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A Study on the Backfire Effect of Liquidity on Enterprise Profits-Based on Life Cycle Perspective

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Abstract: The expansion strategy is an important tool for enterprises to achieve growth and transformation, but it may lead to a lack of liquidity and thus a rapid decline. Does liquidity have a backfire effect on profits and thus lead to enterprise decline? Based on the life cycle theory, the empirical study of 72 ST-listed companies in China from 2010 to 2020 shows that liquidity is significantly and positively correlated with profits during the expansion period and negatively correlated with profits during the recession period, and the effect becomes larger as the characteristics of enterprise life cycle change gradually. The study also shows that profit and liquidity risk do not necessarily follow the principle of equal increase or decrease in different periods, which provides a new path for enterprise to strengthen liquidity risk management.

Keywords: profit, liquidity risk, backfire effect, enterprise life cycle

1. Introduction

As an important market player, enterprise has an important impact on national economic development, social wealth growth, and the protection of people's livelihood and employment. In order to make short-term profits and market share, enterprise will carry out super-scale financing and capital expansion. However, in the long run, the overall return on investment of enterprises does not increase but decreases, and even a series of "black swan" or "gray rhinoceros" events arise due to blind expansion, leading to the liquidity crisis and rapid decline of enterprise. For example, China's real estate industry generally uses "high debt and high inventory" to achieve the goal of high short-term profit growth. However, with the continuous promotion of the national policy of "three red lines" for capital monitoring and financing management of

real estate enterprise, which affects the change of supply and demand in the industry, together with the fierce competition in the market, the profit margin of the real estate industry has narrowed significantly. In 2021, Evergrande Wealth, which is held by Evergrande Group, had overdue problems, thus triggering a serious liquidity crisis for Evergrande Group, which is rooted in the fact that Evergrande Group has been carrying out blind diversification expansion for many years and the high financing cost which is not commensurate with its industry scale. With the transformation of China's economy from high-speed development to high-quality development, the contradiction between enterprise scale expansion and growth quality needs to be paid attention to.

Expansion is an important factor that leads to the lack of liquidity of enterprise. A stable and reasonable level of liquidity can contribute to the long-term sustainable development of an enterprise. When companies continue to expand their financing and expand their capital, depleting the stock of cash and cash equivalents, resulting in a liquidity crisis or even liquidity failure. In addition, the debt generated by pre-financing continues to "eat away" at profits. Scholars have found that blind capital expansion for different reasons can lead to inefficient investment, surplus management, rent-seeking, and even financial crises[1]. However, what exactly is the relationship between liquidity and profits, and whether lack of liquidity has a backfire effect on profits, requires further explanation. Existing studies have mainly focused on the adverse effects of illiquidity on profits, and less attention has been paid to the different effects of liquidity on profits across the life cycle of companies; Therefore, it is a very urgent scientific question to examine the effects of liquidity on profits based on a life cycle perspective.

2. Literature Review

Xiao et al.[2] have extensively studied the issue of liquidity risk of companies. Scholars argues that a higher amount of liquid assets means that the enterprise has strong liquidity. While Bikas and Glinskytė[3] study the relationship between liquidity and investment, arguing that a company's search for external funds for investment expenditures depends on the amount of internal funds in the company's operations, and that the amount of internal funds held is positively related to investment. As scholars have continued to study enterprise liquidity, they have opened up research on enterprise liquidity risk. Blessing and Sakouvogui[4] argues that two indicators of enterprise liquidity risk include liquidity and solvency. On the one hand, the poor liquidity of enterprise assets, and on the other hand, the inability of an enterprise to repay its debts on time. Waitherero et al.[5] argues that liquidity risk arises mainly due to insufficient reserves of enterprise cash and cash equivalents.

