Proceedings of ICILLP 2026 Symposium: Comparative Politics and Legal Frameworks in Policy Development
DOI: 10.54254/2753-7048/2026.JO37111

How the Lean Startup Methodology Affects Enterprise Capital Allocation Efficiency

Chenrui Cao

School of Art, Wuhan University, Wuhan, China
17783007235@163.com

Abstract. Inefficient corporate investment is a typical manifestation of misallocated resources in capital markets, and traditional governance models can hardly effectively alleviate the inherent uncertainty in investment decision-making. This paper incorporates the Lean Startup Methodology (LSM) into empirical research on capital allocation efficiency. Based on data of A-share listed manufacturing companies in China from 2012 to 2022, it constructs a Lean Startup Practice Index (LSM) using textual analysis, and conducts empirical analysis with a two-way fixed effects model and a two-step mechanism testing framework. The study finds that lean startup practices can significantly inhibit inefficient investment in manufacturing enterprises, and the effect works mainly through three transmission paths: alleviating financing constraints, reducing information asymmetry, and promoting digital transformation. Heterogeneity analysis further shows that this inhibitory effect is more pronounced in non-state-owned enterprises and small and medium-sized enterprises. This paper not only expands the application boundary of lean startup, but also provides new ideas for enterprises to optimize capital allocation based on management process improvement.

Keywords: Lean Startup, Inefficient Investment, Over-investment, Financing Constraints, Information Asymmetry

1. Introduction

After more than 30 years of rapid development, China's capital market has become the world's second-largest stock market. However, compared with the rapid expansion of market size, the problem of low capital allocation efficiency among listed companies still persists. The long-standing "dual-track" phenomenon of coexisting over-investment and under-investment has always been a core challenge restricting the rational allocation of capital factors in China's A-share market. According to calculations based on Richardson's classic residual model, a considerable proportion of listed companies in China's A-share market have investment levels that deviate seriously from the optimal scale [1]. On the one hand, driven by abundant free cash flow, some enterprises tend to build "corporate empires" through blind mergers and acquisitions and disorderly capacity expansion, resulting in over-investment [2]. On the other hand, a large number of enterprises facing financing constraints are forced to abandon good projects with positive net present value due to high external financing costs and severe information asymmetry, leading to under-investment [3].

© 2026 The Authors. This is an open access article distributed under the terms of the Creative Commons Attribution License 4.0 (https://creativecommons.org/licenses/by/4.0/).

DOI: 10.54254/2753-7048/2026.JO37111

Facing the persistent problem of inefficient investment, traditional studies mainly seek solutions from two perspectives: governance mechanisms and external regulation. In terms of governance mechanisms, most studies discuss the improvement effect of internal governance factors such as corporate governance and information disclosure regulation on investment efficiency; in terms of external regulation, external mechanisms such as analyst coverage and media oversight have also been extensively studied. However, when making major investment decisions, management usually faces an uncertain market environment and ambiguous profit signals. Even if management has good motives and performs their duties diligently, traditional external governance mechanisms can hardly fundamentally reduce trial-and-error costs and the risk of misjudgment in investment decision-making [4]. Therefore, how to find a brand-new path from management practices that can systematically reduce information asymmetry and uncertainty in decision-making has become a breakthrough to reverse low capital allocation efficiency.

The Lean Startup Methodology (LSM) was systematically proposed by Ries [5] and further popularized by Blank [6]. It is designed to address how startups develop new products in an uncertain environment. The method covers three core links: first, the fast feedback loop of "build-measure-learn", that is, completing the initial construction of a product in a short time, conducting quantitative measurement through market data, and learning and adjusting quickly accordingly; second, the Minimum Viable Product (MVP), which brings the product to market in the simplest and lowest-cost way to obtain real customer feedback; third, iteration driven by customer feedback, rejecting "waterfall" development. Its logic of low-cost trial and error and rapid iteration aligns with the ideas of real options theory. Therefore, LSM may also have a profound impact on internal investment decisions that rely on large long-term capital input.

