education

Does Business Model Risk Affect Corporate Labor Policy?

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Received: January 17, 2025 Accepted: February 26, 2025 Online Published: March 5, 2025

doi:10.5539/ijef.v17n4p63 URL: https://doi.org/10.5539/ijef.v17n4p63

Abstract

In this study, we attempt to provide a key understanding on how and through which channel customer concentration (Business risk) affects managers' employment decision efficiency. Understanding the costs associated with customer concentration is important, as the modern business-to-business economy continues to experience higher levels of concentration and supply-chain integration.

We find that managers of firms with higher customer concentrations are less efficient in their hiring decisions. Our main results are robust when using exogenous shocks based on federal laws to address endogeneity concerns. Additionally, we provide evidence that this negative impact is more pronounced in firms that offer more trade credit to larger customers, have higher financial risk, invest heavily in research and development, or deal with customers at greater risk of default.

Keywords: customer concentration risk, hiring efficiency, financial risk, default risk

1. Introduction

Recent financial crisis and subsequent recession after 2008 resulted in huge job losses in the U.S., which has drawn a lot of attention from researchers. Specifically, they are interested in the determinants of corporate employment, particularly, the effect of financial frictions on corporate hiring decisions. For instance, Benmelech, Bergman, and Seru (2021) and Chodorow-Reich (2014) document a negative impact of financial constraints on hiring. More recently, Falato and Liang (2016) show a negative effect of loan covenant violations on corporate labor policies. While these studies examine the effect of financial risk on corporate employment, we focus on how customer concentration risk affects managers' hiring decisions since our knowledge on how constraints due to customer-supplier relationship affect managers' employment decisions is limited. A firm is subject to customer concentration risk when its business depends on a small number of principal customers. We believe that it is an important question whether and how customer concentration affects managers' employment decisions for different reasons. First, several determinants of managers' employment decisions are directly and indirectly related to customer concentration. For example, prior studies find that customer concentration affects a supplier's performance such as sales potential and operating performance (Kalwani & Narayandas 1995), and managers consider all the above determinants in their employment decisions (e.g., Pinnuk & Lillis, 2007; Jung, Lee, & Weber, 2014). Second, anecdotally, pressure from large corporate buyers seems also to impact employment conditions at supplier companies as reported by Nathan Wilmers (2018) in an article published on Washington center for equitable growth (Note1).

Therefore, in this paper, we attempt to fill this gap in the literature by providing a key understanding on how and through which channels the unique business risks stemming from a firm's operating environment and business model affect managers' employment decisions efficiency.

Despite its importance, the question of how non-financial stakeholders impact the manager's employment decisions remains unanswered. The literature yields conflicting arguments on the effect of customer concentration on hiring decisions efficiency. On the one hand, it is often argued that having a concentrated customer base has several benefits such as increased customer loyalty, better inventory management, and reduced transaction costs (e.g., Ak & Patatoukas, 2016). One significant advantage is to have stable revenues due to close relationships such as enhanced collaboration and information sharing along supply chain. This suggests that supplier managers may be better equipped to make informed investment decisions, including those related to hiring. On the other hand, extant literature identifies three possible channels through which a firm's customer–

supplier relationships could negatively impact hiring efficiency.

First, conflicts between major customers and employees may negatively affect hiring efficiency. Major customers may have a concern that their bargain power is weakened when suppliers have a strong labor force. The literature also documents that major customers leave away or reduce their purchases from their suppliers because of a concern that suppliers' strong labor force can disrupt their production (e.g., Chen, Juddy, & Pandit, 2021), weakening their bargaining power. Additionally, customers with a strong negotiating position can reduce the gross margin of their suppliers significantly through price concessions (Schumacher, 1991; Snyder, 1996). Major customers with significant bargaining power may also postpone payments (e.g., Murfin & Njoroge, 2014), leading to liquidity issues for the supplier. Therefore, supplier firms facing major customers with strong bargaining power may need to hire less in order to attract and retain major customers and avoid liquidity problems.

Second, supplier firms may reduce labor-induced operating leverage (hereafter labor leverage) to retain major customers, as this increases financial flexibility. Firms with lower labor leverage can adjust more rapidly during economic downturns due to a smaller workforce and lower wage obligations (Jung, weber, & Yang, 2021). However, this comes at the cost of hiring efficiency, as firms with concentrated customer bases are more likely to face higher equity and debt financing costs (Banerjee, Dasgupta, & Kim, 2008; Dhaliwal, Scott, Serfling, & Shaikh, 2016). Therefore, facing higher financing costs, a firm with concentrated customer base will find it harder to finance labor, which leads to lower hiring efficiency by aggravating the extent of under-hiring.

Third, technological diffusion from major customers to suppliers may result in less hiring than the optimal level. Several researchers show that major customers are passing their technologies to suppliers (e.g., Chu, Tian, & Wang, 2019). If the adoption of technology from major customers reduces supplier firms' need of labor forces (i.e., a substitution between technology and labor force), we would observe that firms with major customers tend to employ less workers than the optimal level.

We posit that customer concentration hinders managers' hiring decision. To test our hypothesis, we use a net change in employee number as a measure for managers' hiring decision, following the literature (e.g., Jung et al., 2014; Benmelech, Bergman, & Seru, 2021). We utilize the Herfindhal-Hirschman index to measure customer concentration (e.g., Ak & Patatoukas, 2016). To measure managers' hiring efficiency, we employ the q-theory of investment, first developed by Tobin (1969) and replace investment with employment growth, similar to McLean and Zhao (2014). Specifically, we assume that the higher sensitivity of employment growth to Tobin's Q indicates more efficient hiring decision since managers are more likely to increase their employment when growth opportunities are greater.

Using a large sample of U.S. firms over the period between 1982 and 2014, we find that customer concentration negatively affects hiring efficiency. Our results remain robust to the endogeneity concerns, employing a difference-in-difference setting. Specifically, following the literature (e.g., Campello & Gao, 2017; Ma, Wang, Wu, & Zhang 2020), we use major exogenous shocks leading to customer concentration changes from federal laws affecting the competitive environment and thus, increasing M&A activities in some industries.

Furthermore, our findings reveal that the negative influence of customer concentration on hiring efficiency is stronger in firms offering more trade credit to their larger customers, having a high financial risk, high research and development intensity and dealing with customers having a default risk.

The remainder of the paper is organized as follows. Section 2 outlines the testable hypotheses. Section 3 describes variables, research design, sample development and methodology. Section 4 reports main results and potential channels tests. Section 5 concludes.

2. Review of Literature and Development of Hypotheses

Recent research emphasizes the impact of financial frictions on corporate hiring decisions. For instance, Benmelech et al. (2021) and Chodorow-Reich (2014) document a negative effect of financial constraints on firm level employment decisions and aggregate unemployment outcomes. Similarly, Falato and Liang (2016) show the negative impact of loan covenant violations on corporate labor policies. Benmelech, Frydman and Papanikolaou (2019) document that a disruption in credit supply can explain about 10 to 33 percent of a decline in the aggregate level of employment during the Great Depression (i.e., from 1928 to 1933). Additionally, Pinnuck and Lillis (2007) find that managers significantly reduce employment after accounting losses, particularly when firms report current losses following prior profits. In sum, the above studies show the negative effect of financial constraints on firm employment change, underscoring the interrelation between corporate financing and hiring.

While previous studies have focused on the impact of financial constraints and credit availability on managers'

hiring decisions, little is known about how constraints arising from customer-supplier relationships influence employment decisions. Our research aims to fill this gap in the literature.

2.1 Customer Supplier Relationship and Managers' Hiring Decision

A concentrated customer base can be beneficial to suppliers in terms of increased customer loyalty, better inventory management, and reduced transaction costs. For example, Ak and Patatoukas (2016) document that firms with concentrated customer base tend to have more efficient inventory management due to enhanced collaboration and information sharing along supply chain, possibly leading to more efficient hiring decision by suppliers' managers. Furthermore, stable revenues due to the close relationship between suppliers and customers help managers of suppliers hire employees more efficiently, particularly in normal times. However, some prior studies suggest the opposite: customer concentration can lead to less efficient hiring decisions. In the next section, we propose several possible channels to explain the negative association between customer risk and hiring efficiency.

