Modern Management Science & Engineering
ISSN 2052-2576
Vol. 8, No. 3, 2026
www.scholink.org/ojs/index.php/mmse

Original Paper

The Impact of Enterprise Innovation Investment on Labor Cost Stickiness—Evidence from Listed Manufacturing Companies

Menglin Fan[1*]

[1] Southwest Petroleum University, Chengdu, Sichuan, China

[*] Corresponding Author

Received: May 19, 2026 Accepted: June 27, 2026 Online Published: July 17, 2026

doi:10.22158/mmse.v8n3p107 URL: http://dx.doi.org/10.22158/mmse.v8n3p107

Abstract

In recent years, China's manufacturing industry has been in a critical period of transition towards "innovation-driven," and enterprises generally face the dual challenges of rising labor costs and the urgent need to increase innovation investment. This paper aims to deeply explore how innovation investment affects enterprise labor cost stickiness. In terms of research methodology, this paper selects the financial data of China's A-share listed manufacturing enterprises from 2021 to 2025 as the research sample, and draws on the ABJ model to construct a fixed-effects regression model containing an interaction term between innovation investment and changes in operating revenue. The empirical research results show that there is indeed a significant phenomenon of labor cost stickiness in the sample manufacturing enterprises, and confirm that the greater the innovation investment, the higher the labor cost stickiness of manufacturing enterprises. The conclusion shows that with the increase of innovation investment, enterprises' dependence on core technical personnel with high asset specificity deepens. In order to avoid high adjustment costs and prevent the risk of technology leakage, enterprises are often reluctant to lay off employees easily when performance declines, thereby exacerbating the downward rigidity of labor costs.

Keywords

labor cost stickiness, innovation investment, manufacturing industry, ABJ model

1. Introduction

As China's economy gradually enters a new stage of high-quality development, the manufacturing industry, a crucial pillar of the national economy, is undergoing a critical transition from a traditional factor-driven model to an innovation-driven one. Against this backdrop, manufacturing enterprises are facing two major challenges. The gradual fading of the "demographic dividend" and the deepening

implementation of the Labor Contract Law have led to continuously rising corporate labor costs, making their rigid characteristics increasingly apparent. Although traditional cost behavior theory assumes that costs fluctuate symmetrically with business volume, numerous studies indicate that the reduction in corporate costs—particularly labor costs—when business volume declines is consistently much smaller than the increase during an equivalent rise in business volume. This reflects the widespread phenomenon known as “labor cost stickiness.” Additionally, in the face of fierce domestic and international market competition, increasing innovation investment and mastering core technologies have become essential strategies for manufacturing firms to break through developmental bottlenecks and secure sustained competitive advantages. However, some manufacturing enterprises currently still struggle with issues regarding their innovation investments, such as sub-optimal capital allocation, talent attrition, and low input-output efficiency.

At the same time, due to the high complexity, long-term nature, and uncertainty of innovation activities, they not only consume a large amount of funds but also rely more deeply on high-quality R&D personnel and core technical backbones. When enterprises increase innovation investment, the specificity of their human capital increases accordingly. In order to maintain the stability of this strategic human capital, enterprises are often unwilling or unable to easily lay off employees when facing short-term performance fluctuations, which will inevitably profoundly affect the enterprise’s labor cost behavior.

Currently, existing literature mostly focuses on exploring the causes of cost stickiness or the economic consequences of innovation investment, but research combining human capital investment with cost behavior, especially exploring the micro-mechanism of how innovation investment shapes enterprise labor cost stickiness, is still insufficient. Therefore, the research significance of this paper is mainly reflected in: (1) It expands the research perspective on the causes of cost stickiness, enriches the related literature on the economic consequences of enterprise innovation activities, and provides new empirical evidence for understanding the relationship among “innovation-human capital-cost behavior”. (2) It can provide decision-making references for enterprises to optimize human resource allocation and reasonably control cost stickiness, thereby helping manufacturing enterprises achieve high-quality, sustainable development during the technological upgrading cycle.