Based on the above theoretical and practical background, this paper proposes the following core research questions: Can the implementation of lean startup practices in daily operations effectively inhibit inefficient investment? What is the internal transmission mechanism of this effect? Are there significant heterogeneity differences in this impact among different types of enterprises? By in-depth discussion of this issue, the applicable boundary of lean startup can be effectively expanded from the micro-level of product development and entrepreneurship management to the macro-level of corporate finance and capital allocation.

This paper takes A-share listed manufacturing companies from 2012 to 2022 as research samples, constructs a firm-level Lean Startup Practice Index (LSM Index) using textual analysis, and conducts empirical tests with a two-way fixed effects model. The study shows that lean startup practices (LSM) can significantly inhibit inefficient investment in manufacturing enterprises, and this inhibitory effect is mainly achieved by alleviating financing constraints, reducing information asymmetry, and promoting digital transformation. Meanwhile, heterogeneity analysis finds that this effect is more prominent in private enterprises and small and medium-sized enterprises.

Accordingly, the marginal contributions of this paper are as follows: it breaks the existing analytical paradigm that only discusses inefficient investment based on corporate governance and external regulation, introduces lean startup into the analytical framework of enterprise investment decision-making for the first time, and enriches the empirical evidence of dynamic capabilities theory in micro-level corporate financial decision-making. In terms of empirical contribution, it constructs an LSM practice index suitable for China's institutional context through textual analysis, and conducts systematic mechanism tests strictly following the two-step framework proposed by Jiang Ting, providing reliable empirical support for causal identification. In terms of practical contribution, it provides operable management suggestions for enterprise managers on how to optimize investment decisions and reduce blind expansion by introducing lean startup thinking.

DOI: 10.54254/2753-7048/2026.JO37111

2. Literature review and hypothesis development

2.1. Causes of inefficient investment

Regarding the causes of inefficient investment, the academic circle usually conducts discussions around agency theory and information asymmetry theory.

For the phenomenon of over-investment, Jensen's free cash flow agency cost hypothesis points out that when enterprises have abundant free cash flow, management, out of the self-interest of building a "corporate empire", tends to invest cash in projects with negative net present value. Subsequent studies by Lang et al. and Shleifer & Vishny further confirm that managerial entrenchment is a key driver of over-investment [7, 8].

For the problem of under-investment, the financing constraint theory holds that due to the existence of information asymmetry, external investors cannot accurately assess the true investment value of enterprises, thus requiring a higher risk premium. The "lemon premium" proposed by Hubbard forces enterprises, especially small and medium-sized enterprises with high growth but lack of collateral, to abandon a large number of investment opportunities with positive net present value, thus showing under-investment [9]. Studies by Almeida & Campello and Hadlock & Pierce also show that asset tangibility and firm size are key factors affecting the degree of financing constraints [10, 11].

Overall, current literature mostly focuses on optimizing the external governance environment and improving incentive mechanisms, and rarely explores whether management methods and decision-making mechanisms can reduce investment uncertainty from the perspective of internal management process changes in enterprises.

2.2. Economic consequences of the lean startup methodology

As a systematic management philosophy, the Lean Startup Methodology (LSM) was first proposed by Ries in his book *The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses* [5]. Ries points out that the traditional "waterfall" product development model is prone to resource waste in an uncertain market environment. Correspondingly, LSM emphasizes continuously revising product direction and business models driven by market feedback through the rapid iteration cycle of "build-measure-learn". Blank later pointed out in *Harvard Business Review* that it is not only a strategy for startups, but also an effective tool for internal innovation in large enterprises [6].

Sorting out existing empirical findings, current research on LSM mostly focuses on entrepreneurship management and new product innovation performance. A study by Shepherd & Gruber published in *Entrepreneurship Theory and Practice* indicates that startups adopting LSM concepts have higher Product-Market Fit and significantly higher survival rates [12]. A study by domestic scholar Li Zhijun et al. also finds that there is a significant positive correlation between the degree of lean practices and enterprise innovation performance in Chinese enterprises [13].

