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EXPLORING THE IMPACT OF POST-INVESTMENT MANAGEMENT ON INVESTMENT FUNDS

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Abstract

Post-investment management is an essential element in the functioning of equity investment funds. The question of whether post-investment management can improve the investment performance of investment funds is controversial. This article examines the impact of post-investment management on investment performance. The questionnaire survey data from 31 investment institutions and their equity funds data are adopted. The performance of investment funds is measured by the overall exit rate and the proportion of listed IPO exits for the robustness test. Post-investment management is measured by the scale of importance that investment institution employees evaluate their institutions' focus on post-investment management. The results show that post-investment management impacts the performance of investment funds positively in terms of fund exit rates. However, post-investment management has a limited impact in promoting the exit rate of investment funds. The level of post-investment management and investment funds exit rates exhibit an inverse U-shaped relationship. The finding highlights the significance of post-investment management within equity investment institutions. Nevertheless, investment institutions need to strike a balance between tapping and investing in potential firms and post-investment management. Excessive post-investment management may even reduce investment funds' performance. Hence, a moderate level of post-investment management is recommended.

Keywords: Post-investment Management, Investment Funds, Equity Investment, Investment Performance, Questionnaire Survey, China

JEL Classification: D25, G3

1. Introduction

Equity investment funds are commonly structured as partnerships between two entities: the Limited Partner (LP) and the General Partner (GP) (see Figure 1). LPs, e.g., rich individuals, financial institutions, pension funds, endowments, insurance firms, sovereign funds, etc.,

contribute capital to the fund. LPs commonly have limited liability and do not participate in the fund's management or decision-making process. GPs, known as fund managers, take responsibility for the operations and investment decisions of the equity fund while contributing a smaller portion of the fund's capital. GPs earn management fees, typically calculated as a percentage of the committed capital, e.g., 2%, which help cover operational costs. Additionally, GPs share in the fund's profits through carried interests, a percentage of the investment profits as outlined in the limited partnership agreement, e.g., 20%.

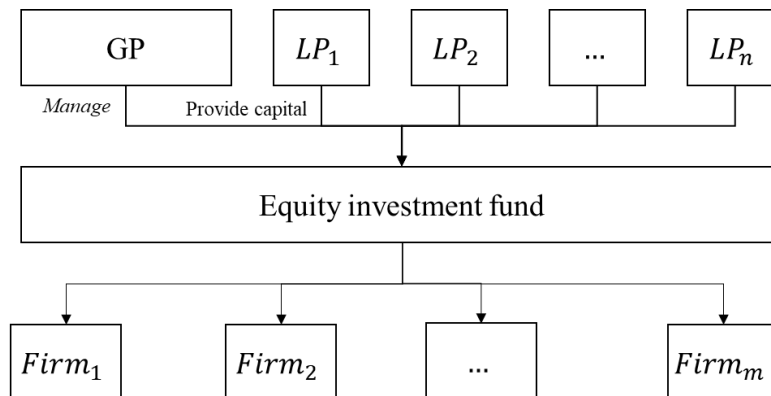


Figure 1. A typical structure of GP and LP-based equity investment funds

Post-investment management plays a crucial role in equity investment funds. Equity investors provide assistance and support with the objective of safeguarding and enhancing the value of invested firms during post-investment. The operational flow of equity investment funds is commonly divided into four stages, i.e., fundraising, investment, management, and exit. The fundraising stage is the beginning of the fund's operational activities. It aims to raise funds from LPs. GPs function as both fundraisers and administrators, responsible for the operational management of the fund in accordance with the fund contract's provisions. In the investment stage, equity fund managers try to find target firms and gather information, followed by negotiation and signing of investment agreements. The funds are then invested in the firms. The management stage involves assigning dedicated professionals to monitor the development progress of the invested firms, facilitate industry resources, and enhance the growth rate and performance. The exit stage represents the harvest phase of equity fund investments. Typically, equity investment funds have a predetermined lifespan, e.g., a common model is the "5+2" model, wherein the investment period (closed-end period) spans five years, and the exit period is two years. In some extreme cases, the investment period is seven years. LPs are restricted from exiting during the closed-end period, but after the completion of the five-year term, they have the option to exit or extend the term for an additional two years before exiting, resulting in a total period of seven years.