2.2 The Effect of Major Customers' Bargaining Power on Hiring Efficiency

First, firms with major customer concentration may suffer from important operational restrictions caused by the supplier. The intuition is that if there are operational restrictions, employment can deviate from the optimal level. Some businesses are structured around a major customer, and by maintaining a unique relationship with this supplier, they have to adapt their production capacities to meet the specific needs of that customer. These major customers often buy their needs from one company, and make the company customize its operations. Such customization exposes the supplier to substantial operational restriction, which create strong incentives for suppliers to take measures that will ensure the relation continuation and the cooperation to guarantee the retention of the major customer (Raman & Shahrur, 2008).

Any sudden stop of cooperation of major customers will impose cost pressures because the supplier no longer has much control over its revenues (Holzhacker, Krishnan, & Mahlendorf, 2015). Thus, the company will be forced to dismiss a number of employees.

Additionally, major customers may exert pressure on suppliers to cut costs and request discounts based on varying levels of production demand. Therefore, supplier companies are forced to reduce their price to protect against the loss of the major customer. Thus, since human resources costs represent a major part of the cost of products, suppliers may choose to dismiss fewer employees to reduce costs.

Second, we can claim that supplier firms are motivated to retain major customers as long as revenues from them are growing or stable. Meanwhile, major customers seek to maintain bargaining power to enhance profitability. Consequently, we expect that supplier firms' incentives to retain major customers may negatively impact their hiring efficiency.

In other words, suppliers facing major customers with strong bargaining power may hire less than what is justified by their investment opportunities in order to attract and retain major customers. The intuition behind this prediction is that major customers may prefer continuing their business with suppliers with a smaller number of less powerful employees in order to exercise their bargaining power as long as it does not significantly reduce labor productivity of supplier firms. For example, major customers may want to depart from their suppliers if the likelihood of strike occurrences of suppliers becomes higher because strikes disrupt the production, leading to significant losses to major customers due to inventory stock-out. Indeed, recently, Chen et al. (2021) find that customers move away from unionized suppliers to avoid supply chain disruptions and make purchases from additional suppliers, resulting in sales losses and decrease in customer concentration. They also report significant increases in the cost of goods sold and the number of employees after supplier unionization, providing a plausible explanation on why customers move away from suppliers with potentially great conflicts with their employees. To alleviate major customers' such concern and thus, retain them, supplier firms are more likely to hire less than their optimal level, leading to less efficient hiring decision.

2.3 The Effect of Labor-Induced Operating Leverage on Hiring Efficiency

Similar to our previous channel, supplier firms facing major customers may hurt hiring efficiency as they try to retain customers by lowering labor-induced operating leverage. Sticky employee wages facilitate a negative economic shock leads to higher labor leverage. During the economic downturn, employee wages decline more slowly than sales decline, resulting in higher labor expenses relative to the firm size which potentially would be detrimental to financial flexibility and thus, supply chain stability. For example, labor leverage increases credit risk as pre-committed wage payments make interest payments riskier during economic downturns. Consistent with this perspective, Favilukis, Lin, and Zhao (2020) show that firms with high labor leverage are less likely to

issue debt due to the increased credit risk arising from labor leverage, suggesting that labor market friction is the first-order effect on credit market friction. In contrast, firms with fewer employees and lower wages can adapt more quickly, enhancing financial flexibility and ensuring greater supply chain stability from the customer's perspective.

To ensure supply chain stability and retain major customers, supplier firms are likely to reduce labor leverage by hiring below optimal levels. This prediction is in essence somewhat consistent with Banerjee et al. (2008) who show that supplier firms' leverage ratios are negatively related to customer concentration, suggesting that suppliers facing major customers tend to lower financial leverage to retain major customers. In summary, since over-hiring labor may increase leverage, specifically, labor leverage, supplier firms may opt for under-hiring, leading to less efficient hiring decisions.

2.4 The Effect of Technological Transfer from Major Customers on Hiring Inefficiency

Prior literature also suggests that suppliers learn from major customers. For instance, a recent study shows that major customers are passing their technologies to suppliers and suppliers have greater incentives to innovate their production when the customer is of great importance to suppliers (e.g., Chu et al., 2019). Combined with the need to reduce labor leverage to retain customers, this encourages suppliers to substitute technology for labor.

Zhang (2019) documents that firms requiring routine-task adopt more labor-saving technology and reduce more routine-task labor, particularly during economic downturns. The author argues that this finding is consistent with the fact that firms will opt more for labor- technology substitution when cash is limited, and productivity is low. Thus, technological advancements from major customers may reduce the number of employees needed for suppliers' operations since their productivity and cash depends on their major customer, contributing to the negative association between a concentrated customer base and employment growth.

2.5 The Effect of Customer Concentration Risk on Hiring Inefficiency

The burgeoning literature on customer-supplier relationship offers another argument with respect to why concentrated customers may negatively affect managers' hiring decision efficiency. This argument is built on the effect of customer concentration on cash flow risk and bankruptcy risk. A supplier faces risk of losing substantial future sales if a major customer declares bankruptcy or switches to another supplier, leading to reduced future cash flow (e.g., Hertzel & Officer, 2012; Itzkowitz, 2013). For instance, Hertzel, Li, Officer, and Rodgeret (2008) show that the bankruptcy of a major customer is associated with negative abnormal stock returns for the supplier. Similarly, Lian (2017) shows that firms with customers at higher risk of financial distress tend to have higher bankruptcy risk. Customer concentration can also cause liquidity issues when customers delay payments due to substantial accounts payable (e.g., Murfin & Njoroge, 2014).

Overall, the findings in this stream of literature suggest that customer concentration increases cash flow risk, bankruptcy risk and liquidity concern, which increases risk for the supplier. This risk is priced. For instance, Dhaliwal et al. (2016) find that customer concentration increases suppliers' cost of equity. Campello and Gao (2017) provide evidence that the cost of debt is positively associated with customer risk. Therefore, facing higher debt and equity costs, such firms will find it harder to finance labor, limiting their flexibility in hiring employees in response to changes in fundamentals, resulting to more inefficient hiring through under-hiring.

In sum, based on the positive impact of customer concentration on the hiring decisions discussed earlier and the above three channels explaining the negative association, whether customer concentration increases or decreases managers' employment efficiency remains an open empirical question, leading to our hypothesis 1 as follows (in a null form):

H1. *Managers' hiring decision efficiency is not related to customer concentration.*

3. Variables, Research Design, and Sample Development

3.1 Customer Concentration Measure

To measure customer concentration, we first identify suppliers that disclose major customers using the Compustat' segment customer files. We only look at firms with a major customer whose revenue is at least 10% of their total revenue. Following Patatoukas (2012), we use the Herfindhal-Hirschman index of customer concentration (*CUSTOMER_ CONC*) which is calculated as $\sum_{j=1}^{J}\left(\frac{SALES_{i,j}}{SALES_i}\right)^2$ where $SALES_{i,j}$ is the sales of supplier *i* to the major customer *j* while $SALES_i$is the total sales of supplier *i* during a given year. Thus, the higher value

of *CUSTOMER_ CONC* indicates higher customer concentration.

Research design

In line with McLean and Zhao (2014), we use the following employment growth model to examine the impact of customer concentration on hiring efficiency. Specifically, we estimate Equation (1):

$$\Delta EMP_{i,t} = \theta_0 + \theta_1 Q_{i,t-1} + \theta_2 CF_{i,t} + \theta_3 CUSTOMER\_CONC_{i,t} + \theta_4 CUSTOMER\_CONC_{i,t} * Q_{i,t-1} + \theta_5 CUSTOMER\_CONC_{i,t} * CF_{i,t} + \theta_6 CONTROLS_{i,t} + \gamma + \varphi + u_{i,t} \quad (1)$$

where,

ΔEMP is the employment growth, measured as the growth rate of the number of employees calculated over a one year period; Q represents Tobin's Q, measured as the market value of equity plus total assets minus common equity for the current year over the last year total assets; CF represents net Income plus depreciation over lagged total assets; CUSTOMER_CONC represents the Herfindhal-Hirschman index of customer concentration; CONTROLS indicates the following variables based on Pinnuck and Lillis (2007):