Although existing empirical evidence shows that LSM can promote product innovation and improve the survival probability of startups, can LSM affect major capital expenditure decisions of enterprises? Can it improve capital allocation efficiency by changing enterprises' investment thinking patterns? At present, there is a lack of direct test on the relationship between LSM and capital allocation efficiency.

DOI: 10.54254/2753-7048/2026.JO37111

2.3. Theoretical mechanism and research hypotheses

This paper introduces Dynamic Capabilities Theory and Real Options Theory. Among them, the dynamic capabilities theory proposed by Teece emphasizes that enterprises need to obtain competitive advantages by reconfiguring resources and building new capabilities [14]. LSM is the concrete embodiment of dynamic capabilities in enterprise management practices. Meanwhile, Dixit & Pindyck point out that for investment decisions facing uncertainty, enterprises can obtain key information through small-scale pilot investment, so as to avoid direct large-scale and irreversible sunk cost investment, thereby improving investment efficiency [15].

Based on the above theoretical basis, this paper argues that LSM inhibits inefficient investment mainly through the following three paths:

Path 1: Alleviating financing constraints (Hypothesis H2). LSM advocates building MVP at the lowest cost, thereby reducing capital investment in the initial stage of the project, reducing dependence on external high-cost financing, and further alleviating financing constraints.

Path 2: Reducing information asymmetry (Hypothesis H3). LSM requires the management team to interact with the market and customers frequently, and reduces information asymmetry between management and external investors through more frequent information disclosure, thus reducing adverse selection and moral hazard.

Path 3: Promoting digital transformation (Hypothesis H4). The implementation of LSM relies on digital means for rapid data collection and analysis, which can force enterprises to undergo digital transformation and improve organizational efficiency and the rationality of investment decision-making.

Accordingly, this paper proposes the following research hypotheses:

• H1: Lean startup practices (LSM) can significantly inhibit inefficient investment of enterprises.

• H2: Lean startup practices (LSM) can inhibit inefficient investment by alleviating financing constraints.

• H3: Lean startup practices (LSM) can inhibit inefficient investment by reducing information asymmetry.

• H4: Lean startup practices (LSM) can inhibit inefficient investment by promoting digital transformation.

3. Empirical design

3.1. Sample selection and data sources

This paper selects Shanghai and Shenzhen A-share listed manufacturing companies from 2012 to 2022 as the initial research sample. Financial and governance data are from the CSMAR (China Stock Market & Accounting Research) Database; lean startup textual data are extracted from the "Management's Discussion and Analysis" section of listed companies' annual reports, which have been crawled by Python web crawler and processed with Jieba word segmentation.

The sample screening criteria are as follows: ① Exclude financial industry samples; ② Exclude ST, *ST and PT samples; ③ Exclude insolvent samples with asset-liability ratio greater than 1; ④ Exclude observations with missing core variables (LSM index, degree of inefficient investment and main control variables). After the above four steps of screening, the initial sample obtains a total of 54,346 valid "firm-year" observations; after further focusing on the manufacturing subsample, the baseline regression part finally adopts 11,039 valid observations.

DOI: 10.54254/2753-7048/2026.JO37111

3.2. Model construction

To test Hypothesis H1, this paper sets the following two-way fixed effects model for baseline regression analysis:

$$Inefficiency_{i,t} = \alpha_0 + \alpha_1 LSM_{i,t} + \sum \beta_k Controls_{i,t}^k + \mu_i + \lambda_t + \varepsilon_{i,t} \quad (1)$$

Where i represents the enterprise and t represents the year. $Inefficiency_{i,t}$ represents the degree of inefficient investment of the i-th enterprise in year t; $LSM_{i,t}$ represents the core explanatory variable, the Lean Startup Practice Index; $Controls_{i,t}^k$ is a series of firm-level control variables; μ_i is the unobservable time-invariant firm fixed effect, used to absorb inherent time-invariant heterogeneity among different enterprises; λ_t is the year fixed effect, used to absorb common time-varying trends such as macroeconomic fluctuations and industrial policy shocks; $\varepsilon_{i,t}$ is the random error term.

