

The Predictive Power of Early Investment Indices on Startup Exit Success

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Abstract. This research delves into the critical relation between investment factors and startup exit performance, aiming to refine venture capital strategy. It focuses on key investment indices with perspectives of the size of initial capital injections, the sequence and number of funding rounds, and the extent of venture capital involvement. Utilizing data from 39,030 firms, the study employs a Generalized Linear Model (GLM) for analysis. The results reveal a significant correlation between the selected investment indices and startup exit outcomes. By highlighting the influence of the financial indices, the research advances the understanding of effective venture capital strategies, emphasizing the importance of well-calibrated financial support and strategy for the growth and eventual success of startups.

Keywords: venture capital, investment indices, startup financial metrics, exit performance prediction

1. Introduction

In the pulsating heart of modern economic growth lies a dynamic interplay between venture capital (VC) and entrepreneurship. Venture capital, often envisioned as the lifeblood of innovative startups, provides not just financial capital but also mentorship, strategic guidance, and networking opportunities, propelling nascent ideas from infancy to market reality.

Startups, as emergent entities in this ecosystem, fueled by visionary zeal and the promise of disruptive innovation, responsible for generating significant economic and job growth [1].

Despite the extensive literature on the dyadic relationship between venture capital and startups, a nuanced understanding of specific investment indices and their implications is of paramount significance to investors, entrepreneurs, and policymakers alike. Such metrics, including the quantum of funds raised in initial rounds, the progression and sequencing of investment rounds, and the magnitude of venture capital commitment, are integral to discerning the evolution of startups from nascent stages to mature entities.

Several determinants lie behind a thriving startup: market relevance, adaptability [2], leadership prowess, and talent attraction and retention [3]. But how does venture capital integrate and influence these factors to enhance a startup's exit performance? Notably, exits, whether through acquisitions, mergers, or initial public offerings (IPOs), play a pivotal role in the startup ecosystem, often being viewed as a significant milestone and reflection of its success.

The objective of the research is to identify the relation between the performance of startups and their previous investment indices, aiming to clarify how the indices, which might serve as informational tools for investors, correlate with the success potential of startups, particularly in terms of the exit performance. The potential connection between investment indices and the ultimate success of startups might offer important insights for both investors and entrepreneurs. The understanding of the dynamics and mechanisms at play in startup financing and success can provide a more grounded perspective on the predictive value of investment indices in the startup ecosystem.

2. Literature review

2.1. The importance of exploring VC investment strategies

Venture capital firms are at the forefront of innovation, not only by providing necessary funding but also by employing strategic indices that significantly enhance the prospects of startup success. The strategies that guide VC investment decisions are critical, as they directly influence the growth of new ventures and the dynamism of the broader economy. By meticulously analyzing the strategic underpinnings of these investment decisions, such as the emphasis on the entrepreneur's background [4] and the startup's stage of development [5], researchers can uncover the patterns that lead to successful funding outcomes. These insights are invaluable; they not only inform emerging VC firms about effective investment practices but also enable entrepreneurs to tailor their pitches to meet the nuanced expectations of potential investors. Moreover, the strategic indices used by VCs are indicative of their expertise in identifying and nurturing potential within the startup ecosystem, which is essential for the sustained health of the venture capital market [6,7].

2.2. Characterizing the evolution of VC investment strategies

The trajectory of venture capital investment strategies can be segmented into distinct periods, each marked by characteristic approaches to startup evaluation. The foundational period was hallmarked by an emphasis on the entrepreneur's vision and leadership, with venture capitalists valuing the persuasive power of a compelling business plan and a charismatic founder [4]. As the industry entered the expansion period, the lens through which VCs viewed potential investments widened to include market dynamics and competitive advantage, reflecting a deeper appreciation for the startup's potential to disrupt or define markets [8].

With the advent of the strategic period, temporal indices such as the frequency and size of investment rounds became pivotal, signaling a startup's growth trajectory and the VC's commitment to long-term development [9]. This period was characterized by a strategic calibration of investment timing to the developmental milestones of startups. In the analytical period, the focus shifted towards a rigorous analysis of financial metrics and intellectual property, with VCs employing sophisticated financial models and diversification strategies to manage investment risk [5]. This period underscored the importance of a data-driven approach and the strategic specialization of VCs in certain industries or stages of business growth [10, 11].