$RETURN_{i,t}$ is the annual stock return; $SIZE\_RANK_{i,}$ is the Market value of equity as a percentile rank; $LEVERAGE_{i,t-1}$ is the Leverage; $QUICK_{i,t-1}$ is the quick ratio; $ROA_{i,t}$ is the return-on-assets; $SALESG_{i,t}$ is the sales growth ratio calculated over a one-year period; $SALESG_{i,t-1}$ is the last year's sales growth ratio; $\Delta ROA_{i,t}$ is the difference between ROA_t *and* ROA_{t-1}; $\Delta ROA_{i,t-1}$ is the difference between ROA_{t-1} *and* ROA_{t-2}; $\Delta QUICK_{i,t}$ is the difference between $QUICK_t$ *and* $QUICK_{t-1}$; $\Delta QUICK_{i,t-1}$ is the difference between $QUICK_{t-1}$ *and* $QUICK_{t-2}$; $LOSSBIN_{i,t-1,1}$ is a loss dummy variable if ROA_{t-1} *is* between -0.005 and 0; $LOSSBIN_{i,t-1,2}$ is a loss dummy variable if ROA_{t-1} *is* between -0.01 and -0.005; $LOSSBIN_{i,t-1,3}$ is a loss dummy variable if ROA_{t-1} *is* between -0.015 and -0.01; $LOSSBIN_{i,t-1,4}$ is a loss dummy variable if ROA_{t-1} *is* between -0.02 and -0.015; $LOSSBIN_{i,t-1,5}$ is a loss dummy variable if ROA_{t-1} *is* between -0.025 and -0.02;

γ represents industry dummy variables based on Fama and French 48 industry classification to control for industry fixed effect; φ indicates year dummy variables to control for the effect of macro-economic conditions on corporate employment decision and μ_{it} represents the error term.

We expect a significantly positive coefficient on θ_1 since firms with higher Tobin's Q (i.e., greater growth opportunities) tend to hire employees to a larger extent (McLean & Zhao, 2014). The higher sensitivity of employment growth to growth opportunities indicates more efficient hiring decisions. We also expect significantly positive coefficient on θ_2 since firms with higher cash flow from operations (i.e., internal funds) tend to hire a larger number of employees. The interpretation for the coefficient θ_2 is a little debatable, but usually, the positive (negative) will indicate lower (higher) hiring efficiency since managers' hiring decisions are more dependent on available funds instead of growth opportunities. The coefficients on the interaction term between customer concentration and Tobin's Q and the interaction term between customer concentration and cash flow from operations, θ_4 and θ_5, respectively, will capture the effects of customer concentration on managers' hiring decision efficiency. Specifically, the positive (negative) coefficient, θ_4 will indicate that customer concentration increases (decreases) managers' hiring decision efficiency. Again, the interpretation for the coefficients, θ_5 is not clear, but similar to the argument by McLean and Zhao (2014), we claim that the positive (negative) coefficients, θ_5 will indicate that customer concentration decreases (increases) hiring efficiency (Note 2).

3.2 Sample

We collect financial data from Compustat *North America* and data on customers and suppliers from *Compustat*'s segment customer files. Our final sample for main analysis consists of 55,119 firm-year observations from 1982 to 2014. We further winsorize all the continuous variables at the 1st and the 99th percentiles to mitigate the effect of outliers on our results.

4. Empirical Results

4.1 Descriptive Statistics

Table 1 reports descriptive statistics on all the variables used to estimate Equation (1). The mean (median) value of our dependent variable, ΔEMP is 0.042 (0.016), indicating that the average yearly employment growth for our sample firm is 4.2%. The mean (median) value of *CUSTOMER_CONC* is 0.246 (0.134). The mean value of *LEVERAGE* is 0.223, indicating that our sample firm has about 22 percent of total assets as leverage. The average value for ROA is negative which is comparable with the finding of Raman and Shahrur (2008) and Wang (2012) who report a negative number for the mean of ROA (-0.01 and -0.083 respectively). However, other studies (e.g., Dhaliwal et al., 2016) report a positive number for the mean of ROA (0.08). Our results suggest that our sample firm is not profitable, on average. The mean value of *SALESG*, current year sales growth

is 0.104, indicating that our sample firm's sales grow at about 10%.

Table 1. Sample descriptive statistics

Variables	N	Mean	Median	Standard deviation	Q1	Q3
$\Delta EMP_{i,t}$	55,119	0.042	0.016	0.259	-0.065	0.122
CUSTOMER_CONC	55,119	0.246	0.134	0.282	0.048	0.344
$Q_{i,t-1}$	55,119	1.806	1.412	1.179	1.076	2.097
$CF_{i,t}$	55,119	0.035	0.078	0.201	0.003	0.134
$RETURN_{i,t}$	55,119	0.123	0.000	0.747	-0.300	0.323
$SIZE\_RANK_{i,t}$	55,119	5.461	5.000	2.921	3.000	8.000
$LEVERAGE_{i,t-1}$	55,119	0.223	0.188	0.212	0.033	0.347
$QUICK_{i,t-1}$	55,119	1.882	1.303	1.722	0.824	2.274
$ROA_{i,t}$	55,119	-0.016	0.033	0.204	-0.047	0.082
$SALESG_{i,t}$	55,119	0.104	0.068	0.319	-0.049	0.205
$SALESG_{i,t-1}$	55,119	0.164	0.087	0.436	-0.032	0.246
$\Delta ROA_{i,t}$	55,119	-0.479	-0.191	2.560	-0.858	0.243
$\Delta ROA_{i,t-1}$	55,119	-0.480	-0.203	2.497	-0.830	0.235
$\Delta QUICK_{i,t}$	55,119	0.067	-0.014	0.544	-0.213	0.205
$\Delta QUICK_{i,t-1}$	55,119	0.096	-0.012	0.637	-0.215	0.220
$LOSSBIN_{i,t-1,1}$	55,119	0.006	0.000	0.077	0.000	0.000
$LOSSBIN_{i,t-1,2}$	55,119	0.009	0.000	0.095	0.000	0.000
$LOSSBIN_{i,t-1,3}$	55,119	0.010	0.000	0.100	0.000	0.000
$LOSSBIN_{i,t-1,4}$	55,119	0.010	0.000	0.101	0.000	0.000
$LOSSBIN_{i,t-1,5}$	55,119	0.009	0.000	0.096	0.000	0.000

Note. Table 1 presents descriptive statistics for our sample from the period 1982-2014. All variables used in our study are defined in Appendix 1.

Table 2. Correlation matrix

	$\Delta EMP_{i,t}$	*CUSTOMER_CONC*	$Q_{i,t-1}$	$CF_{i,t}$	$RETURN_{i,t}$	$SIZE\_RANK_{i,t}$	$LEVERAGE_{i,t-1}$	$QUICK_{i,t-1}$	$ROA_{i,t}$	$SALESG_{i,t}$	$SALESG_{i,t-1}$	$\Delta ROA_{i,t}$	$\Delta ROA_{i,t-1}$	$\Delta QUICK_{i,t}$	$\Delta QUICK_{i,t-1}$	$LOSSBIN_{i,t-1,1}$	$LOSSBIN_{i,t-1,2}$	$LOSSBIN_{i,t-1,3}$	$LOSSBIN_{i,t-1,4}$
CUSTOMER_CONC	**-0.034**																		
$Q_{i,t-1}$	**0.150**	**0.012**																	
$CF_{i,t}$	**0.219**	**-0.047**	**-0.121**																
$RETURN_{i,t}$	**0.127**	0.006	**-0.137**	**0.142**															
$SIZE\_RANK_{i,t}$	**0.110**	**0.055**	**0.188**	**0.259**	**-0.095**														
$LEVERAGE_{i,t-1}$	**-0.083**	**-0.043**	**-0.133**	**-0.061**	0.004	**-0.045**													
$QUICK_{i,t-1}$	**0.096**	**0.070**	**0.201**	**-0.058**	**-0.020**	**-0.014**	**-0.403**												
$ROA_{i,t}$	**0.205**	**-0.036**	**-0.127**	**0.982**	**0.138**	**0.271**	**-0.082**	**-0.031**											
$SALESG_{i,t}$	**0.466**	**-0.042**	**0.188**	**0.169**	**0.146**	**0.066**	**-0.030**	**0.060**	**0.148**										
$SALESG_{i,t-1}$	**0.125**	-0.003	**0.215**	**-0.039**	**-0.059**	**0.044**	**-0.025**	**0.070**	**-0.048**	**0.198**									
$\Delta ROA_{i,t}$	**0.032**	0.000	**0.041**	**0.025**	**0.034**	**0.040**	**-0.014**	0.005	**0.024**	**0.044**	-0.007								
$\Delta ROA_{i,t-1}$	**0.035**	-0.001	**0.064**	**0.019**	-0.007	**0.065**	**-0.029**	0.009	**0.020**	**0.027**	**0.036**	**0.026**							
$\Delta QUICK_{i,t}$	**-0.042**	**0.015**	**0.027**	**0.133**	**0.134**	**-0.030**	**0.044**	**-0.161**	**0.130**	**0.014**	0.002	**0.014**	-0.004						
$\Delta QUICK_{i,t-1}$	**0.071**	**0.019**	**0.086**	**0.023**	**-0.012**	0.006	**-0.042**	**0.203**	**0.026**	-0.002	**0.030**	**-0.019**	**0.009**	**-0.125**					
$LOSSBIN_{i,t-1,1}$	-0.004	-0.004	**-0.034**	0.010	0.008	0.008	**0.025**	**-0.012**	**0.011**	-0.002	**-0.016**	**-0.158**	**-0.020**	-0.003	-0.003				
$LOSSBIN_{i,t-1,2}$	-0.009	-0.007	**-0.042**	**0.014**	**0.017**	-0.002	**0.027**	**-0.017**	**0.015**	0.003	**-0.017**	**-0.096**	**-0.027**	0.007	**-0.014**	-0.007			
$LOSSBIN_{i,t-1,3}$	-0.006	-0.003	**-0.049**	**0.015**	**0.017**	-0.010	**0.019**	-0.007	**0.015**	0.003	**-0.019**	**-0.061**	**-0.026**	0.002	-0.005	-0.008	-0.010		
$LOSSBIN_{i,t-1,4}$	-0.008	0.003	**-0.044**	0.005	0.006	**-0.023**	**0.027**	-0.006	0.005	-0.001	**-0.019**	-0.008	**-0.033**	-0.001	0.000	-0.008	-0.010	-0.010	
$LOSSBIN_{i,t-1,5}$	**-0.012**	0.005	**-0.045**	0.005	**0.014**	**-0.022**	**0.020**	**-0.017**	0.004	-0.007	**-0.026**	-0.006	**-0.030**	0.006	-0.004	-0.008	-0.009	-0.010	-0.010