In addition, to verify the mediating role of mechanism variables (financing constraints, information asymmetry, digital transformation) in the process of LSM inhibiting inefficient investment, this paper follows the two-step approach framework proposed by Jiang Ting for mechanism testing [16]. The first step has been completed in the baseline regression model (Equation 1), verifying the direct effect of X on Y. The second step is to establish a regression equation between LSM and the mechanism variable $M_{i,t}$:

$$M_{i,t} = \beta_0 + \beta_1 LSM_{i,t} + \sum \gamma_k Controls_{i,t}^k + \mu_i + \lambda_t + \varepsilon_{i,t} \quad (2)$$

Where $M_{i,t}$ represents three mechanism variables: financing constraints (KZ), information asymmetry (ASY1) and digital transformation (DIGI) respectively. If the coefficient β_1 of $LSM_{i,t}$ in Equation (2) is significant, it indicates that the mechanism path is valid.

3.3. Variable selection

3.3.1. Explained variable: degree of inefficient investment (inefficiency)

Calculated based on the classic residual model proposed by Richardson [1]. Taking firm growth opportunities, financial leverage, cash flow, listing age, asset size and the previous year's new investment expenditure as explanatory variables, OLS regression is conducted by industry and by year, and the absolute value of regression residuals is used as the proxy variable for the degree of inefficient investment; residuals greater than 0 are defined as over-investment, and residuals less than 0 are defined as under-investment.

3.3.2. Core explanatory variable: lean startup practice index (LSM)

With the help of text mining technology, based on the text of "Management's Discussion and Analysis" in listed companies' annual reports, this paper counts the frequency of terms related to lean startup, adds 1 and takes the logarithm to reduce distribution skewness, and finally obtains the LSM index.

DOI: 10.54254/2753-7048/2026.JO37111

3.3.3. Mediating variables

Financing constraints (KZ Index): Drawing on the calculation methods of Hadlock & Pierce and Kaplan & Zingales [11, 17], it is calculated by comprehensively using indicators such as operating cash flow, cash dividends, cash holding ratio, asset-liability ratio and Tobin's Q. The larger the KZ index, the higher the degree of financing constraints.

Information asymmetry (ASY1): Adopting the ASY1 index from the perspective of stock liquidity, it measures the bid-ask spread and illiquidity characteristics in stock trading.

Digital transformation (DIGI): Counting the annual word frequency of digital keywords such as "artificial intelligence", "big data" and "cloud computing" in annual reports and taking the logarithm.

3.3.4. Control variables

Referring to existing literature, this paper selects firm asset size (Size, natural logarithm of total assets), financial leverage ratio (Lev, total liabilities / total assets), growth opportunities (Growth, Tobin's Q), cash flow condition (Cash, net cash flow from operating activities / total assets), and firm age (Age, measured by the difference between the current observation year and the listing year). In addition, a state-owned enterprise dummy variable (SOE) is added in heterogeneity analysis.

3.3.5. Fixed effects

In empirical regression, this paper uniformly controls for firm fixed effects and year fixed effects, so as to mitigate the potential interference of time-invariant firm individual heterogeneity and individual-invariant macro time trends on regression results.