2. Literature Review and Research Hypothesis

Traditional cost theory generally assumes a linear and proportional relationship between costs and business volume. However, through empirical analysis, Anderson et al. (2003) discovered an asymmetric response of corporate costs to increases and decreases in business volume, providing the first empirical evidence of cost stickiness in listed companies. Furthermore, domestic scholars Sun Zheng and Liu Hao (2004) utilized data from numerous listed companies spanning from 1994 to 2001, similarly confirming the widespread existence of expense stickiness among listed companies in China. Moreover, research indicates that the underlying causes of cost stickiness can be categorized into

several dimensions, including agency costs, adjustment costs, and managers' optimistic expectations (Banker et al., 2013). These factors collectively influence corporate cost management behaviors, causing corresponding costs to exhibit asymmetric characteristics in response to fluctuations in business volume. Therefore, as a crucial branch of cost stickiness, labor cost stickiness is fundamentally rooted in these same theoretical dimensions.

From the perspective of adjustment costs, when an enterprise increases innovation investment, its requirements for human capital specificity increase significantly. If a manufacturing enterprise easily dismisses these core technical personnel to cut costs when facing a short-term decline in sales revenue, it will not only turn the expensive early-stage innovation training and R&D investment into sunk costs, but may also trigger huge risks of core technology and commercial secret leakage to competitors. In addition, the adjustment costs of firing, re-recruiting, and training highly skilled labor are much higher than those of ordinary labor. Therefore, based on expectations of future market demand recovery and strategic considerations of maintaining core innovation capabilities, the greater the innovation investment, the more management tends to "hoard" high-value R&D personnel when business volume declines, causing labor costs to be difficult to drop synchronously with business volume.

From the perspective of agency costs (Chen et al., 2012), to demonstrate their own strategic vision for innovation, maintain their reputation in the industry, or maintain their own "empire building," management often has strong motives to refuse to cut innovation-related labor expenditures and R&D team size when performance declines, which further exacerbates the downward rigidity of labor costs.

In summary, the greater a firm's innovation investment, the deeper its reliance on highly skilled and highly specialized human capital, which in turn leads to higher associated layoff costs and risks of technology leakage. Consequently, when business volume declines, a firm's willingness and ability to reduce labor costs are relatively diminished, thereby exhibiting higher labor cost stickiness.

Based on the above analysis, this paper proposes the following hypothesis:

H1. The greater the innovation investment, the higher the labor cost stickiness of manufacturing enterprises.

3. Research Design

3.1 Sample Selection

This paper selects China's A-share listed manufacturing companies from 2021 to 2025 as the initial sample and applies the following data screening procedures: (1) excluding observations with missing data for key variables; (2) excluding firms designated as ST, *ST, and PT; and (3) winsorizing all continuous variables at the 1st and 99th percentiles to mitigate the influence of extreme outliers. Following these procedures, a final sample of 10,225 firm-year observations was obtained. Additionally, all data utilized in this study are sourced from the China Stock Market & Accounting Research (CSMAR) database.

3.2 Variable Definitions

3.2.1 Dependent Variable

Labor cost stickiness: Refers to the phenomenon where the downward adjustment margin of an enterprise's labor cost is smaller than the upward adjustment margin when the business volume changes. In the manufacturing industry, due to the higher dependence of the production process on skilled technical workers and stable teams, coupled with the influence of union power and industry practices, this stickiness is particularly prominent. This paper draws on Anderson's method and measures it by calculating the ratio of the current year's labor cost to the previous year's and taking the natural logarithm. At the same time, referring to Gu's (2020) practice, the "cash paid to and for employees" in the cash flow statement is used to represent the real labor cost of the enterprise.

3.2.2 Independent Variables

(1) Innovation investment: Refers to the total resources a firm invests across various innovation activities to acquire, maintain, and enhance its innovation capabilities. Generally, the stronger a firm's innovation capability, the higher its market position is likely to be. Following the approach of Zhu Naiping et al. (2014)[6], this paper measures innovation investment using the ratio of R&D expenditure to operating revenue.

(2) Change rate of operating revenue: Calculated as the natural logarithm of the ratio of the current year's operating revenue to the previous year's operating revenue.