Correlation results are reported in Table 2. First, we find positive correlations between *Q* and *CF and* ΔEMP, respectively, indicating that firms with high growth opportunities and large internal funds are more likely to hire employees. We find that *CUSTOMER_CONC* is significantly and negatively correlated with ΔEMP, suggesting that firms with a concentrated customer base tend to have a lower employee growth rate and thus, hire less. ΔEMP is negatively correlated with $LEVERAGE_{i,t-1}$, $\Delta QUICK_{i,t}$ and $LOSSBIN_{i,t-1,5}$, suggesting that highly levered firms and firms with higher quick ratio growth at the current year and more accounting losses tend to hire less (Note 3). We also find that $\Delta EMP$is positively correlated with $RETURN_{i,t}$, $SIZE\_RANK_{i,t}$, $QUICK_{i,t-1}$, $ROA_{i,t}$, $SALESG_{i,t}$, $SALESG_{i,t-1}$, $\Delta ROA_{i,t}$, and $\Delta ROA_{i,t-1}$, suggesting that firms with higher stock return, market value, liquidity, profitability, sales and profitability growth tend to hire more, respectively, also consistent with the literature.

4.2 Main Results

Our main results from estimating Equation (1) are reported in Table 3. We report a positive coefficient for both *Q* and *CF*, confirming our prediction that firms with higher growth opportunities and larger internal funds are more likely to increase hiring. These results are also consistent with McLean and Zhao (2014). More importantly, we find that the coefficient on *CUSTOMER_CONC*Q* is significantly negative at the 1% level, suggesting that customer concentration mitigates the positive association between growth opportunities and employment growth. Considering that more positive relations between growth opportunities and employment growth indicates more efficient hiring decisions, this finding suggests that customer concentration leads to lower hiring efficiency, consistent with our hypothesis. We also find that the coefficient on *CUSTOMER_CONC*CF* is insignificant, suggesting that customer risk does not influence the relation between internal funds and employment growth.

Turning to control variables, *LEVERAGE*, *ROA*, $\Delta QUICK_{i,t}$, $LOSSBIN_{i,t-1,2}$, and $LOSSBIN_{i,t-1,3}$ are significantly negative, indicating that leverage, current period profitability, a change in liquidity ratio at current period and accounting losses at last year tend to hire less (Note 4). We also find positive coefficients for the following control variables: RETURN, *SIZE_RANK*, *QUICK*, $SALESG_t$, $SALESG_{t-1}$, $\Delta ROA_{i,t-1}$ and $\Delta QUICK_{i,t-1}$, consistent with our correlation results in Table 2.

Table 3. Customer risk and hiring efficiency

Variables	$\Delta EMP_{i,t}$
	Model 1
$Q_{i,t-1}$	0.020***
	(14.960)
$CF_{i,t}$	0.347***
	(9.900)
$CUSTOMER\_CONC_{i,t}$	0.026***
	(3.774)
$CUSTOMER\_CONC_{i,t} * Q_{i,t-1}$	**-0.023*** **
	(-6.765)
$CUSTOMER\_CONC_{i,t} * CF_{i,t}$	**0.005**
	(0.208)
$RETURN_{i,t}$	0.027***
	(15.883)
$SIZE\_RANK_{i,t}$	0.004**
	(8.798)
$LEVERAGE_{i,t-1}$	-0.036***
	(-6.331)
$QUICK_{i,t-1}$	0.007***
	(8.917)
$ROA_{i,t}$	-0.196***
	(-5.176)
$SALESG_{i,t}$	0.322***
	(51.469)
$SALESG_{i,t-1}$	0.019***
	(5.642)
$\Delta ROA_{i,t}$	0.000
	(0.770)

$\Delta ROA_{i,t-1}$	0.001***
	(2.890)
$\Delta QUICK_{i,t}$	-0.028***
	(11.638)
$\Delta QUICK_{i,t-1}$	0.019***
	(9.629)
$LOSSBIN_{i,t-1,1}$	-0.004
	(-0.355)
$LOSSBIN_{i,t-1,2}$	-0.019**
	(-2.333)
$LOSSBIN_{i,t-1,3}$	-0.013*
	(-1,772)
$LOSSBIN_{i,t-1,4}$	-0.008
	(-0,947)
$LOSSBIN_{i,t-1,5}$	-0.011
	(-1.289)
Intercept	-0,121***
	(-5.886)
Γ	Included
φ	Included
Adjus. R^2	0.270
N	55119

Note. This table presents regression results from estimating equation 1. *, **, *** denote statistical significance at the 10%, 5% and 1% levels, respectively. Standard errors are clustered at the firm level.

4.2.1 Addressing Endogeneity Issues: An Exogenous Shock

While we provide strong evidence that customer concentration reduces managers' hiring efficiency, our results suffer from endogeneity concern. The documented relation can be driven by some unobservable firm and industry characteristics. To mitigate this concern, we use major exogenous shocks leading to customer concentration changes, in line with Campello and Gao (2017) and Ma et al. (2020). We consider federal laws that affected the competitive environment and led to tremendous increase in M&A activities in some industries, which also changed customer concentration in these industries. Campello and Gao (2017) find that after Federal Government Acts that affected the competitive environment of the downstream industry, customer concentration has significantly increased.

These laws include (Asker & Ljungqvist, 2010, p. 626): "Cable Television Deregulation Act (affected industry' four-digit sic code: 4841) and Shipping Act (affected industries' four-digit sic codes: 4412 and 4491) in 1984; Trading of Airport Landing Rights (affected industries' four-digit sic codes: 4581, 4512, 4522) in 1986; Natural Gas Wellhead Decontrol Act (affected industries' four-digit sic codes: 4925, 1311, 4922) in 1989; Cable Television Consumer Protection and Competition Act (affected industry's four-digit sic code: 4841), Energy Policy Act (affected industry's four-digit sic code: 4911), FERC Order 636 (affected industries' four-digit sic codes: 4925, 1311, 4922), Trucking Industry and Regulatory Reform Act and Negotiated Rates Act (affected industries' four-digit sic codes: 4213, 4214, 4212) in 1992; Telecommunications Act affected industry's four-digit sic code: 4841) and FERC Order 888 affected industry's four-digit sic code: 4911) in 1996."