Today's VC investment strategies represent an amalgamation of these periods, with a hybrid approach that intertwines the qualitative assessments of earlier times with the quantitative precision of contemporary finance. This approach is indicative of a mature industry that employs a comprehensive set of indices, combining past wisdom with current data analytic to navigate the complex startup landscape [6,12]. The evolution of these strategies is a testament to the VC

industry's adaptability and its relentless pursuit of optimizing investment decisions to foster innovation and generate substantial returns.

2.3. Contributions, gaps, and the value of financial indices

The corpus of literature on venture capital investment strategies has been instrumental in shaping the current methodologies employed by VCs. It has illuminated the multifaceted nature of VC decision-making, revealing the importance of both the entrepreneur's profile and the startup's strategic market position [8]. The research has also underscored the relevance of financial metrics and the timing of investment rounds in predicting the long-term viability and success of startups [5,9]. These studies have collectively contributed to a more structured and informed approach to venture investing, providing a robust framework that guides VCs in their pursuit of lucrative investments [6,7].

However, remains a notable lack of enough empirical studies on crowd fundings for VC's impact on startups. This gap is particularly evident in the systematic examination of financial parameters that could predict a startup's future performance. Current research has yet to fully delve into the nuances of investment indices such as initial funding proportions, overall financial support, the frequency and number of investment stages, the diversity of the investment consortium, and the investment period's duration. This lack of empirical focus on these areas may result in an incomplete understanding of a startup's potential. These indices are potentially crucial in revealing insights about a startup's operational efficiency, market acceptance, and financial health, making empirical studies in this domain highly beneficial for a more comprehensive evaluation of startup success factors.

This research seeks to delve into these less-explored financial indices, positing that a more granular analysis could yield valuable predictive insights. By integrating these financial parameters into the investment decision-making process, venture capitalists can gain a more comprehensive view of a startup's financial trajectory and risk profile. This enhanced perspective is not intended to replace existing strategies but to augment them, providing VCs with a more robust and multifaceted toolkit for investment evaluation.

3. Data analysis

In our dataset collected from the Kickstarter, a crowdfunding VC website, we observe detailed statistics about venture capital activities across 39030 firms from 826 industries. These firms have an average first-round capital raise of \$8,130,576, with the maximum being \$17,600,000,000 and a standard deviation of 99,128,956. The firms underwent an average of 2.05 investment rounds, with the number of VC firms participating in the first-round averaging at 2.03, albeit reaching as high as 24 in some cases. The dataset includes 4789 exited firms, with an exit rate of 12.30%, comprising 2.79% via initial public offering (IPO) and 9.50% through mergers and acquisitions (M&A). The average capital raised by these exited firms is \$59,609,396, with a range from \$1,500 to \$30,079,503,000, a median of \$13,000,000, and a standard deviation of 543,275,388.

Table 1. Statistic description

	No.	Mean	SD	Min	Max	Median
Overview						
Firms	3903 0					
Exited firms	4789					
Industries	826					
Funds	1273 6					
Overall Firms' characteristics						
Capital raised in first round (\$)	3903 0	8,130,576	99,128,956	1	17,600,000,000	1,095,747
Rate of capital raised in first round (fraction, %)	3903 0	0.7130603	0.3777446	5.0E-07	1	1
Rounds of investment	3903 0	2.050218	1.575937	1	19	1
No. of VC participated in first round	3903 0	2.027534	1.713142	1	24	1
Exited Firms' characteristics						
Exit rounds ¹	4789	2.597411	1.914189	1	18	2
Dollar exit rate ²	4789	59,609,396	543,275,388	1,500	30,079,503,000	13,000,000
(1) Dollar IPO rate ³	1088	160,798,578	1,103,771,935	4,000	30,079,503,000	36,666,000
(2) Dollar M&A rate ⁴	3701	29,862,346	141,849,165	1,500	5,820,000,000	10,000,000
Exit rate (% of portfolio companies exited)				12.30%		
(1) IPO rate (% of portfolio companies sold via IPO)				2.79%		
(2) M&A rate (% of portfolio companies sold via M&A)				9.50%		
¹ Exit rounds: number of rounds each firm raises if exits						
² Dollar exit rate: capital each firm raised if exits						
³ Dollar IPO rate: capital each firm raised if exits via IPO						
⁴ Dollar M&A rate: capital each firm raised if exits via M&A						

According to the data, potential variables will be extracted as listed in Table 2. Variables of Investment Indices.