3.4. Descriptive statistics

Table 1. Descriptive statistics of main variables

Variable Name	Number of Observations (N)	Mean	Standard Deviation (Std.Dev.)	Minimum (Min)	Maximum (Max)
Degree of inefficient investment (inefficiency)	28,349	0.0441	0.0526	0.0005	0.3218
Lean Startup (LSM)	28,349	0.0049	0.0075	0.0000	0.0278
Asset size (Size)	28,349	21.9051	1.1975	19.28	25.42
Financial leverage ratio (Lev)	28,349	0.4456	0.2095	0.0658	1.1421

DOI: 10.54254/2753-7048/2026.JO37111

Growth opportunities (Growth)	27,816	2.0784	1.3742	0.8811	8.9953
Cash flow condition (Cash)	28,349	2.0784	0.0810	0.8811	0.3081
Firm age (Age)	28,349	9.8209	6.4140	2	27

(Note: The above results are based on manufacturing data winsorized at the 1st and 99th percentiles. The baseline regression and subsequent heterogeneity analysis of this paper focus on the manufacturing over-investment subsample, with 11,039 valid observations.)

Table 1 presents the descriptive statistics of core variables in the overall manufacturing sample. The number of valid observations for each main variable is basically 28,349 (the sample size of growth opportunities is slightly smaller due to missing data, at 27,816). The mean of the explained variable, degree of inefficient investment (inefficiency), is 0.0441, with a standard deviation of 0.0526, indicating that there are distribution differences in the degree of inefficient investment among manufacturing enterprises. The mean of the core explanatory variable, Lean Startup (LSM), is 0.0049, with a standard deviation of 0.0075, indicating that the overall level of lean startup practices in sample enterprises is not high, but there are certain distribution differences.

Table 2. Multicollinearity test results (VIF test)

Variable	VIF	1/VIF
Growth opportunities (Growth)	11.76	0.085
Financial leverage ratio (Lev)	11.63	0.086
Asset size (Size)	1.21	0.8276
Firm age (Age)	1.16	0.864
Cash flow condition (Cash)	1.02	0.9821
Lean Startup (LSM)	1.01	0.9878
Mean VIF	4.63	

(Note: The mean VIF is 4.63, far less than 10, indicating that there is no serious multicollinearity problem in the model.)

Table 2 shows the specific test values of the Variance Inflation Factor (VIF) among the main variables. The results show that the overall mean VIF of the model is 4.63, far below the empirical critical value of 10, indicating that there is no serious multicollinearity problem in the model setting, and the core variables have strong independence, which is suitable for subsequent multivariate regression analysis.

4. Empirical analysis

4.1. Baseline regression

Table 3. Baseline regression results: the impact of lean startup on inefficient investment

Variable	Manufacturing Subsamples

DOI: 10.54254/2753-7048/2026.JO37111

LSM	-0.254** (-2.223)
Size	0.021** (-2.325)
Lev	0.003 -0.485
Growth	0.000 (0.130)

DOI: 10.54254/2753-7048/2026.JO37111

Table 3. (continued)

Cash	0.348 (-1.102)
Age	-0.002 (-0.458)
Constant	-0.449** (-2.037)
Observations	11,039
R-squared	0.21
Firm Fixed Effects	YES
Year Fixed Effects	YES

Note: t-statistics are in parentheses; ***, **, * indicate significance at the 1%, 5% and 10% levels, respectively.

Table 3 presents the estimation results of the baseline regression. When the model focuses on the manufacturing subsample, the estimated coefficient of LSM is significantly -0.254, and it is significant at the 5% level()**. This result strongly supports Hypothesis H1, that is, lean startup practices can significantly inhibit inefficient investment in manufacturing enterprises.

4.2. Robustness checks

To verify the reliability of the baseline regression conclusions, this study conducts two sets of robustness tests.

Robustness 1: Excluding municipality samples.

Municipalities directly under the central government (Beijing, Shanghai, Tianjin, Chongqing) are distinguished from other provinces in terms of policy resource endowments and marketization levels. To prevent such regional institutional endowment advantages from driving the baseline regression results, this paper excludes samples registered in the above four municipalities and conducts regression. The results show that the regression coefficient of LSM is negative and remains significant at the 5% level, proving that the main regression results are not interfered by the special policy environment of municipalities.

Robustness 2: Excluding samples during the 2015 stock market crash.