Post-investment management goes beyond supervision and risk monitoring of invested firms by equity investors. It includes providing value-added services such as strategic planning support, introducing professional personnel and executives, offering follow-up financing assistance, strengthening corporate governance structures, and developing plans for capital market expansion. The ultimate objective is to maximize returns for equity investment funds. In general, post-investment management can be categorized into the following five areas. First, business management involves monitoring the invested firms' operating environment, performance, and financial data. Second, human capital focuses on introducing senior management and technical talents and providing training and development support to the invested firms. Third, capital operations assist the invested firms in market value management, seeking and negotiating M&A targets, providing financing assistance, preparing for IPOs, and tracking fund exit plans. Fourth, business development and resource coordination encompass equity investors providing industry resources, facilitating market expansion, and coordinating with suppliers and industry stakeholders. Fifth, internal monitoring involves overseeing corporate

governance, business performance, significant risks, and formulating response measures. Additionally, regular summarization and preparation of fund return reports, as well as analysis reports on invested firms and other relevant materials, are conducted.

Three prevalent modes of post-investment management are integrated pre- and post-investment, professionalization, and external professionalization. The integrated pre- and post-investment mode entails equity investors assuming responsibility for the entire process from due diligence to ongoing monitoring. This mode is focused and provides incentives for equity fund managers, although it becomes increasingly challenging to effectively manage multiple tasks as the number of investment firms grows. The professionalization mode involves establishing an independent post-investment team tasked with activities such as resource integration, tracking, and active involvement in management and operations, resulting in substantial benefits for the invested firms. However, this mode necessitates considerable time costs for coordination between investors and the post-investment team. The external professionalization mode delegates these responsibilities to third-party professional institutions, e.g. consulting firms. The primary challenge of this mode lies in evaluating the performance of both parties. Table 1 summarizes the three types of post-investment management.

Table 1. Summary of the three types of post-investment management

| | Integrated pre- and post-investment | Professionalization | External professionalization |
|-----------------------------|--|---------------------------------|--|
| Responsibility | Equity investment managers | Post-investment management team | Professional institutions |
| Professionalism | Low | Moderate | High |
| Appraisal | Linked to investment managers' performance | Subjective | Based on the agreements |
| Fee | Free | Free | Paid to external professional institutions |
| Applicable situation | Venture capital, small equity fund | Medium equity fund | Large equity fund, buyout fund |

Investment institutions need to possess professional competence, communication, coordination skills, and industry expertise to meet the high requirements of post-investment management. The importance of post-investment management is a topic of debate within the investment community. Critics claim that the firm itself possesses superior market understanding compared to investment teams, suggesting that the key to investment success lies in selecting promising projects. Conversely, advocates argue that post-investment management plays a vital role in the successful development of firms. They emphasize that optimizing and refining post-investment management practices can enhance firms' overall success and mitigate investment risks.

This article explores the impact of post-investment management on the performance of equity funds. The data from a comprehensive survey among mid-level and senior personnel and post-investment professionals from a diverse sample of investment institutions is adopted and analyzed. The goal of the survey is to measure the level of importance assigned to post-investment management by these institutions. The article focuses on analyzing the relationship between the perceived importance of post-investment management and the exit rates of investment funds. By examining the exit rates, which serve as an indicator of fund performance, the article seeks to gain valuable insights regarding the role and impact of post-investment management practices on investment funds performance.

The selected equity investment institutions represent prominent players in the investment industry in China, with the majority established between 2009 and 2011. This timeframe ensures that the investment funds analyzed in the article have reached a critical stage of their lifecycle, e.g. the 7 to 12 years' exit period. Thus, all investment funds analyzed in the article have been

exited by 2023. As such, the findings obtained from this research provide a realistic assessment of the investment funds' actual performance.

Because of the scarcity of data pertaining to post-investment management in investment funds, limited literature rarely delves into the influence of post-investment management on investment funds performance. For example, Lee *et al.* (2021) investigate the key factors contributing to the success of post-investment management, with a specific focus on content projects. Their approach involves selecting and interviewing 15 seasoned venture capitalists, centering on their expertise in project management. Zhang (2021) examines follow-up management with a focus on blockchain venture capital. They develop a model to analyze post-investment management in blockchain ventures utilizing cloud computing technology. Zhu *et al.* (2024) examine how post-investment management influences firms' sustainable development. Their study reveals that venture capital plays a significant role in fostering corporate sustainable development by mitigating financing constraints and guarding against short-sighted management practices.

This article contributes to the field of post-management by investigating the impact of post-investment management on investment funds performance, as measured by exit rates and IPO rates. The analysis is based on distinctive questionnaire data collected from senior managers of investment funds spanning various institutions in China.

Understanding the role of post-investment management is important for fund managers and investors seeking to optimize equity investment funds. The findings indicate that post-management positively affects the performance of investment funds. However, this positive effect is constrained, as illustrated by the inverse-U sharp relation between post-investment management and investment funds performance. Excessive post-investment management could potentially decrease the performance of investment funds. Consequently, the article recommends that investment institutions aim to strike a balance between post-investment management activities and the pursuit of investment opportunities in firms.