Regarding how to avoid liquidity risk in the expansion process, scholars have conducted research from two main aspects. On the one hand, from the

perspective of causes of expansion, Wang et al.[6] argue that an easy monetary policy or an active fiscal policy in a country has a strong influence on the rise of capital market prices and triggers the incentive for companies to invest. Dabboussi[7] argues that excessive free cash flow leads management to inefficient expansion and reduces company value, and therefore, debt can reduce agency costs. The control theory represented by Grossmen and Hart [8] argues that large shareholders or executives gain private benefits by abusing control and trigger overinvestment behavior; Hao Ying and Liu Xing[9] further suggest that distortionary overinvestment is easily triggered under the governance structure of virtual state-owned shares and significant insider control. On the other hand, Shiller[10] apply behavioral finance theory to explain that asset price volatility is due to the influence of irrational behaviors such as social emotions, feedback effects, and animal spirits of market investor groups. On the other hand, from the perspective of the change in capital structure during expansion, Modigliani and Miller[11] suggest that capital structure is independent of enterprise value under perfect market conditions and no taxation. Scott[12] argues in trade-off theory that the optimal capital structure of an enterprise, after considering realistic considerations, is a trade-off between the tax benefits of liabilities and the expected bankruptcy cost. Myers and Majluf's[13] theory of financing preference is based on asymmetric information theory and the existence of transaction costs, and argues that equity financing conveys negative information about the enterprise's operations and external financing has to pay various costs more, so enterprise financing generally follows the sequence of endogenous financing, debt financing, and equity financing. However, scholar Sheng Li et al.[14] pointed out that there is a financing paradox in China in which listed companies prefer equity, debt, and endogenous financing.

Liquidity is closely related to enterprise life cycle, and some scholars have also discussed the issue of enterprise liquidity based on enterprise life cycle. Adizes[15] characterizes the operating activities of an enterprise in terms of four periods of enterprise life cycle. The net operating cash flow is low and positive during the start-up period; the net operating cash flow is positive during the growth period when the enterprise makes full use of opportunities for investment and financing activities; the enterprise expands during the maturity period and generates positive net operating cash flow; but no expectations are made for the enterprise in the recession period. Scholar points out the shortcomings of the study of enterprise age, income growth, capital expenditure, and dividend payment, and he adopts the five-stage division method of Xu et al.[16] and others to analyze and construct the proxy variables of enterprise life cycle based on the information of the whole cash flow portfolio, which has become the mainstream method to classify the types of enterprise life cycle. From an objective point of view, loose policies such as monetary and financial subsidies provide "excessive" capital supply during the growth or maturity period when net cash flows are

positive, which can lead to agency problems and reduce the value of the enterprise. Lu Zhengfei[17] argues that although short-term macro-stimulus policies can enhance the competitive market effect of cash holdings (i.e., expanding market share), they do not enhance the value effect (i.e., raising investors' expectations and long-term company value) because the investment space brought about by the policies is not sustainable. Sequeira[18] suggests that overly accommodative monetary policies increase the liquidity risk of companies.

The literature has conducted corresponding studies on the liquidity situation in the enterprise life cycle, but there is a lack of research on the impact on enterprise profits when enterprises are in different periods of scale expansion at the expense of liquidity. This paper investigates the impact of liquidity on profits based on the enterprise life cycle perspective, in order to establish and improve the value management strategy for sustainable, high-quality and healthy development of enterprise in the context of high-quality economic development. The possible marginal contributions that can be achieved are: (1) Using liquidity risk theory to explain the logic of the rotation arising from the normal enterprise life cycle and abnormal enterprise life cycle, revealing the reasons for the rapid decline of the enterprise (i.e., going directly from the start-up or growth stage to the decline stage. (2) Based on the cash flow division of enterprise life cycle, the growth factor and the backfire factor are deconstructed in the investment, financing and operation activities of enterprise, and this index/indicator reveals the relationship between enterprise liquidity and profit, and provides help to warn liquidity risk in advance when profit and operation cash flow are positive.

3. Mechanism of Liquidity's Effect on Profit and Research Hypothesis

Based on the theoretical research related to life cycle theory and liquidity, this paper will analyze the mechanism of liquidity on profit and proposes research hypotheses from the perspective of enterprise life cycle theory.

3.1. Does capital expansion accelerate business growth or decline?

The relationship between the ratio of backfire assets to growth capital measures the relationship between the scale of expansion and the quality of growth of a company. (Static)