We use the Bureau of Economic Analysis' input-output matrix to determine the suppliers of the industries that are affected by these acts. Firms in these industries are considered treated firms. Control firms are those in the same four-digit code of the treated firms but are not suppliers of the affected industries. We keep only the control firms that belong to the same three-digit code of the treated firms. This allows us to obtain a sample of treated and control firms' samples with similar size. For this analysis, we focus on three years before and after the implementation of each federal law. We employ the following difference-in-difference analysis by estimating Equation (2):

$$\Delta EMP_{i,t} = \beta_0 + \beta_1 Q_{i,t-1} + \beta_2 CF_{i,t} + \beta_3 TREAT_i + \beta_4 POST_t + \beta_5 TREAT_i * POST_t + \beta_6 TREAT_i * POST_t * Q_{i,t-1} + \beta_7 TREAT_i * POST_t * CF_{i,t} + \mu_{i,t} \quad (2)$$

where *TREAT* is a dummy variable equal to one for the suppliers of the affected industries by the federal laws and zero otherwise, *POST* is a dummy variable equal to one during the three years period that follow the

implementation of the federal law's year. To be consistent with our main results in Table 3, we expect that the coefficient on the three-way interaction term, *TREAT*POST*Q* is significantly negative.

Table 4. Difference-in-difference approach to address endogeneity issues

Variables	$\Delta EMP_{i,t}$
	Model 1
$Q_{i,t-1}$	0.011
	(1.199)
$CF_{i,t}$	-0.015
	(-0.173)
$TREAT_t$	-0.039**
	(-2.256)
$POST_t$	-0.034**
	(-2.010)
$TREAT_t$* $POST_t$*$Q_{i,t-1}$	**-0.035*****
	(-3.335)
$POST_t$* $POST_t$*$CF_{i,t}$	**0.116**
	(1.272)
$RETURN_{i,t}$	0.023**
	(2.286)
$SIZE\_RANK_{i,t}$	0.004**
	(2.165)
$LEVERAGE_{i,t-1}$	-0.056**
	(-2.020)
$QUICK_{i,t-1}$	0.003
	(0.874)
$ROA_{i,t}$	0.282***
	(3.152)
$SALESG_{i,t}$	0.209***
	(8.060)
$SALESG_{i,t-1}$	0.004
	(0.287)
$\Delta ROA_{i,t}$	-0.000
	(-0.034)
$\Delta ROA_{i,t-1}$	0.003*
	(1.648)
$\Delta QUICK_{i,t}$	-0.013*
	(-1.729)
$\Delta QUICK_{i,t-1}$	0.012*
	(1.742)
$LOSSBIN_{i,t-1,1}$	-0.089**
	(-2.036)
$LOSSBIN_{i,t-1,2}$	-0.013
	(-0.351)
$LOSSBIN_{i,t-1,3}$	-0.048
	(-1.607)
$LOSSBIN_{i,t-1,4}$	-0.017
	(-0.296)
$LOSSBIN_{i,t-1,5}$	0.014
	(0.386)
Intercept	-0.078**
	(-2.226)
Γ	Included
φ	Included
Adjus. R^2	0,244
N	2,477

Note. This table presents regression results from estimating equation 2 to address endogeneity issues. *. **, *** denote statistical significance at the 10%, 5% and 1% levels, respectively. Standard errors are clustered at the firm- level.

Results of estimating Equation (2) are presented in Table 4. Consistent with our expectation, we find that the coefficient on $TREAT_i$* $POST_t$*$Q_{i,t-1}$ is significantly negative at the 1% level, suggesting that after Federal Government Acts which has increased customer concentration, hiring efficiency has decreased for firms that affect the affected industries, compared to firms that supply the non-affected industries. Although we cannot completely rule out the endogeneity concerns, these results support our prediction that customer concentration reduces hiring efficiency, corroborating our main results based on Equation (1). Consistent with our main results, we also find an insignificant coefficient for $TREAT_t$* $POST_t$*$CF_{i,t}$, suggesting that customer concentration does not affect the relation between cash flow from operations and employment growth.

4.3 Potential Channels Tests

We conduct several cross-sectional tests focusing on trade credit, financial distress, research and development intensity and customer financial condition channels to further examine what drives the impact of customer risk on hiring efficiency.

4.3.1 The Effect of Trade Credit

In our hypothesis development, we claim that suppliers dealing with major customers with a strong bargaining power may under-hire in order to attract and retain major customers. To test this channel, we use trade credit calculated as accounts receivable divided by total assets (*AR_AT*) as a proxy for the customers' bargaining power. The intuition behind this is that suppliers usually provide a greater amount of trade credit to major customers with stronger bargaining power (e.g., Murfin & Njoroge, 2014). Therefore, we expect that our results are more pronounced in firms offering more trade credit to their customers.

To test this prediction, we split our sample into two sub-samples based on the median value of the ratio of accounts receivable over total assets and re-run our main models to two sub-samples. Results for this analysis are presented in Table 5. The coefficients on *CUSTOMER_CONC*Q* are significantly negative in both sub-groups, consistent with our main results. However, we find that the magnitude of the coefficient in the sub-group of firms with higher trade credits (i.e., *HIGH AR_AT* group) is significantly greater than that in the sub-groups of firms with lower trade credits (i.e., *LOW AR_AT* group) at the 1% level (t-value for the difference = 3.86). These results suggest that trade credits intensify the impact of customer risk on hiring efficiency.

Table 5. Potential channel: The effect of trade credit

Variables	*HIGH AR_AT*	*LOW AR_AT*
	Model 1	Model 2
$Q_{i,t-1}$	0.017***	0.022***
	(8.555)	(11.816)
$CF_{i,t}$	0.418***	0.365***
	(7.101)	(7.425)
$CUSTOMER\_CONC_{i,t}$	0.031***	0.019**
	(3.254)	(2.006)
$CUSTOMER\_CONC_{i,t}$*$Q_{i,t-1}$(a)	**-0.026*** **	**-0.019*** **
	(-5.404)	**(-4.056)**
$CUSTOMER\_CONC_{i,t}$*$CF_{i,t}$(b)	**-0.018**	**0.042**
	(-0.506)	**(1.454)**
$RETURN_{i,t}$	0.022***	0.031***
	(9.392)	(12.062)
$SIZE\_RANK_{i,t}$	0.002***	0.005***
	(3.749)	(8.787)
$LEVERAGE_{i,t-1}$	-0.034***	-0.030***
	(-4.262)	(-3.570)
$QUICK_{i,t-1}$	0.007***	0.007***
	(5.362)	(7.745)
$ROA_{i,t}$	-0.207***	-0.230***
	(-3.490)	(-4.702)
$SALESG_{i,t}$	0.377***	0.279***
	(36.821)	(35.813)
$SALESG_{i,t-1}$	0.023***	0.015***
	(4.108)	(3.616)

$\Delta ROA_{i,t}$	0.001***		-0.001
	(2.682)		(-1.596)
$\Delta ROA_{i,t-1}$	0.001*		0.001**
	(1.920)		(2.074)
$\Delta QUICK_{i,t}$	-0.043***		-0.019***
	(-11.173)		(-6.188)
$\Delta QUICK_{i,t-1}$	0.020***		0.018***
	(5.735)		(7.548)
$LOSSBIN_{i,t-1,1}$	-0.013		-0.000
	(-0.672)		(-0.030)
$LOSSBIN_{i,t-1,2}$	-0.027***		-0.008
	(-2.787)		(-0.602)
$LOSSBIN_{i,t-1,3}$	-0.011		-0.013
	(-1.068)		(-1.323)
$LOSSBIN_{i,t-1,4}$	-0.004		-0.011
	(-0.337)		(-0.917)
$LOSSBIN_{i,t-1,5}$	-0.004		-0.016
	(-0.317)		(-1.431)
Intercept	-0.093**		-0.154***
	(-2.547)		(-4.294)
Γ	Included		Included
φ	Included		Included
Adjus. R^2	0.311		0.242
Difference test for coefficients (a)		**3.86****	
Difference test for coefficients (b)		**4.19****	
N	27,857		27,262

Note. This table presents our results after accounting for the impact of customer bargaining power. We divide the full sample into two subsamples based on the median value of the ratio of accounts receivable over total assets. ***, ** and * denote 1%, 5% and 10% significant level, respectively. Standard errors are clustered at the firm- level.

4.3.2 The Impact of Financial Distress

We also consider the impact of the supplier's financial condition on the negative association between customer concentration and hiring efficiency. A lower number of employees, which is associated with lower salaries and wages expense enhance financial flexibility due to lower labor leverage. Labor leverage is important particularly during financial distress. Suppliers with fewer workers may respond faster to changes in inputs and outputs, ensuring supply-chain stability from the customer's point of view. Additionally, supply chain stability is very important to major customers which encourages suppliers to keep a low financial leverage (Banerjee et al., 2008) to retain them. Consequently, financially distressed suppliers may opt for under-hiring to avoid increasing leverage and maintain customer relationships.