(3) Operating revenue decline: A dummy variable that equals 1 if the current period's operating revenue is lower than that of the previous period, and 0 otherwise.

3.2.3 Control Variables

Based on the research of Liang Shangkun et al. (2015), this paper selects economic control variables, mainly including two consecutive years of revenue decline (RS), macroeconomic growth changes (GDP), labor intensity (LI), and fixed capital intensity (AI), and introduces a series of other control variables to ensure research accuracy. Specific variables are detailed in Table 1.

Table 1. Variable Definitions

Variable name	Variable code	Variable Description
Labor cost change	$\Delta lnLCost$	The difference between the natural logarithm of the current year's labor cost and the previous year's.
Operating revenue change	$\Delta lnLRev$	The difference between the natural logarithm of the current year's operating revenue and the previous year's.
Operating revenue decline	D	Assigned 1 if the current year's operating revenue is less than the previous year's, 0 otherwise.
Two consecutive years of revenue decline	RS	Assigned 1 when operating revenue shows a downward trend for two consecutive years, 0 otherwise.

Variable name	Variable code	Variable Description
Innovation investment	*R&D*	Enterprise R&D expenditure / operating revenue.
Macroeconomic growth change	*GDP*	The GDP growth rate of the province where the enterprise is located.
Labor intensity	*LI*	Number of employees at the end of the year / operating revenue.
Fixed capital intensity	*AI*	Total assets at the end of each year / current operating revenue.
Enterprise size	*Scale*	The total assets of the enterprise, taking the natural logarithm.
Profitability level	*ROA*	Net profit / total assets.
Asset-liability level	*Lev*	Total liabilities / total assets.
Management shareholding ratio	*M_share*	Number of shares held by management / total number of shares.
Largest shareholder's shareholding ratio	*SHR*	Number of shares held by the largest shareholder / total number of shares.
Proportion of independent directors	*IDR*	Number of independent directors / total number of directors.
CEO duality	*Dual*	Assigned 1 when the chairman and general manager are the same person, 0 otherwise.
Auditor reputation	*Audit*	Assigned 1 when the audit institution belongs to the Big Four accounting firms, 0 otherwise.

3.3 Model Design

This paper primarily draws on the ABJ model proposed by Anderson et al. (2003) to construct Model (1) for verifying the existence of labor cost stickiness. Furthermore, following the approach of Liang Shangkun et al. (2015), this study incorporates an interaction term involving innovation investment, operating revenue decline, and operating revenue change to construct the baseline regression Model (2) in order to examine the relationship between innovation investment and labor cost stickiness.

$$\Delta \ln \mathrm{LCost} = \mu_0 + \mu_1 \Delta \ln \mathrm{LRev} + \mu_2 \Delta \ln \mathrm{LRev} \times D + year + \varepsilon \quad (1)$$

$$\Delta \ln \mathrm{LCost} = \mu_0 + \mu_1 \Delta \ln \mathrm{LRev} + \mu_2 \Delta \ln \mathrm{LRev} \times D + \mu_3 \Delta \ln \mathrm{LRev} \times D \times R\&D + \mu_4 R\&D + \sum \Delta \ln \mathrm{LRev} \times D \times \mathrm{Econ\_Var} + \sum \mathrm{Econ\_Var} + \sum \mathrm{Control\_Var} + year + \varepsilon \quad (2)$$

The analytical principle of the labor cost stickiness empirical analysis model constructed in this paper is consistent with the ABJ model. μ_2 is used to measure the enterprise's labor cost stickiness; when μ_2 is negative, it indicates the existence of labor cost stickiness; otherwise, it is labor cost anti-stickiness. If innovation investment is positively correlated with the labor cost stickiness of manufacturing enterprises, μ_3 is expected to be significantly negative, that is, an increase in enterprise innovation investment will make the margin of decline in labor cost smaller when revenue falls, thereby increasing the degree of labor cost stickiness.