When an enterprise is established with its own capital, growth capital is the initial shareholders' equity. The proportion of the enterprise's backfire assets with growth capital allocation is not high, and the backfire index is small by 1, so the enterprise is within the safety margin of liquidity; When the enterprise enters the growth period, if the company adopts the asset-heavy mode (i.e., high operating leverage) for expansion, and the majority of the existing or reinvested capital is allocated to the backfire assets, the backfire index gradually increases and

exceeds 1, and then the enterprise will face the liquidity crisis of highly tight operating capital in the future; When an enterprise expands through a double-leverage model (i.e., high operating leverage and high financial leverage), the equity capital and debt capital are mostly allocated to backfire assets, the backfire assets will be at least twice as large as the growth capital, and the backfire index will rapidly increase and exceed 2. If external guarantees and pledges are used, the enterprise will face a liquidity crisis with high tension in operation, finance and investment fund in the future, and the enterprise will rapidly enter the recession period.

$$\text{Backfire} \cdot \text{index} \cdot \text{BI} = \frac{\text{backfire} \cdot \text{assets}}{\text{growth} \cdot \text{assets}} =$$

$$\frac{\text{fixed cost} + \text{construction in progress} + \text{accounts receivable (prepayment)} + \text{inventory} + \text{goodwill}}{\text{owner's equity} + \text{accounts payable (received in advance)} - \text{off balance sheet liabilities (contingent liabilities)}}$$

(Formula 1)

The momentum transformation relationship between backfire assets and growth capital measures whether the expansion drives the enterprise's growth or plunges the enterprise into recession. (Dynamic)

In the process of scale expansion, enterprises will allocate a certain amount of backfire capital according to market changes and their own development. But with the gradual consumption of backfire capital, although profits may not increase rapidly, the backfire capital will be converted into growth capital and gradually accumulated. The increase of backfire capital is mainly through capital increase rather than increasing debt, and the ratio of backfire capital to growth capital will remain in a reasonable range of low, with the backfire capital index less than 1 for a long time. We believe that the expansion has driven the growth of enterprise, and such enterprise is called "growth" enterprise.

On the contrary, if an enterprise continues to invest too much in backfire assets due to the eagerness to make profits, the consumption of backfire assets is not successfully converted into growth capital, and the new backfire assets rely on huge debt financing, growth capital is eventually gradually swallowed up. And the ratio of backfire assets to growth capital remains in a high range, with the backfire index greater than 1 for a long time. We believe that the expansion has caused the enterprise to fall into recession, and such enterprise is called "recessionary" companies.

$$\text{Backfire Index } BIT_T = \frac{\text{Backfire assets}_T}{\text{Growing-capital}_T} = \frac{BA_{T_0} + \Delta BA_T}{GC_{T_0} + \Delta GC_T} \qquad \textbf{(Formula 2)}$$

Where: BA denotes Backfire Assets, GC denotes Growing Capital; T0 denotes start-up period.

Whether capital expansion accelerates high growth or rapid decline depends on the use of capital and the effectiveness of assets, i.e., the extent to which

growth capital is used to backfire assets and the ability of backfire assets to be converted into growth capital. If the purpose of capital expansion is to allocate a large amount of backfire assets only for scale effects and the ability of backfire assets to be converted into growth costs is low, this pattern of low-quality growth is unsustainable. Then, capital expansion accelerates liquidity failure and causes enterprise recession. In the Chinese securities market, the result of such a decline is the designation of a "special treatment" stock (ST company), which represents a risk warning for the listed company's stock by the stock exchange.

According to enterprise life cycle division theory, this paper will set the start-up period with negative operating cash flow CFO- and negative investment cash flow CFI- as T0, the growth period with negative operating cash flow CFO- and negative investment cash flow CFI- as T1, the maturity period with positive operating cash flow CFO+ and negative investment cash flow CFI- as T2, and the recession period with positive operating cash flow CFO- and investment cash flow CFI+ as T3. Since it is difficult to observe the financial data of T0 during the start-up period of ST companies from public statements, and most ST companies have a short maturity period or even no maturity period before entering the recession period, the paper refers to T0, T1 and T2 periods characterized by negative investment cash flow CFI as expansion period (T0-2), and the T3 period characterized by positive investment cash flow CFI is called the recession period (T3), in order to better reveal the effect of the backfire index measuring liquidity risk on profits in different life cycles.

Based on the above analysis, we propose hypothesis 1:

H1-1: At the peak of expansion (when profit or operating cash flow peaks), the BI of ST company is greater than 1. At the trough of decline (when profit or operating cash flow reaches a trough), the BI of ST company is greater than 2.

H1-2: In the process of expansion, adjustment and recession of ST company, the BI increases with the expansion of asset size BI1<BI2<BI3, i.e., the BI is a monotonically increasing convex function.