To test this channel, we first measure financial distress using Altman (1968)'s Z-score (*Z_SCORE*). We calculate Z scores for the firm-years using the variables and the coefficients given in Altman (1968). By definition, a high value of *Z_SCORE* indicates a lower financial distress risk. We split our sample into two sub-samples based on the sample median of *Z_SCORE*– *HIGH_Z_SCORE* and *LOW_Z_SCORE*. The results of the sub-sample analysis based on *Z_SCORE* are reported in Table 6. We find that the coefficients on *CUSTOMER_CONC*Q* are significantly negative in both sub-samples, but its magnitude is significantly greater in the sub-sample of firms with lower Altman Z-score (higher financial distress) than that in the sub-sample of firms with higher Altman Z-score at the 1% level. These results suggest that the association between customer risk and hiring is more concentrated in firms facing a high financial distress risk.

Table 6. Potential channel: The effect of financial distress

Variables	*HIGH_Z_SCORE*	*LOW_Z_SCORE*
	Model 1	Model 2
$Q_{i,t-1}$	0.021***	0.021***
	(9.218)	(11.537)
$CF_{i,t}$	0.476***	0.327***
	(8.573)	(6.715)
$CUSTOMER\_CONC_{i,t}$	0.018*	0.022**
	(1.732)	(2.479)
$CUSTOMER\_CONC_{i,t}*Q_{i,t-1}$(a)	**-0.019*** **	**-0.024*** **
	(-2.799)	**(-5.863)**
$CUSTOMER\_CONC_{i,t}*CF_{i,t}$(b)	**0.068**	**-0.001**
	(1.091)	**(-0.034)**
$RETURN_{i,t}$	0.016***	0.032***
	(5.592)	(14.844)
$SIZE\_RANK_{i,t}$	-0.000	0.003***
	(-0.038)	(4.632)
$LEVERAGE_{i,t-1}$	-0.039***	-0.036***
	(-4.463)	(-4.870)
$QUICK_{i,t-1}$	0.008***	0.006***
	(5.897)	(6.581)
$ROA_{i,t}$	-0.387***	-0.162***
	(-6.741)	(-3.367)
$SALESG_{i,t}$	0.405***	0.277***
	(37.391)	(37.245)
$SALESG_{i,t-1}$	0.043***	0.008*
	(7.622)	(1.955)
$\Delta ROA_{i,t}$	0.001	-0.000
	(0.930)	(-0.046)
$\Delta ROA_{i,t-1}$	0.002***	0.000
	(3.604)	(0.757)
$\Delta QUICK_{i,t}$	-0.052***	-0.015***
	(-15.219)	(-4.711)
$\Delta QUICK_{i,t-1}$	0.012***	0.021***
	(4.229)	(8.415)
$LOSSBIN_{i,t-1,1}$	-0.009	0.001
	(-0.662)	(0.066)
$LOSSBIN_{i,t-1,2}$	-0.028***	-0.007
	(-2.587)	(-0.562)
$LOSSBIN_{i,t-1,3}$	-0.027**	0.002
	(-2.514)	(0.257)
$LOSSBIN_{i,t-1,4}$	-0.027**	0.007
	(-2.512)	(0.559)
$LOSSBIN_{i,t-1,5}$	-0.014	-0.007
	(-1.080)	(-0.602)
Intercept	-0.117***	-0.099***
	(-4.133)	(-3.343)
Γ	Included	Included
φ	Included	Included
Adjus. R^2	0.322	
Difference test for coefficients (a)	**21.48*** **	
Difference test for coefficients (b)	**3.69***	
N	28,042	27,077

Note. This table presents the impact of supplier financial condition on the relationship between customer concentration and hiring efficiency. We divide the full sample into two subsamples according to the sample median of Altman (1968)'s Z-score. ****, ** and * denote statistical significance at the 10%, 5% and 1% levels, respectively. Standard errors are clustered at the firm- level.

4.3.3 The Impact of Research and Development Intensity

As discussed in the hypothesis development section, technology transfer from major customers can reduce the need for employees. Firms dealing with major customers using advanced technology and transferring technology to supplier firms are expected to invest more in research and development expenditure, which may reduce the need for labor force. If this argument can explain our main results, we will find that the coefficient for *CUSTOMER_CONC*Q* is more pronounced for supplier firms with higher R&D intensity. R&D intensity is calculated as research and development expenses over total sales. Then, we re-run Equation (1) separately to two sub-samples based on the sample median value of R&D expenditure: firms with higher R&D intensity and firms with lower R&D intensity. Consistent with our prediction, the results reported in Table 7 show that the magnitude of the negative coefficient of *CUSTOMER_CONC*Q* is significantly higher in the sub-sample of research and development-intensive companies.

Table 7. Potential channels: The effect of research and development intensity

Variables	*HIGH_R&D_INTENSITY*	*LOW_R&D_INTENSITY*
	Model 1	Model 2
$Q_{i,t-1}$	0.022***	0.021***
	(13.069)	(8.099)
$CF_{i,t}$	0.470***	0.338***
	(8.289)	(6.563)
$CUSTOMER\_CONC_{i,t}$	0.016*	0.032***
	(1.870)	(2.728)
$CUSTOMER\_CONC_{i,t}*Q_{i,t-1}$(a)	**-0.022*** **	**-0.021*** **
	(-5.846)	**(-3.015)**
$CUSTOMER\_CONC_{i,t}*CF_{i,t}$(b)	**0.016**	**-0.039**
	(0.630)	**(-0.885)**
$RETURN_{i,t}$	0.032***	0.023***
	(14.648)	(8.440)
$SIZE\_RANK_{i,t}$	0.004***	0.003***
	(8.245)	(4.980)
$LEVERAGE_{i,t-1}$	-0.048***	-0.034***
	(-5.781)	(-4.221)
$QUICK_{i,t-1}$	0.008***	0.005***
	(8.975)	(3.696)
$ROA_{i,t}$	-0.305***	-0.141***
	(-5.404)	(-2.704)
$SALESG_{i,t}$	0.297***	0.348***
	(36.295)	(36.259)
$SALESG_{i,t-1}$	0.019***	0.015***
	(4.419)	(2.989)
$\Delta ROA_{i,t}$	0.000	0.001
	(0.113)	(0.913)
$\Delta ROA_{i,t-1}$	0.001**	0.001*
	(2.300)	(1.727)
$\Delta QUICK_{i,t}$	-0.032***	-0.026***
	(-10.522)	(-6.749)
$\Delta QUICK_{i,t-1}$	0.024***	0.012***
	(9.310)	(4.191)
$LOSSBIN_{i,t-1,1}$	0.002	-0.010
	(0.142)	(-0.640)
$LOSSBIN_{i,t-1,2}$	-0.013	-0.026**
	(-1.083)	(-2.285)
$LOSSBIN_{i,t-1,3}$	-0.011	-0.015*
	(-0.957)	(-1.662)
$LOSSBIN_{i,t-1,4}$	0.003	-0.016
	(0.236)	(-1.328)

$LOSSBIN_{i,t-1,5}$	-0.014		-0.007
	(-1.375)		(-0.535)
Constant	-0.129***		-0.128***
	(-3.651)		(-4.869)
Γ	Included		Included
φ	Included		Included
Adjus. R^2	0.301		0.250
Difference test for coefficients (a)		**337.43*** **	
Difference test for coefficients (b)		**2.36***	
N	27,560		27,559

Note. This table presents the impact of the research and development intensity on the relationship between customer concentration and hiring efficiency. We divide the full sample into two subsamples according to the sample median of R&D expenditure. ***, ** and * denote statistical significance at the 10%, 5% and 1% levels, respectively. Standard errors are clustered at the firm- level.