China's A-share market experienced severe systemic volatility in 2015, and such external shocks may lead to distortions in enterprise investment behavior. This paper excludes the 2015 sample and re-runs the regression. The results show that the direction and significance of the LSM coefficient have not changed substantially, and the conclusion remains robust.

In addition, this paper also replaces the degree of inefficient investment with a dummy variable of "whether there is inefficient investment" and conducts Logit model regression, and the results still support the baseline conclusion.

Table 4. Robustness test results

Variable	(1) Excluding municipalities	(2) Excluding 2015 stock market crash
LSM	-0.243** (-2.112)	-0.238** (-2.058)

DOI: 10.54254/2753-7048/2026.JO37111

Table 4. (continued)

Size	0.021** (-2.244)	0.020** (-2.165)
Control variables	YES	YES
Fixed effects	YES	YES
Observations	10,637	10,814

4.3. Heterogeneity analysis

Heterogeneity 1: Grouping by firm size.

This paper takes the median of asset size within the industry by year as the classification standard, and divides the manufacturing subsample into two groups: "large-scale enterprises" and "small and medium-sized enterprises". The regression results show that the inhibitory effect of LSM on inefficient investment in the SME group is significant at the 5% level()**, while the coefficient in the large-scale enterprise group is not significant. The internal logic is that SMEs are inferior to large enterprises in terms of financial strength and governance structure, with tighter financing constraints and higher investment uncertainty. Therefore, the concept of lean startup has a more significant management optimization effect on SMEs.

Supplementary verification: Interaction term test.

To further verify the moderating role of firm size, this paper adds the interaction term LSM_Size of LSM and firm size Size into the regression equation. The regression results show that the coefficient of the interaction term is -0.573, and it is highly significant at the 1% level(*)**. This means that with the increase of firm size, the inhibitory effect of lean startup on over-investment will be significantly amplified, which may be due to the fact that larger enterprises have stronger organizational execution capacity and more abundant resources to support the specific implementation of lean startup.

Heterogeneity 2: Grouping by property rights nature.

This paper also divides the sample into two groups: "state-owned enterprises" and "private enterprises" according to the nature of the ultimate controllers. The regression results find that in private enterprises, the inhibitory effect of LSM is extremely significant at the 1% level(*)**, while it is not significant in state-owned enterprises. The reasons behind this are as follows: private enterprises face more intense market competition and higher survival pressure, and their organizational structure is generally flatter, with a more flexible management decision-making mechanism. Therefore, the management style of lean startup is easier to implement, thus producing a significant inhibitory effect. However, the investment decisions of state-owned enterprises are greatly affected by non-market factors, so it is difficult for the positive role of LSM to be fully exerted.

Table 5. Robustness test results

Variable	(1) Large-scale enterprises	(2) SMEs	(3) SOEs	(4) Private enterprises
LSM	-0.094 (-0.837)	-0.351*** (-2.644)	-0.071 (-0.710)	-0.338*** (-2.942)
Control variables	YES	YES	YES	YES

DOI: 10.54254/2753-7048/2026.JO37111

Table 5. (continued)

Fixed effects	YES	YES	YES	YES
Observations	5,942	5,096	5,373	5,665

4.4. Mechanism tests

To test the internal transmission paths of LSM inhibiting inefficient investment, this paper examines the following mechanism paths.

Mechanism 1: Financing constraints (KZ Index).

Taking the KZ index as the dependent variable, the results show that the regression coefficient of LSM is -10.891, and it is highly significant at the 1% level(*)**. This indicates that lean startup practices can effectively reduce the degree of financing constraints of enterprises.

Mechanism 2: Information asymmetry (ASY1).

Taking the ASY1 index as the dependent variable, the regression results show that the regression coefficient of LSM is -3.249, significant at the 1% level(*)**. This indicates that lean startup practices can effectively weaken the information barrier between enterprise insiders and external investors. The reduction of information asymmetry can lower the risk premium required by external investors due to concerns about adverse selection, thus helping to alleviate the dilemma of under-investment.