This article is structured as follows. Section 2 provides an overview of the literature. Section 3 outlines the data and model used in the study. Section 4 demonstrates the results and robustness test. Section 5 provides a discussion of the findings. Section 6 concludes the article.

2. Literature

Barry *et al.* (1990) propose the screening and monitoring theory. They find that venture-backed firms outperformed non-backed firms. The theory identifies three stages: screening, monitoring, and management. Venture capitalists offer support and value-added services during the management stage, including financial planning, introducing investors, and aiding talent and technology recruitment. This theory provides a structured framework for venture capitalists to assist businesses in achieving growth and profitability. Gompers (1996) proposes the name-dropping theory. The theory suggests that newly established venture capital firms accelerate the listing of invested firms to demonstrate their strength and establish market credibility quickly. These invested firms, compared to those supported by mature venture capital firms, tend to have higher underpricing rates and lower venture capital ownership. The theory highlights the vital role of venture capitalists in providing financing, market credibility, and brand recognition to entrepreneurial firms. Chemmanur *et al.* (2011) explore the efficiency benefits of venture capital for private firms. The result suggests that venture capital-backed firms have higher overall efficiency than non-venture capital-backed firms, which comes from both selection and monitoring effects. Hochberg (2012) explores the governance changes in entrepreneurial firms transitioning from private to public ownership with venture capital support. He finds that venture capital-backed firms have lower earnings management and a more independent board structure compared to similar non-venture capital-backed firms. Croce *et al.* (2013) discover that venture capital has a crucial impact on on-site involvement with invested firms. In addition, venture capitalists can strengthen interactions with the firm's management, mitigate conflicts during the management process, and enhance both the innovation level and the success rate of investment exits. Dutta and Folta (2016) examine add-in value generated by private equity investors in entrepreneurial development. They find that venture capital-backed firms have a greater influence in terms of

innovation and undergo a faster commercialization process. Han *et al.* (2020) find that while VC may not effectively screen out high-quality firms, it does have a positive impact on the performance of invested firms by enhancing operational efficiency and innovation and providing industry experience and resources. Yin *et al.* (2021) investigate how entrepreneurs' salaries impact the external financing ability of small and midsize enterprises (SMEs). They find negative connections between entrepreneurs' salaries and the external financing capacity of SMEs.

2.1. Assets growth patterns and investment methods

Prowse (1990) examines institutional investment patterns and corporate financial behavior in both the United States and Japan. The study indicates that the agency problem is more effectively addressed in Japan than in the United States, primarily due to differences in the equity positions that institutions can hold in each country. Gwartney *et al.* (2006) focus on exploring the correlation between institutions and investment, examining how institutional quality impacts growth by affecting both the level and productivity of investment. Their research reveals that nations with superior institutional quality tend to experience greater growth per unit of investment and attract a larger proportion of private investment relative to their gross domestic product. Wang and Hausken (2022a) explore the dynamics of the Bitcoin price evolution with growth models incorporating oscillation and lengthening cycles. They present the Bitcoin growth potential compared with other asset classes, such as gold and bonds. Wang and Hausken (2023) introduce five growth models, i.e., conventional logistic growth, Gompertz growth, generalized charged capacitor growth, combined logistic and charged capacitor growth, and combined Gompertz and charged capacitor growth as an investment method. They compare growth models with 15 other common investment methods and show they are especially useful for predicting asset prices involving growth and fluctuations.

2.2. Post-investment management

The impact of post-investment management on investment funds performance remains largely unexplored and lacks empirical evidence. Mason and Harrison (1996) examine three aspects of the informal venture capital, i.e. the investment process, the post-investment experience and the investment performance. The research is based on data gathered through telephone interviews with 31 business angels and 28 owner-managers. They highlight the deficiencies in the understanding of venture capital market. Hassan and Leece (2008) use a questionnaire-based methodology and focuses on the post-investment behavior of venture capital firms. They highlight that the source of funding for venture capital firms has a significant impact on their behavior and approach. Metrick and Yasuda (2011) emphasize the significance of private ownership and draw attention to the presence of information asymmetry and illiquidity that are typically associated with private equity. Gurău and Dana (2020) investigate the systemic relationship between financing paths, accessed resources, management and governance structures, and their impact on corporate entrepreneurship in early-stage biotechnology firms. They suggest that equity financing paths provide specific levels of operant and operand resources. Chen (2022) explores the impact of private equity participation on business performance and innovation ability. The study reveals that private equity investment significantly decreases return on assets (ROA) for firms in the innovation layer of the National Equities Exchange and Quotations. However, it has a positive and significant impact on firms' technology investment ratio. Hao *et al.* (2023) examine the impact of CEOs' levels of human capital on the likelihood of venture capital firms replacing them, a specific aspect of post-investment management. Their study reveals that venture capital firms are less inclined to replace CEOs with higher levels of human capital. Zhang *et al.* (2024) construct a two-sided matching structural model and examine the effects of GVCs (government venture capitals) on the post-investment performance of funded firms. Their findings indicate that GVCs outperform private venture capitals in enhancing companies' innovative performance. Zhu *et al.* (2024) discovered that post-investment management by venture capital firms enhances the sustainable development of businesses.