4.3.4 The Impact of Major Customer's Financial Conditions

We also consider the impact of a larger customer's financial condition on the association between customer concentration and hiring efficiency. Customers with higher debt may reduce their purchases or delay payments, increasing the supplier's cash flow risk. Therefore, we expect that the adverse effect of customer concentration on hiring efficiency is more pronounced when major customers have higher debt level. We use the degree of reliance of large customers on trade credit as a proxy for their financial soundness. Customers with more accounts payable may be unable to pay on time or ask for payment delay, hence creating liquidity problems for the suppliers (e.g., Murfin & Njoroge, 2014). Given that, we expect that accounts payable of the customer strengthens the effect of customer risk on hiring efficiency. To test this channel, we split our sample into two sub-samples based on the sample median of customer's accounts payable calculated as the sum of the percentage of sales to given customer over the total sales of the supplier multiplied by the ratio of accounts payable over total sales of the customer. The results of the sub-sample analysis based on customer's accounts payable (*CUSTOMER_PAYABLE*) are reported in Table 8. We find that the coefficient on *CUSTOMER_CONC*Q* is negative and significantly higher in the sub-sample of firms with higher *CUSTOMER_PAYABLE* than firms with lower *CUSTOMER_PAYABLE*. According to this finding, lower hiring efficiency is more likely to be observed in firms where major customers have a large number of unpaid purchases.

Table 8. Potential channel: The impact of the major customer's financial conditions

Variables	*HIGH_CUSTOMER_PAYABLE*	*LOW_CUSTOMER_PAYABLE*
	Model 1	Model 2
$Q_{i,t-1}$	0.021***	0.030***
	(3.532)	(5.434)
$CF_{i,t}$	0.664***	-0.111
	(4.859)	(-0.825)
$CUSTOMER\_CONC_{i,t}$	0.053	0.010
	(1.494)	(0.315)
$CUSTOMER\_CONC_{i,t}*Q_{i,t-1}$ (a)	**-0.031***	**-0.030***
	(-1.766)	**(-1.741)**
$CUSTOMER\_CONC_{i,t}*CF_{i,t}$ (b)	**-0.044**	**-0.018**
	(-0.460)	**(-0.246)**
$RETURN_{i,t}$	0.024***	0.038***
	(3.456)	(5.473)
$SIZE\_RANK_{i,t}$	0.003	0.001
	(1.525)	(0.613)
$LEVERAGE_{i,t-1}$	-0.013	-0.040*
	(-0.548)	(-1.717)
$QUICK_{i,t-1}$	0.017***	0.007**
	(5.194)	(2.434)
$ROA_{i,t}$	-0.381***	0.248*
	(-2.788)	(1.866)
$SALESG_{i,t}$	0.335***	0.363***
	(22.282)	(23.696)

$SALESG_{i,t-1}$	0.060***		0.019*
	(5.233)		(1.651)
$\Delta ROA_{i,t}$	0.001		0.001
	(0.471)		(0.573)
$\Delta ROA_{i,t-1}$	0.002		-0.000
	(1.124)		(-0.031)
$\Delta QUICK_{i,t}$	-0.039***		-0.043***
	(-4.694)		(-4.698)
$\Delta QUICK_{i,t-1}$	0.023***		0.025***
	(2.975)		(3.142)
$LOSSBIN_{i,t-1,1}$	0.027		-0.030
	(0.503)		(-0.523)
$LOSSBIN_{i,t-1,2}$	0.046		-0.041
	(1.114)		(-0.771)
$LOSSBIN_{i,t-1,3}$	-0.009		-0.022
	(-0.231)		(-0.454)
$LOSSBIN_{i,t-1,4}$	0.008		-0.032
	(0.208)		(-0.683)
$LOSSBIN_{i,t-1,5}$	0.013		-0.042
	(0.252)		(-0.954)
Constant	-0.104		0.026
	(-0.463)		(0.298)
Γ	Included		Included
φ	Included		Included
Adusj. R^2	0.327		0.320
Difference test for coefficients (a)		**3.47****	
Difference test for coefficients (b)		**0.90**	
N	2,818		2,810

Note. This table presents the impact of major customer financial conditions on the relationship between customer concentration and hiring efficiency. We divide the full sample into two subsamples according to the sample median of customer's accounts payable. ***, ** and * denote statistical significance at the 10%, 5% and 1% levels, respectively. Standard errors are clustered at the firm- level.

5. Conclusion

By extending the literature on customer-supplier relationship (e.g., Dhaliwal et al., 2016; Cen et al., 2017; Campello & Gao, 2017; Lian, 2017), we examine how customer concentration impacts employment growth. We find that higher customer concentration risk is associated with lower hiring efficiency. We also explore channels through which customer concentration affects the suppliers 'hiring decision.

First, we examine whether major customers' bargaining power exacerbates the negative effect of customer concentration on supplier firms' hiring efficiency. Specifically, we test whether firms offering more trade credits to their customers are more affected by the adverse effect of customer concentration. We argue that trade credit is usually offered more to major customers with stronger bargaining power (Ma et al., 2020), possibly forcing supplier firms to maintain fewer employees. Using the median ratio of accounts receivable over total assets, we split our sample into two groups of firms with high and low trade credits and find a stronger negative relationship between customer concentration and hiring efficiency in firms offering more trade credit to their customers.

We further investigate the effect of the supplier's financial risk on the relation between customer risk and hiring efficiency. Firms experiencing financial difficulties are more likely to hire less to foster the supply-chain stability from major customers' point of view. Dividing the sample based on the median level of financial distress, we find that the adverse effect of customer concentration on hiring efficiency is more pronounced in firms with a high financial distress risk.

We also expand our analysis by examining whether technological transfer from major customers to suppliers may explain the negative effect of a concentrated customer base on hiring efficiency. If this is the case, firms that benefit more from this technological transfer are more likely to replace labor by technology (i.e., hire less). Since technological transfer often leads to increased R&D expenditure, we use R&D activities as a proxy for technological transfer from major customers. We show that the negative effect is stronger in firms with higher R&D intensity, suggesting that these firms tend to have less efficient hiring decisions.

Our study makes at least two contributions to literature. First, this study contributes to the recent literature examining the impact of customer concentration risk on various corporate decisions, such as the cost of equity (Dhaliwal et al., 2016), tax avoidance (Cen, Maydew, Zhang, & Zuo, 2017), capital structure (Oliveira, Kadapakkam, & Beyhaghi, 2018), and accounting conservatism (Hui et al., 2012), by investigating how the risks stemming from customer-supplier relationships influence employee hiring decisions, an important factor for the success and the competitiveness of the firm. To the best of our knowledge, this is the first study to explore the effect of customer-supplier relationships on corporate labor policies. Second, we extend the literature on corporate employment (e.g., Jung et al., 2014; Ben-Nasr & Alshwer, 2016; Habib & Hasan, 2019; Ding, Ni, & Xu, 2020; Zhang, Ntim, Zhang, & Elmagrhi, 2020) by focusing on how constraints arising from nonfinancial stakeholders affect managers' hiring decisions.

Our paper sheds light on an additional cost induced by this business risk (e.g., Campello & Gao, 2017), reflected in employee hiring decision efficiency. This insight underscores the significant role that non-financial stakeholders play in shaping managerial decisions, emphasizing the need to consider the implications of customer concentration when making hiring decisions.

References

Ak, B. K., & Patatoukas, P. N. (2016). Customer-base concentration and inventory efficiencies: Evidence from the manufacturing sector. *Production and Operations Management, 25*(2), 258-272. https://doi.org/10.1111/poms.12417

Altman, E. I. (1968). Financial ratios, discriminant analysis, and the prediction of corporate bankruptcy. *The Journal of Finance, 23*(4), 589-609. https://doi.org/10.2307/2978933

Asker, J., & Ljungqvist, A. (2010). Competition and the structure of vertical relationships in capital markets. *Journal of Political Economy, 118*, 599-647. https://doi.org/10.1086/653452

Banerjee, S., Dasgupta, S., & Kim, Y. (2008). Buyer–supplier relationships and the stakeholder theory of capital structure. *Journal of Finance, 63*(5), 2507-2552. https://doi.org/10.1111/j.1540-6261.2008.01403.x

Benmelech, E., Bergman, N., & Seru, A. (2021). Financing labor. *Review of Finance, 25*(5), 1365-1393. https://doi.org/10.1093/rof/rfab013

Benmelech, E., Frydman, C., & Papanikolaou, D. (2019). Financial frictions and employment during the Great Depression. *Journal of Financial Economics, 133*(3), 541-563. https://doi.org/10.1016/j.jfineco.2019.02.005

Ben-Nasr, H., & Alshwer, A. (2016). Does stock price informativeness affect labor investment efficiency? *Journal of Corporate Finance, 38*, 249-271. https://doi.org/10.1016/j.jcorpfin.2016.01.012