4. Empirical Analysis

4.1 Descriptive Statistics

This section conducts a descriptive statistical analysis of the above main variables, detailed results in Table 2. First, it can be observed that the mean and standard deviation of labor cost change ($\Delta lnLCost$) are 0.103 and 0.152, respectively, with a minimum value of -0.296 and a maximum value of 0.575, indicating that the gap in labor costs among enterprises is small and shows an overall upward trend. The mean of the operating revenue change rate ($\Delta lnLRev$) is 0.074, with a minimum value of -0.56, which differs from the maximum value by 1.331, indicating that there are large differences in revenue changes among different enterprises. In addition, the mean of the dummy variable operating revenue decline (*D*) is 0.338, meaning that 66.2% of the sample enterprises saw an increase in operating revenue compared to the previous year, showing a good operating trend.

Regarding innovation investment, the mean of the sample enterprises' innovation investment (*R&D*) is 0.057, with a minimum value of 0.001 and a maximum value of 0.302, meaning that the innovation investment of some enterprises is only 0.1%. This indicates that the overall innovation investment level of manufacturing enterprises is low, and some enterprises do not even have R&D activities.

Table 2. Results of Descriptive Statistics

Variable	N	Mean	Std	Min	Max
$\Delta lnLCost$	10225	0.103	0.152	-0.296	0.575
$\Delta lnLRev$	10225	0.074	0.221	-0.560	0.771
D	10225	0.338	0.473	0.000	1.000
RS	10225	0.128	0.334	0.000	1.000
R&D	10225	0.057	0.050	0.001	0.302
GDP	10225	0.068	0.036	0.000	0.151
LI	10225	0.102	0.066	0.010	0.382
AI	10225	2.131	1.213	0.511	7.775
Scale	10225	22.389	1.182	20.313	26.148
ROA	10225	0.036	0.059	-0.172	0.202

Lev	10225	0.397	0.181	0.064	0.832
M_share	10225	0.158	0.195	0.000	0.726
SHR	10225	31.333	13.787	7.800	67.500
IDR	10225	0.381	0.054	0.333	0.571
Dual	10225	0.359	0.480	0.000	1.000
Audit	10225	0.063	0.242	0.000	1.000

4.2 Analysis of Correlation Results

According to the correlation results in the following Table 3 and Table 4, the correlation coefficients among all variables are below 0.8, indicating the absence of severe multicollinearity. Specifically, the correlation coefficient between the dependent variable, change in labor cost (Δ*lnLCost*), and the explanatory variable, change in operating revenue (Δ*lnLRev*), for the sample enterprises is 0.588. This demonstrates a significant positive correlation, indicating that as operating revenue increases, corporate labor costs rise accordingly. Furthermore, the correlation coefficients of the dummy variable for revenue decline (*D*) with the change in labor cost (Δ*lnLCost*) and the change in operating revenue (Δ*lnLRev*) are -0.426 and -0.721, respectively. These negative coefficients are consistent with expectations, as operating costs generally tend to decrease when a firm's operating revenue declines. In terms of significance levels, the coefficients for most variables are significant at the 1% level. This further validates the rationality of the variable selection and lays a solid foundation for subsequent research.

Table 3. Results of Descriptive Statistics

Variable	*△lnLCost*	*△lnLRev*	*D*	*RS*	*R&D*	*GDP*	*LI*	*AI*
Δ*lnLCost*	1							
Δ*lnLRev*	0.588***	1						
D	-0.426***	-0.721***	1					
RS	-0.352***	-0.402***	0.537***	1				
R&D	0.050***	-0.057***	0.038***	0.018*	1			
GDP	0.289***	0.230***	-0.170***	-0.136***	-0.030***	1		
LI	-0.055***	-0.127***	0.080***	0.056***	0.299***	-0.010	1	
AI	-0.094***	-0.210***	0.165***	0.139***	0.502***	-0.041***	0.373***	1
Scale	0.026***	0.037***	-0.039***	-0.017*	-0.196***	-0.049***	-0.409***	-0.143***
ROA	0.319***	0.349***	-0.296***	-0.268***	-0.118***	0.114***	-0.202***	-0.252***
Lev	-0.011	0.060***	-0.048***	-0.011	-0.250***	-0.047***	-0.209***	-0.274***
M_share	0.131***	0.067***	-0.044***	-0.067***	0.141***	0.034***	0.186***	0.051***
SHR	-0.004	-0.003	-0.003	-0.002	-0.106***	0.044***	-0.007	-0.136***