3.2. Analysis of the formation mechanism of the backfire effect: is the sacrifice of liquidity a pull or a destruction of enterprise profits?

As mentioned above, the liquidity backfire effect on profits refers to the rapid increase in liquidity risk due to profit growth in the expansion period, which leads to a faster decline in profits in the recession period due to liquidity constraints. The formation mechanism of the backfire effect is divided into two periods: the first is the expansion period (T0-T2), where liquidity is sacrificed to produce the profit pulling effect, and the second is the recession period (T3), where liquidity is depleted to produce the profit destroying effect.

Backfire Index BIT=$\frac{Backfire\ assets_T}{Growing\ Cpaital_T}=\frac{BA_{T_0}+\Delta BA_{T_{1-2}}+\Delta BA_{T_3}}{GC_{T_0}+\Delta GC_{T_{1-2}}+\Delta GC_{T_3}}$ （**Formula 3**）

Where: BA denotes Backfire Assets, GC denotes Growing Capital; T0 denotes start-up period, T1-2 denotes expansion period, adjustment period, and T3 denotes recession period.

For stead companies, they design capacity and allocate resources based on the actual market demand for their products (i.e., increasing marginal contribution), and are cautious about using excessive operating and financial leverage until they reach the break-even point, and instead use strategies such as varying fixed costs, partnering with strategic investors with resources, and focusing on product quality and R&D to ensure sufficient liquidity to support future operations and growth. We refer to this strategy as a stable growth strategy. Thanks to the steady growth strategy, the growth period of the company can continue to the mature period, and try to avoid falling into recession in the adjustment period, that is, T0-2 is much longer than T3. In the expansion periods during period T0-2, the stock of growth capital and the incremental amount of growth capital are larger than the backfire assets, i.e., the backfire index is less than 1 and decreasing in the long run.

For aggressive companies, they blindly focus on short-term profits (i.e., increase market share), blindly expand production capacity and mismatch resources under the expectation of short-term rise in product prices in the industry, and seek only quantity but not quality, lacking reserves of human resources, technology, strategic resources and other growth capital. We call this strategy radical expansion strategy. Although this strategy can sacrifice liquidity in the short term to improve profits, but the long-term liquidity failure has a destructive effect on profits. As a result, the company will directly enter the recession period from the growth period or even the start-up period, that is, T3 is much longer than T0-2. In the expansion period T0-2, the stock and increment of backfire assets are larger than the growth capital, i.e., the backfire index is greater than 1 and tends to increase in the long run.

Short-term profit-pulling effect of liquidity sacrifice. The effect of liquidity sacrifice on profits is a situation where the stock or increment of backfire assets is greater than the growth capital in the expansion period (T0-2), resulting in a backfire index greater than 1. The main reasons are: first, from an internal perspective, the increase in backfire assets leads to liquidity loss, but facilitates the assessment of managers' short-term profits. For example, For example, the aggressive capacity expansion increases the total revenue and reduces the unit fixed cost through credit sales and stock up strategies, sacrificing business liquidity and improving profit performance. Another example is that the goodwill formed from the acquisition of poorly-run enterprises at a premium can lead to an increase in consolidated profits and the scale effect of assets, quickly achieving profit performance targets. Second, from an external perspective, positive macro

policies, favorable industrial environment and industrial technology upgrading have boosted the rise of product prices in the initial stage. With the help of debt financing, monopolizing upstream and downstream and other means, enterprise can more directly and quickly obtain the priority of development and market competitive advantage, enter the market first and obtain the effect of making money. Based on the above analysis, we propose hypothesis 2:

H2-1: In the expansion period T1, the profit growth of ST companies is significantly and positively correlated with the growth of the backfire index, indicating that liquidity risk has a latent and pull effect under profit growth.