Table 2. Variables of investment indices

Variable name	Variable description
Industry	An indicator variable equal to one if the startup belongs to high capital industries that are top 10% industries attracting the most investment capital, and zero otherwise, if the startup does not belong to high capital industries.
Location	An indicator variable equal to one if the startup locates in high capital regions that are top 10% regions conducting venture capital transaction most frequently, and zero otherwise, if the startup does not locate in those regions.
Ln(Timing)	The natural logarithm of days between the first round landing and the last round before exiting or liquidation.
Rounds	The number of investment rounds during the whole investment process.
VC participated degree	The degree of the number of venture capital participated in the investment process.
Ln(Capital avg)	The natural logarithm of amount of average capital raised each round (\$).
Ln(Capital 1st)	The natural logarithm of amount of capital raised in first round (\$).
Capital rate 1st	The rate of capital raised in first round (fraction, %).
Exit	An indicator variable equal to one if the startup exits (IPO, M&A) successfully, and zero otherwise.

The General Linear Model (GLM) is used to identify the implications of investment indices:

$$\text{Exit}_i = \beta_1 \cdot \text{Industry}_i + \beta_2 \cdot \text{Location}_i + \beta_3 \cdot \ln \text{Timing}_i + \beta_4 \cdot \text{Rounds}_i + \beta_5 \cdot \text{VC participated}_{\text{degree}_i} + \beta_6 \cdot \ln \text{Capital}_{\text{avg}_i} + \beta_7 \cdot \ln \text{Capital}_{\text{1st}_i} + \beta_8 \cdot \text{Capital rate}_{\text{1st}_i} + \lambda_i + \varepsilon_i$$

The regression analysis presented in Table 3. Regression results offer a detailed examination of the factors influencing the success of startup exits.

Startups in high capital industries have a significantly higher likelihood of a successful exit, as evidenced by the coefficient of 1.0876. This strong positive impact, with a statistical significance at 0.1% level, underscores the importance of industry type in the success of a startup.

The coefficient for location is 0.82198, indicating a substantial positive effect on the likelihood of a successful exit. This finding, with a statistical significance at 0.1% level (p-value < 2e-16), suggests that startups located in top venture capital regions are more likely to achieve successful exits. The prominence of location in the venture capital ecosystem is thus reaffirmed by this significant statistical evidence.

The timing between the first and last funding rounds, with a coefficient of 0.000497, reveals that longer periods between funding rounds positively influence the exit rate. This result, significant at the 0.1% level, provides valuable insights for startups in planning their fundraising strategies.

The variable of investment rounds, with a coefficient of 0.233481 and a statistical significance at 0.1% level, is positively correlated with successful exit outcomes. More investment rounds tend to

increase the chances of a successful exit, where the relationship highlights the importance of sustained investment support for startups.

The degree of venture capital participation, measured by a coefficient of 0.085629 statistically significant at 0.1% level, indicates that startups funded by a larger number of VCs have a higher probability of a successful exit. This finding highlights the benefit of diverse venture capital support in the startup ecosystem.

The coefficient of the natural logarithm of average capital raised at each round is 9.04E-09 and is statistically significant at 0.1% level. The average of capital raised at each round has positive impacts in exit behavior. Firms with higher average of capital raised at each round has better performance in exit rate. In addition, the coefficient of the amount of the fund raised in angel round is 5.075E-09 and is statistically significant at 0.1% level. The coefficient of angel round proportion is -0.953 and is statistically significant at 0.1% level. These state that the financing scale of angel round exerts impact on the exit status. More raised amount in angel round will increase the successful exit rate, while startups need to engage in more rounds of funding with larger scale of capital to enhance their exit performance.