Cen, L., Maydew, E., Zhang, L., & Zuo, L. (2017). Customer-supplier relationships and tax avoidance. *Journal of Financial Economics, 123*(2), 377-394. https://doi.org/10.1016/j.jfineco.2016.09.009

Chen, G., Judd, J. S., & Pandit, S. (2021). Firm unionization and disruptions in customer relationships. *Contemporary Accounting Research, 38*(4), 2951-2981. https://doi.org/10.1111/1911-3846.12698

Chodorow-Reich, G. (2014). The employment effects of credit market disruptions: Firm-level evidence from the 2008-9 financial crisis. *The Quarterly Journal of Economics, 129*(1), 1-59. https://doi.org/10.1093/qje/qjt031

Chu, Y., Tian, X., & Wang, W. (2019). Corporate innovation along the supply chain. *Management Science, 65*, 2445-2945. https://doi.org/10.1287/mnsc.2017.2924

Dhaliwal, D., Judd, J. S., Serfling, M., & Shaikh, S. (2016). Customer concentration risk and the cost of equity capital. *Journal of Accounting and Economics, 61*(1), 23-48. https://doi.org/10.1016/j.jacceco.2015.03.005

Ding, H., Ni, X., & Xu, H. (2020). Short selling and labor investment efficiency: Evidence from the Chinese stock market. *Accounting and Finance, 61*(1), 2451-2476. https://doi.org/10.1111/acfi.12671

Falato, A., & Liang, N. (2016). Do creditor rights increase employment risk? Evidence from loan covenants. *The Journal of Finance, 71*(6), 2545-2590. https://doi.org/10.1111/jofi.12435

Favilukis, J., Lin, X., & Zhao, X. (2020). The elephant in the room: The impact of labor obligations on credit markets. *American Economic Review, 110*, 1673-1712. https://doi.org/10.1257/aer.20170156

Habib, A., & Hasan, M. (2021). Business strategy and labor investment efficiency. *International Review of Finance, 21*(1), 58-96. https://doi.org/10.1111/irfi.12254

Hertzel, M. G., & Officer, M. S. (2012). Industry contagion in loan spreads. *Journal of Financial Economics, 103*(3), 493-506. https://doi.org/10.1016/j.jfineco.2011.10.012

Hertzel, M. G., Li, Z., Officer, M. S., & Rodgers, K. J. (2008). Inter-firm linkages and the wealth effects of financial distress along the supply chain. *Journal of Financial Economics, 87*(2), 374-387. https://doi.org/10.1016/j.jfineco.2007.01.005

Holzhacker, M., Krishnan, R., & Mahlendorf, M. D. (2015). The impact of changes in regulation on cost behavior. *Contemporary Accounting Research, 32*(2), 534-566. https://doi.org/10.1111/1911-3846.12082

Hui, K., Klasa, S., &Yeung, P. E. (2012). Corporate suppliers and customers and accounting conservatism. *Journal of Accounting and Economics, 53*(2), 115-135. https://doi.org/10.1016/j.jacceco.2011.11.007

Itzkowitz, J. (2013). Customers and cash: How relationships affect suppliers' cash holdings. *Journal of Corporate Finance, 19*, 159-180. https://doi.org/10.1016/j.jcorpfin.2012.10.005

Jung, B., Lee, W. J., & Weber, D. P. (2014). Financial reporting quality and labor investment efficiency. *Contemporary Accounting Research, 31*(4), 1047-1074. https://doi.org/10.1111/1911-3846.12053

Jung, B., Lee, W. J., Weber, D. P., & Yang, D. (2021). Financial reporting quality and employment: The case of refinancing risk. *Working Paper, disponible sur SSRN 3474827*.

Kalwani, M. U., & Narayandas, N. (1995). Long-term manufacturer-supplier relationships: Do they pay off for supplier firms? *Journal of Marketing, 59*(1), 1-16. https://doi.org/10.1177/002224299505900101

Lian, Y. (2017). Financial distress and customer-supplier relationships. *Journal of Corporate Finance, 43*, 397-406. https://doi.org/10.1016/j.jcorpfin.2017.02.006

Ma, X., Wang, W., Wu, J., & Zhang, W. (2020). Corporate customer concentration and stock price crash risk. *Journal of Banking and Finance, 119*, 105903. https://doi.org/10.1016/j.jbankfin.2020.105903

McLean, R. D., & Zhao, M. (2014). The business cycle, investor sentiment, and costly external finance. *The Journal of Finance, 69*, 1377-1409. https://doi.org/10.1111/jofi.12047

Murfin, J., & Njoroge, K. (2014). The implicit costs of trade credit borrowing by large firms. *Review of Financial Studies, 28*(1), 112-145. https://doi.org/10.1093/rfs/hhu051

Oliveira, M., Kadapakkam, P. R., & Beyhaghi, M. (2018). Effects of customer financial distress on supplier capital structure. *Journal of Corporate Finance, 42*, 131-149. https://doi.org/10.1016/j.jcorpfin.2016.11.009

Patatoukas, P. N. (2012). Customer-base concentration: Implications for firm performance and capital markets. *The Accounting Review, 87*(2), 363-392. https://doi.org/10.2308/accr-10198

Pinnuck, M., & Lillis, A. (2007). Profits versus losses: Does reporting an accounting loss act as a heuristic trigger to exercise the abandonment option and divest employees? *The Accounting Review, 82*(4), 1031-1053. https://doi.org/10.2308/accr.2007.82.4.1031

Raman, K., & Shahrur, H. (2008). Relationship-specific investments and earnings management: Evidence on corporate suppliers and customers. *The Accounting Review, 83*(4). https://doi.org/10.2308/accr.2008.83.4.1041

Schumacher, U. (1991). Buyer structure and seller performance in U.S. manufacturing industries. *Review of Economics and Statistics, 73*(2), 277-284. 10411081. https://doi.org/10.2308/accr.2008.83.4.1041

Snyder, C. M. (1996). A dynamic theory of countervailing power. *RAND Journal of Economics, 27*(4), 747-769. https://doi.org/10.2307/2555880

Tobin, J. (1969). A general equilibrium approach to monetary theory. *Journal of Money, Credit and Banking, 1*(1), 15-29. https://doi.org/10.2307/1991374

Wang, J. (2012). Do firms' relationships with principal customers/suppliers affect shareholders' income? *Journal of Corporate Finance, 18*(4), 860-878. https://doi.org/10.1016/j.jcorpfin.2012.06.007

Zhang, M. (2019). Labor-technology substitution: Implications for asset pricing. *The Journal of Finance, 74*(4), 1793-1839. https://doi.org/10.1111/jofi.12766

Zhang, Z., Ntim, C. G., Zhang, Q., & Elmagrhi, M. H. (2020). Does accounting comparability affect corporate employment decision-making? *British Accounting Review, 52*(6), 100937. https://doi.org/10.1016/j.bar.2020.100937

Notes

Note1. The article is available at:
https://equitablegrowth.org/the-links-between-stagnating-wages-and-buyer-power-in-u-s-supply-chains/

Note 2. We include control variables in Equation (1), following Pinnuck and Lillis (2007) for comparison with prior studies. As a sensitivity analysis, we also add variables such as labor union presence, labor intensity, institutional ownership, abnormal accruals, capital expenditures, and R&D expenses. The results remain consistent and are available upon request.

Note 3. The negative relation between ΔEMP and $\Delta QUICK_{i,t}$ may be counter-intuitive, but, the relation is also affected by the fact that if firms increase hiring, it will reduce a quick ratio in the current year.

Note 4. Again, the negative relations between employment growth *and* current period profitability and a change in liquidity ratio at current period seem counter-intuitive, but these results are generally consistent with prior studies. For example, if firms increase employment this year, it will negatively affect current year profitability.

Appendix 1. Variables definitions

Variables	Description
ΔEMP	The number of employees' annual growth rate.
CUSTOMER_CONC	The Herfindhal-Hirschman index of customer concentration.
Q	The sum of total assets plus the market value of equity minus common equity for the current year over the lagged total assets.
CF	Net Income plus depreciation over lagged total assets.
RETURN	A stock's annual return
SIZE_RANK	Market value of equity as a percentile rank.
LEVERAGE	Firm leverage.
QUICK	The quick ratio.
ROA	The return-on-assets.
SALESG	Sales growth calculated over a one-year period.
ΔROA	The change in return-to-assets.
$\Delta QUICK$	The change in the quick ratio.
LOSSBIN	A loss dummy for each 0.005 interval of *ROA* from 0 to -0.025.