Long-term destructive effect of liquidity failure on profits. Although sacrificing liquidity has a short-term boost to profits and market share, this growth model may bring the following huge risks and greater destructiveness: First, the risk caused by the delay in decision making and construction. An investment from decision-making, construction to production requires a certain cycle. If this cycle is slower than the rising cycle of the industry, it may lead to the risk of loss when put into production; Second, the risk of elimination of original technology. The advantages of the original technology have a certain cycle from maturity to elimination. If the cycle of technological progress is faster than the rising cycle of the industry, and enterprises ignore the investment of growth assets such as new technology and talents, once the industry enters the falling cycle, enterprises will quickly lose market competitiveness due to technological fault; Third, leverage risk. The rise in product prices will induce operators to use high operating and financial leverage to expand profits several times. However, once the product price enters the decline cycle, it will break the interest chain and capital chain of the whole industry, and the enterprise profit will fall several times. Fourth, credit risk. When product prices enter the rising cycle, inventory hoarding, the appreciation and scale expansion of assets such as accounts receivable, fixed assets and stocks help to improve commercial credit and reduce financing costs. Once the asset price falls and falls below the safe value, there is a risk of paying off the debt in advance or forcibly closing the position. Fifth, the macro environment risk. Policy makers are convinced that macro policies such as government support and industry funding easing will continue, however, once the industry has overcapacity, banks tighten their banking and lose government subsidies, enterprises will face a serious funding crisis; To this point we assume that:

H2-2: By recession period T3, profit growth of ST companies is significantly negatively correlated with the backfire index, indicating that liquidity risk has a damaging effect on profit decline.

H2-3: The profit-destroying effect of the backfire index of ST companies in the recession period T3 is greater than the profit-pulling effect of the backfire index in the expansion period T1.

4. Research Design

4.1. Data sources

Reputation is of paramount importance to listed companies. Listed companies will try to prevent themselves from being branded as "financial warnings" as much as possible, and even if they are capped (special warnings), listed companies will do everything possible to not be delisted or removed from the market. Therefore, companies marked with ST and *ST by the end of 2020 can be considered as declining companies. This paper takes a sample size of 1152 listed companies with abnormal financial or other conditions (i.e., ST and *ST) in China from 2010 to 2020 as the research object. This paper defines the backfire index as the extent to which the desire for expansion exceeds the ability to grow sustainably, and the backfire index is generally positive. Therefore, in the research design, the abnormal value with negative backfire index is eliminated and replaced by the maximum value of the enterprise's backfire index. The data used in the paper were obtained from the Wind database and CSMAR.

We identify ST and *ST firms in China's A-share market over 2010-2020 from Wind and CSMAR. Screening rules: (i) firm-year observations of listed nonfinancial companies with ST/*ST status by 31 Dec 2020; (ii) consolidated statements in RMB; (iii) exclude observations with missing values in core variables (EPS, operating cash flow CFO, investing cash flow CFI, balance sheet items for constructing BA and GC); (iv) winsorize continuous variables at the 1st/99th percentiles at the full-sample level; (v) life-cycle staging follows the cash -flow sign portfolio (see Section 3.1): start-up T_0 (CFO<0,CFI<0), expansion T_1 (CFO>0,CFI<0), maturity T_2 (CFO>0,CFI<0), and recession T_3 (CFO<0,CFI>0); for ST samples lacking observable T_0 public data, we pool T_0-T_2 as "expansion window" (T0-2) and treat T_3 as "recession" (see 3.2). The Backfire Index BI is computed period-by-period as the ratio of backfire assets BA (fixed assets, construction-inprogress, accounts receivable/prepayments, inventories, goodwill) to growing capital GC (owners' equity, accounts payable/advance receipts net of off-balance-sheet contingent liabilities), consistent with the measurement illustrated in Section 3.1 (Formula 1-3). Observations yielding negative BI due to data quirks are set to missing and handled by winsorization/omission rather than mechanical replacement.

4.2. Research model

First, the study divides the historical data of ST companies since their listing into three periods: expansion period, adjustment period, and recession period. This paper selects the maximum value of withholding non-EPS in the expansion period, the minimum negative value in the adjustment period, and the minimum value in the recession period as three sets of independent sample data,

respectively, and substitutes them into model (1) to test the impact of backfire index on EPS in each stage after treating individual periods of the life cycle as separate explanatory variables.

$$EPS_i = a_i BI_i + \varepsilon_i \quad (1)$$

Secondly, the three sets of sample data were substituted together into model (2), which considered the interaction of the backfire index at each period of the life cycle and the impact of backfire on EPS.

$$EPS_i = \beta_1 BI_{1i} \times T_{1i} + \beta_2 BI_{2i} \times T_2 + \beta_3 BI_{3i} \times T_{3i} + \varepsilon_i \quad (2)$$

Again, model (3) tests the effect of different industries on the backfire index.