IDR	0.003	-0.004	0.001	0.000	0.041***	-0.011	0.034***	0.026***
Dual	0.062***	0.045***	-0.042***	-0.045***	0.123***	0.002	0.119***	0.052***
Audit	0.028***	0.026***	-0.021***	-0.006***	0.018***	0.007***	-0.118***	-0.023**

Table 4. Results of Descriptive Statistics

Variable	*Scale*	*ROA*	*Lev*	*M_share*	*SHR*	*IDR*	*Dual*	*Audit*
Scale	1							
ROA	0.100***	1						
Lev	0.397***	-0.371***	1					
M_share	-0.308***	0.104***	-0.199***	1				
SHR	0.063***	0.149***	-0.046***	0.003	1			
IDR	-0.043***	-0.028***	0.002	0.058***	0.024***	1		
Dual	-0.159***	0.005	-0.058***	0.167***	-0.008	0.104***	1	
Audit	0.304***	0.056***	0.054***	-0.110***	0.112***	0.017*	-0.038***	1

4.3 Analysis of Regression Results

To obtain more accurate regression results, this paper employs a fixed-effects model, controlling for both year and firm dummy variables. Table 5 presents the detailed regression results regarding the impact of innovation investment on corporate labor cost stickiness.

To test whether the sample enterprises have labor cost stickiness, this paper obtains the results of column (1) and column (2) through model (1), which are the results before and after adding all control variables, respectively. It can be seen that the coefficient of operating revenue change (*ΔlnLRev*) is 0.544, indicating that for every 1% increase in operating revenue, labor cost will rise by 54.4%. The coefficient of the cost stickiness interaction term (*ΔlnLRev*×*D*) is -0.073, indicating that for every 1% increase in operating revenue, operating cost decreases by 7.3%, and the margin of decrease in labor cost is significantly smaller than the margin of its increase. This further verifies that the sample enterprises do indeed have labor cost stickiness.

Additionally, columns (3) and (4) of the regression results from Model (2) are used to examine the impact of innovation investment. In column (3), which excludes the control variables, the coefficient of the interaction term between operating revenue and innovation investment is significantly negative, indicating that an increase in corporate innovation investment exacerbates labor cost stickiness. After incorporating the control variables, the results in column (4) consistently show that the coefficient of this interaction term remains significantly negative with an even higher level of statistical significance. These findings provide robust support for Hypothesis H1 of this paper.

Table 5. Baseline Regression Results

	(1)	(2)	(3)	(4)
	ΔlnLCost	*ΔlnLCost*	*ΔlnLCost*	*ΔlnLCost*
ΔlnLRev	0.544***	0.466***	0.546***	0.458***
	(27.619)	(13.429)	(24.225)	(14.031)
ΔlnLRev×D	-0.073**	-0.104***	-0.058***	-0.102***
	(-2.418)	(-3.933)	(-2.224)	(-3.952)
ΔlnLRev×D×R&D			-0.029**	-0.036***
			(-2.191)	(-3.246)
R&D			0.062**	0.068***
			(2.224)	(4.612)
ΔlnLRev×D×RS		0.043**		0.040**
		(2.152)		(2.285)
ΔlnLRev×D×GDP		-0.004*		-0.004***
		(-1.705)		(-5.243)
ΔlnLRev×D×LI		0.020**		0.030**
		(1.976)		(2.046)
ΔlnLRev×D×AI		-0.024		-0.002
		(-0.804)		(-0.065)
RS		-0.082**		-0.079**
		(-4.243)		(-3.757)
GDP		-0.018		-0.018
		(-0.550)		(-0.523)
LI		0.026		0.024
		(1.202)		(1.151)
AI		0.035		0.011
		(0.991)		(0.352)
Scale		0.036*		0.038**
		(2.766)		(3.258)
Lev		0.133***		0.141***
		(9.393)		(11.777)
ROA		0.042**		0.054**
		(2.938)		(3.671)
M_share		0.074**		0.068**
		(3.344)		(3.294)