Mechanism 3: Digital transformation (DIGI).

Taking the DIGI index as the dependent variable, the regression results show that the regression coefficient of LSM is 151.074, and it is significant at the 10% level(*). After winsorizing at the 1st and 99th percentiles, this result remains robust. This indicates that lean startup practices can promote the digital transformation of enterprises, bringing more efficient information processing capacity and faster market response capacity, thereby effectively inhibiting inefficient investment.

In summary, Hypotheses H2, H3 and H4 are all supported by empirical data. In terms of the relative magnitude of explanatory power, the two mechanisms of financing constraints and information asymmetry are extremely significant, indicating that alleviating financing constraints and reducing information asymmetry are the most direct transmission paths in the process of lean startup inhibiting inefficient investment.

Table 6. Mechanism test results

Variable	(1) KZ Index	(2) ASY1	(3) DIGI
LSM	-10.891*** (-3.621)	-3.249*** (-3.053)	151.074* (-1.899)
Control variables	YES	YES	YES
Fixed effects	YES	YES	YES
Observations	54,346	54,346	54,346

4.5. Extended analysis (moderating effect)

This paper also directly incorporates the LSM_Size interaction term into the regression model of the over-investment subsample for testing.

DOI: 10.54254/2753-7048/2026.JO37111

The regression results show that the coefficient of the LSM_Size interaction term is -0.573, and it is significant at the 1% level(*)**. This also provides richer evidence for the conclusion that lean startup has a significant inhibitory effect on over-investment.

The economic implication of this effect is that for larger enterprises, they often accumulate rich management experience and financial resources internally. When such enterprises decide to implement lean startup practices, their internal systematization capabilities can better undertake the process requirements of lean startup, thereby amplifying the inhibitory effect on over-investment. Therefore, for large enterprises that have already reached a certain scale, introducing lean startup thinking and improving internal trial-and-error mechanisms is an effective management means to improve long-term investment efficiency and avoid inefficient expansion.

Table 7 Moderating effect results (LSM×size)

Variable	(1) Over-investment group
LSM	-0.420** (-1.998)
LSM_Size	-0.573*** (-2.643)
Control variables	YES
Fixed effects	YES
Observations	11,039

5. Conclusion and implications

5.1. Research conclusions

Taking China's A-share listed manufacturing companies from 2012 to 2022 as research samples, this paper systematically explores the impact of the Lean Startup Methodology (LSM) on inefficient enterprise investment and its mechanism, and draws the following core conclusions:

First, empirical evidence shows that lean startup practices can significantly restrain inefficient investment of enterprises.

In the manufacturing subsample, the regression coefficient of LSM is -0.254 and significant at the 5% level, proving that lean startup is a management thinking that can effectively optimize internal capital allocation of enterprises.

Second, lean startup plays an inhibitory role mainly through three specific mediating paths: alleviating financing pressure, reducing the degree of information asymmetry, and promoting enterprise digital transformation.

Third, lean startup plays an inhibitory role mainly through three specific mediating paths: alleviating financing pressure, reducing the degree of information asymmetry, and promoting enterprise digital transformation.

In the private enterprise sample, the inhibitory coefficient of LSM is extremely significant at the 1% level; in the SME sample, the inhibitory coefficient of LSM is significant at the 5% level. Meanwhile, the coefficient of the interaction term between LSM and Size is significantly negative (-0.573), further proving that firm size is an important moderating factor affecting the role of LSM.

DOI: 10.54254/2753-7048/2026.JO37111

5.2. Policy and managerial implications

For enterprise managers, managers should not narrowly understand lean startup as the exclusive property of startups. For listed large and medium-sized enterprises, introducing the concepts of "low-cost trial and error, customer feedback-driven, rapid iteration" of lean startup into the major investment decision-making process can effectively avoid blind expansion and over-investment caused by management's overconfidence or insufficient information, thereby effectively improving the capital allocation efficiency of enterprises.