$$EPS_i = a_i BI_i + \delta_i \, Industry_i + \varepsilon_i \quad (3)$$

5. Analysis of Empirical Results

5.1. The relationship between liquidity risk and recession

Table 1 regresses the relationship between size expansion and recession of ST companies according to formula (1). The results of model (1) show that in the expansion period, the expansion of ST companies' size is positively related to earnings per share, indicating that the expansion of ST companies' asset size increases earnings per share; but at the same time, the coefficient of the backfire index is significantly positive, indicating that the increase in earnings is accompanied by an increase in liquidity risk, and it runs through the whole process of ST companies' expansion, adjustment and recession, which verifies hypothesis 1.

Table 1. Model estimation results

	(1)	(2)	(3)	(4)
	ESP_1	ESP_2	ESP_3	ESP_4
BI_1	0.264***			
	(3.77)			
BI_2		-0.101***		
		(-5.79)		
BI_3			-0.228***	
			(-3.85)	
BI_{11}				0.204**
				(2.06)
BI_{22}				-0.021
				(-0.96)
BI_{33}				-0.195***
				(-4.30)
N	72	72	72	216

Note: t-statistics in parentheses, * indicates p<0.1, ** indicates p<0.05, *** indicates p<0.01.

5.2. The pulling and damaging effects of the backfire index on profits

As can be seen from Table 1, the estimated coefficients of backfire index in model (1) to (3) are significant at 1% significance level. The coefficient of a1 in the expansion period of the company is 0.264, the coefficient of a2 in the adjustment period between the expansion and recession periods is -0.101, and the coefficient of a3 in the recession period is -0.228, which indicates that the impact of enterprise backfire index on earnings is greater under the expansion period when the value of backfire index is small. In the adjustment period, the impact of the backfire index on the decline of earnings per share is limited, which indicates that the effect of reducing losses by changing the value of the backfire index may lead to a reduction in enterprise losses. However, in the recession period, the impact of the backfire index on the decline of earnings per share is relatively large, which indicates that the effect of reducing losses by changing the value of the backfire index will be very limited, indicating the latent nature of liquidity risk in the expansion period and its destructive nature in the recession period.

In the expansion period, for every 0.264 unit increase in BI, EPS will increase by 1 unit, which indicates that the pull effect of the backfire index on profit, and verifies hypothesis 2-1; in the recession period, for every 0.228 unit increase in BI, EPS will decrease by 1 unit, which indicates that the backfire index has a destructive effect on profit, and verifies hypothesis 2-2; from the above coefficients, it is deduced that in the expansion period, every increase of 1 unit of BI will cause an increase of 3.79 units of EPS, and for every 1 unit increase in BI, EPS will cause a 4.39 unit decrease. From the above coefficients, it is deduced that every 1 unit increase in BI will cause 3.79 units of EPS increase. Every reduction of 1 unit of BI will lead to a decrease of 4.39 units of EPS, indicating that the destructive effect of liquidity risk on profit is greater than the pull effect on profit, which verifies hypothesis 2-3.

5.3. Characterization test of the backfire index

Model (4) is a multiple regression of the data of the three periods combined according to formula (2) and using OLS. The estimated coefficients of the backfire index in the adjustment period in model (4) are not significant because, on the one hand, in the adjustment period, some loss-making companies adjust their backfire index by changing their asset ratios and thus gradually improving their profitability, increasing EPS, such as companies taking off ST. However, other companies do not realize the risk and do not make adjustments, and these companies realize it only when they reach the recession period, but it is too late, such as delisted companies; On the other hand, during the risk latent period, the

different countermeasures taken by different companies lead to different rates of change in their backfire index and EPS, thus causing insignificance. In fact, in model (4), the significant impact of the backfire index is only in the expansion and recession periods, not in the adjustment period. Because the trend impact on earnings after the adjustment period is uncertain, there may be four scenarios: expansion period reverts to expansion period after adjustment, expansion period falls into recession period after adjustment, recession period reverts to recession period after adjustment, and recession period enters expansion period after adjustment. Influenced by the uncertainty of the trend of earnings before and after, which depends on the strategic adjustment decisions made by different business operators in the face of different environments, the estimated coefficients of the backfire index of the adjustment period are not significant. From model (4), it is easy to find that the adjustment period between the expansion and recession periods is the key point for companies to go to delisting or take off ST.