Dual		-0.021*		-0.017
		(-2.670)		(-2.088)
IDR		-0.000		-0.001
		(-0.030)		(-0.239)
SHR		0.025*		0.019*
		(2.516)		(2.507)
Audit		0.011		0.005
		(1.031)		(0.462)
Constant	0.035	0.349	0.245	0.830
	(0.520)	(1.128)	(0.591)	(0.773)
N	10225	10225	10225	10225
Adjusted R^2	0.290	0.330	0.298	0.337

5. Conclusion

Based on the financial data of China's A-share listed manufacturing companies from 2021 to 2025, this paper empirically tests the impact of enterprise innovation investment on labor cost stickiness. The study found: First, manufacturing enterprises generally exhibit labor cost stickiness; that is, the margin of increase in labor costs when operating revenue increases is significantly greater than the margin of decrease in labor costs when operating revenue declines. Second, innovation investment is significantly positively correlated with the labor cost stickiness of manufacturing enterprises. The larger the scale of an enterprise's innovation investment, the deeper its dependence on highly skilled, highly specific human capital. When facing a decline in business volume, in order to retain strategic human capital, the enterprise's willingness and ability to cut labor costs weaken accordingly, thereby showing stronger labor cost stickiness.

Based on these findings, this paper offers several insights for corporate management practices: (1) Labor cost stickiness is not entirely negative.When short-term revenue declines, forcefully laying off the R&D team might yield immediate cost savings, but the substantial training and R&D investments made previously would become sunk costs, ultimately doing more harm than good. Therefore, managers should continuously assess the long-term value of retaining core talent rather than simply viewing cost stickiness as a burden. (2) Optimize the structure of innovation investment. While increasing R&D funding, companies should build flexible employment mechanisms aligned with their innovation strategies. They can implement long-term incentive and retention plans for key technical personnel, while opting for outsourcing or flexible hiring for auxiliary roles. This approach reduces overall labor adjustment costs while safeguarding the company's innovation capabilities. (3) Improve internal governance mechanisms. During performance downturns, management might retain surplus staff to protect their personal reputation or out of an "empire-building" mindset. To address this,

companies should strengthen the board's supervisory functions, increase the proportion of independent directors, and incorporate human capital efficiency into executive performance appraisals. This helps reduce the irrational labor hoarding driven by agency problems. (4) The government and regulatory authorities should acknowledge the temporary cost pressures faced by innovative companies. For instance, they could consider offering targeted social security exemptions or R&D talent subsidies to highly innovative manufacturing firms during specific periods. This would not only lower the marginal cost of retaining highly skilled labor but also foster a positive synergy between innovation-driven growth and overall employment stability.

References

Anderson, C. M., Banker, D. R., & Janakiraman, N. S. (2003). Are selling, general, and administrative costs "sticky"?. *Journal of Accounting Research*, *41*(1), 47-63.

Banker, D. R., Byzalov, D., & Chen, L. (2013). Employment protection legislation, adjustment costs and cross-country differences in cost behavior. *Journal of Accounting and Economics*, *55*(1), 111-127.

Chen, X. C., Lu, H., & Sougiannis, T. (2012). The agency problem, corporate governance, and the asymmetrical behavior of selling, general, and administrative costs*. *Contemporary Accounting Research*, *29*(1), 252-282.

GU, Z., TANG, S., & WU, D. (2020). The political economy of labor employment decisions: evidence from China. *Management Science*, *66*(10), 4703-4725.

Liang, S. K. (2015). Managerial overconfidence, debt constraints and cost stickiness. *Nankai Business Review*, *18*(03), 122-131.

Sun, Z., & Liu, H. (2004). A Study on the "Sticky" Behavior of Expenses in Chinese Listed Companies. *Economic Research Journal*, (12), 26-34+84.

Zhu, N. P., Zhu, L., Kong, Y. S. et al. (2014). A study on the synergistic impact of technological innovation investment and social responsibility assumption on financial performance. *Accounting Research*, *2014*(2), 57-63.