Table 3. Regression results

	Estimate	Std. Error	z-value	Pr(> z)	Significance
Industry	1.0876	0.0952	11.43	<2e-16	***
Location	0.82198	0.03754	21.89	<2e-16	***
ln(Timing)	4.97E-04	1.61E-05	30.83	<2e-16	***
Rounds	0.233481	0.007185	32.49	<2e-16	***
VC participated degree	0.085629	0.003439	24.9	<2e-16	***
ln(Capital avg)	9.04E-09	5.14E-10	17.6	<2e-16	***
ln(Capital 1st)	5.075E-09	1.196E-09	4.242	0.0000221	***
Capital rate 1st	-0.9525	0.1153	-8.262	< 2e-16	***

4. Discussion

4.1. Insights from data analysis

4.1.1. The impact of initial funding on exit success

The initial capital infusion a startup receives is a critical indicator of its future exit potential. The data analysis reveals that startups with higher initial funding have a greater likelihood of successful exits. This suggests that substantial initial investments may provide startups with the necessary resources to scale operations, invest in product development, and navigate market challenges effectively. The robustness of initial funding can be seen as a vote of confidence from investors, which may also attract further attention and resources from other stakeholders in the ecosystem.

4.1.2. The role of investment rounds in startup growth

The frequency and number of investment rounds are positively correlated with successful startup exits. This trend indicates that ongoing financial support is vital for the sustained growth of startups. Multiple rounds of funding allow startups to adapt to changing market conditions, iterate on product offerings, and refine their business models over time. The data suggests that a startup's ability to

secure continuous funding is a strong signal to the market of its growth potential and long-term viability.

4.1.3. Diversification of venture capital participation

A diverse group of venture capital investors contributes positively to the exit outcomes of startups. The involvement of multiple VCs brings not just capital but also a wealth of knowledge, networks, and mentorship to the startup. This diversity in support helps startups to leverage a wide range of insights and expertise, which can be pivotal in navigating the complexities of scaling a business and achieving a successful exit.

4.1.4. The significance of investment duration

The time span between the first and last investment rounds emerged as a significant factor in the success of startup exits. Longer investment periods may reflect a more measured and strategic approach to growth, allowing startups to develop their offerings and market position thoroughly. This finding highlights the importance of patience and long-term commitment from investors as startups work towards their exit goals.

4.2. Research limitations and avenues for future exploration

The limitations of this study are primarily related to the scope of the financial indices analyzed. While the research provides a detailed examination of specific financial metrics and their correlation with startup exit success, it does not encompass all possible factors that could influence outcomes. For instance, the interplay between the financial indices studied and the operational strategies of startups remains unexplored. Understanding how these financial metrics interact with a startup's internal decision-making processes, such as burn rate management and pivot agility, could offer deeper insights into the pathways to successful exits.

Furthermore, the analysis does not extend to the macroeconomic variables that can have a profound impact on startup success. Market volatility and regulatory changes are external factors that can alter the business landscape significantly. Future research could investigate how these broader economic conditions might affect the relationship between the financial indices identified and startup exit performance. This would provide a more holistic view of the venture capital ecosystem and the external forces that shape it.

By addressing these limitations, subsequent studies can enhance the current understanding of venture capital investment strategies and startup success, offering venture capitalists a more comprehensive framework for evaluating potential investments.

5. Conclusion

This study has systematically dissected the financial indices that venture capitalists consider when evaluating startups, providing a quantitative backbone to the art of venture investment. The findings affirm that the magnitude of initial funding, the cadence of investment rounds, the breadth of VC networks, and the strategic timing of financial support are pivotal to the exit success of startups. These insights not only validate the importance of financial due diligence but also highlight the strategic patience required for nurturing a startup to its full potential.

This research provides a factual understanding of how investment indices influence startup performance, thereby enhancing venture capital strategy. By analyzing various investment-related

factors, it becomes evident that these indices have significant implications for a startup's potential success and exit outcomes. This empirical approach offers a clear perspective on the decision-making process in venture capital, aligning investment strategies with data-driven insights.

However, the scope of this research is primarily focused on verifying the referential value of these investment indices for investors, confirming their utility in guiding investment decisions. Yet, the extent to which these indices can be reliably used as benchmarks for investment strategies remains an open question. This gap in understanding paves the way for further research in the field. Furthermore, testing and exploring additional investment indices are also crucial for deepening the understanding of the complex dynamics within the venture capital ecosystem.

The future research calls for an integrative approach that combines financial indices with operational strategies and macroeconomic trends. This comprehensive perspective promises to refine investment strategies further and enhance the predictive accuracy of startup success. It opens the door to a more nuanced understanding of the venture capital landscape, where financial support is intricately linked with broader economic and market dynamics.

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