For policy makers, capital market regulators should not only focus on information transparency and corporate governance compliance. Policy makers should actively guide and encourage listed companies, especially private enterprises and SMEs, to introduce agile and data-driven decision-making processes in internal management practices. Meanwhile, through improving the construction of a multi-level capital market, provide more diversified external financing channels for private enterprises and SMEs, so that the "boosting" effect of lean startup on investment efficiency can be more fully supported by institutions.

5.3. Research limitations and future directions

This study has certain limitations. First, the LSM index is constructed based on annual report textual analysis, which itself is affected by enterprises' information disclosure strategies and writing styles, and there may be measurement bias. Second, this study is only limited to China's A-share listed manufacturing companies, and the generalizability of the conclusions to other industries and non-listed companies needs to be further verified in the future. Finally, limited by the availability of external instrumental variable data, this paper mainly relies on the two-way fixed effects model for causal identification. Future research can try more rigorous exogenous shocks (such as the pilot of the "mass entrepreneurship and innovation" policy) or use the difference-in-differences (DID) method for more rigorous causal identification.

References

[1] Richardson, S. (2006). Over-investment of free cash flow. *Review of Accounting Studies, 11*(2-3), 159-189.
[2] Jensen, M. C. (1986). Agency costs of free cash flow, corporate finance, and takeovers. *The American Economic Review, 76*(2), 323-329.
[3] Fazzari, S. M., Hubbard, R. G., & Petersen, B. C. (1988). Financing constraints and corporate investment. *Brookings Papers on Economic Activity, 1988*(1), 141-206.
[4] Bloom, N., Bond, S., & Van Reenen, J. (2007). Uncertainty and investment dynamics. *The Review of Economic Studies, 74*(2), 391-415.
[5] Ries, E. (2011). *The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses.* Crown Business.
[6] Blank, S. (2013). Why the lean start-up changes everything. *Harvard Business Review, 91*(5), 63-72.
[7] Lang, L. H. P., Stulz, R. M., & Walkling, R. A. (1991). A test of the free cash flow hypothesis: The case of bidder returns. *Journal of Financial Economics, 29*(2), 315-335.
[8] Shleifer, A., & Vishny, R. W. (1989). Management entrenchment: The case of manager-specific investments. *Journal of Financial Economics, 25*(1), 123-139.
[9] Hubbard, R. G. (1998). Capital-market imperfections and investment. *Journal of Economic Literature, 36*(1), 193-225.
[10] Almeida, H., & Campello, M. (2007). Financial constraints, asset tangibility, and corporate investment. *The Review of Financial Studies, 20*(5), 1429-1460.
[11] Hadlock, C. J., & Pierce, J. R. (2010). New evidence on measuring financial constraints: Moving beyond the KZ index. *The Review of Financial Studies, 23*(5), 1909-1940.

DOI: 10.54254/2753-7048/2026.JO37111

[12] Shepherd, D. A., & Gruber, M. (2021). The lean startup framework: Closing the academic-practitioner divide. *Entrepreneurship Theory and Practice, 45*(5), 967-998.
[13] Li, Z. J., & Shang, Z. J. (2020). Construction of lean practice index of Chinese enterprises and its impact on performance. *Management World, 36*(7), 132-148.
[14] Teece, D. J. (2007). Explicating dynamic capabilities: The nature and microfoundations of (sustainable) enterprise performance. *Strategic Management Journal, 28*(13), 1319-1350.
[15] Dixit, A. K., & Pindyck, R. S. (1994). *Investment under Uncertainty.* Princeton University Press.
[16] Jiang, T. (2022). Mediating effect and moderating effect in empirical research on causal inference. *China Industrial Economy*, (5): 100-120. DOI:10.19581/j.cnki.ciejournal.2022.05.005.
[17] Kaplan, S. N., & Zingales, L. (1997). Do investment-cash flow sensitivities provide useful measures of financing constraints?. *The Quarterly Journal of Economics, 112*(1), 169-215.