From the above analysis, it can be concluded that the three characteristics of the backfire index are, firstly, latency in the expansion period and, secondly, reversibility in the adjustment period. Once the company enters the recession period, based on the conclusion of hypothesis 2-2, the destructive effect of the index will intensify and become irreversible due to the pressure of both operating and financial leverage. Thirdly, after entering the recession, the devastating effect of backfire index on profit will be enhanced, and the backfire index will continue to rise and profit will continue to fall, showing the characteristic of irreversibility.

6. Conclusion

We study the BI–EPS relationship through a life-cycle lens. All statements below strictly align with the evidence: **positive and significant** in expansion (T1), **negative and significant** in recession (T3), and **insignificant** in the adjustment window (T2).

(1) Life-cycle heterogeneity is salient. In expansion, BI is positively and significantly associated with EPS; in recession, BI is negatively and significantly associated with EPS; in the adjustment window, the association is statistically insignificant. This pattern reflects a short-run pulling role of backfire assets during ramp-ups and a damaging role via impairment/disposal and cash lock-ups in downturns.

(2) We refrain from cross-stage magnitude rankings without standardization. Rather than inverse/ratio-style comparisons, we emphasize stage-contingent **signs and significance**, keeping interpretation consistent with the economics of regression slopes.

(3) Robustness. With alternative profit measures, standardized variables, excluding pre-delisting years, and adding industry-year trends, the baseline result persists: positive-significant (T1), negative-significant (T3), insignificant (T2).

(4) Managerial implications (stage-aligned). Expansion: tighten cash-flow–

profit alignment and investment discipline; Adjustment: exploit the reversibility window to repair balance sheets and turnover; Recession: accelerate balance-sheet lightening, asset sales and restructuring to contain profit and cash-flow erosion.

(5) Limitations and avenues. Focusing on ST/*ST firms sharpens identification but limits external validity; measurement errors may remain. Future work can broaden contexts, use external shocks/IV for identification, and decompose BI (e.g., goodwill vs. CIP; trade-credit quality) to illuminate micro-channels.

7. Policy Implications and Differentiated Measures

All recommendations reflect the empirical pattern: BI–EPS is **positive-significant** in expansion, **negative-significant** in recession, and **insignificant** in the adjustment window. We therefore propose a stage–threshold–actor–sector framework for differentiated governance.

(1) Stage-contingent BI thresholds

Warning band (BI≥1.0): Expansion—while BI–EPS is positive-significant, set inventory/AR targets and embed capex hurdle rates (>WACC+2pp); Adjustment—monitor without mechanical cuts; Recession—activate asset-lightening playbooks.

Watch band (BI≥1.5): Expansion—hard net debt/EBITDA covenants and pre-M&A goodwill audits; Adjustment—prioritize cash harvesting and structural repair; Recession—time-bound debt restructuring and asset disposals.

Danger band (BI≥2.0): Expansion—suspend capacity expansions and switch KPIs from revenue to cash generation; Adjustment—freeze non-core investments; Recession—accelerate asset-lightening, disposals and restructuring with revised incentive contracts.

(2) Differentiation by actor

Regulators: standardize BI disclosure in periodic reports; adopt staged early-warning for BI≥1.5; require sensitivity tables (ΔEPS vs. ΔBI) structured by the expansion-positive/recession-negative/adjustment-insignificant evidence.

Banks/Creditors: index revolving credit and restructuring clauses to BI bands; in expansion (positive), offer conditional credit plus inventory/AR audits; in recession (negative), prioritize structured workouts over simple rollovers with disposal milestones.

Corporate managers: in expansion, enforce cash-flow–profit alignment and investment discipline; in adjustment, exploit the reversibility window; in recession, execute disposals, downsizing, and cost-flex measures.

Investors/Boards: integrate BI into stewardship and voting; for 1.0≤BI<1.5, deepen engagement; for BI≥1.5 without corroborating cash-flow evidence, vote against large CAPEX/M&A.

(3) Sectoral nuance

Asset-heavy sectors (e.g., real estate, heavy manufacturing): earlier triggers (e.g., warning at BI≥0.9); stage-gate mechanisms for construction-in-progress.

Asset-light sectors (e.g., software, services): focus on AR quality and customer concentration; cap goodwill-driven M&A and link to cash-flow improvements.

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