Overall, existing literature provides valuable insights into equity funds and venture capital, particularly regarding their impact on the invested firms. However, there is a noticeable gap in empirical evidence concerning the impact of post-investment management on the performance

of investment funds. This article aims to address this gap by focusing on examining the impact of post-investment management on the performance of investment funds.

3. Data and methodology

3.1. Data sources

This article uses data collected from surveys and interviews with professionals working in venture capital, private equity, and angel investment organizations in China. The survey conducted over a six-month period in 2019 and was administered by Potential Stock platform, which facilitates equity transfer services for investors, company founders, and shareholders in China. The platform maintains strong connections with major investment institutions in China, enabling them to distribute questionnaires to senior managers within these institutions. The survey report is publicly available when starting to write this article and all senior managers' information anonymized. Questions were structured using a scale format, ranging from high to low levels of importance concerning post-investment management. This article applies the survey result of 31 investment institutions with fund sizes ranging from hundreds of millions to billions of yuan. The sample represents a diverse range of funds and is considered representative. The survey participants are mainly senior executives and post-investment professionals from investment institutions.

The article focuses on 31 equity funds managed by well-known investment managers active in the Chinese market. These funds are selected because they are representative of the Chinese equity market and are established between 2009 and 2011, which means they have already entered the exit phase by 2023. The data obtained for the analysis mainly comes from exit cases, which provide valuable insights into fund performance. The exit data is collected from various sources for cross check, e.g. Tianyancha (www.tianyancha.com), PEDATA MAX (<https://max.pedata.cn>), and CVSource (<https://www.cvsource.com.cn>). Table 2 presents a summary of the information on these 31 equity investment funds.

| Type | GP | Equity investment fund name | Established date |
|-------|---------------------------|---|------------------|
| VC | Aozhi Capital | Huaao Venture Fund | 2009-12 |
| VC | Junlian Capital | Junlian Fund 1 | 2009-09 |
| VC | Songhe Capital | Songhe Excellent Fund | 2009-01 |
| VC | Dachen Venture | Dachen Creation Prosperity | 2010-03 |
| VC | Shenzhen Venture | Shenzhen Creation | 2010-03 |
| VC | Lihe Qingyuan Capital | Tianjin Lihe Chuangying | 2010-05 |
| VC | Eastern Fortune | Eastern Fortune Wuhu Equity | 2010-12 |
| VC | Zhejiang Business Venture | Zhejiang Xinhai Entrepreneurship | 2011-05 |
| Angel | Fenxiang Investment | Kunshan Fenxiang | 2011-10 |
| Angel | Jiuhe Venture | Jiuhe Yunqi Investment | 2011-08 |
| Angel | Gobi Venture | Gobi Yingzhi | 2011-08 |
| VC | Detong Capital | Detong Kaidi | 2010-04 |
| VC | Yunfeng Fund | Shanghai Yunfeng Investment | 2010-12 |
| VC | Qiming Venture | Qiming Venture Fund 2 | 2011-11 |
| VC | He Yuan Capital | Heyuan Beijiguang | 2011-08 |
| VC | Yuanxing Capital | Yuanxing Capital Kexing | 2011-06 |
| VC | IDG | Beijing Harmony Growth Investment Center | 2011-08 |
| VC | Xinzhongli | Beijing Xinzhongli Equity Investment Center | 2011-09 |
| VC | Saif Fund | Saif Xiangrui | 2011-01 |
| PE | Jishi Capital | Zhufeng Jishi Equity Investment | 2011-07 |
| PE | Jiuding Venture | Yongle & Zhouyuan Jiuding | 2011-03 |
| PE | Zhongxing Venture | Zhonghe Chunsheng No. 1 Equity | 2010-11 |
| PE | Fukun Venture | Fukun Yangtze River Winning Communication Venture | 2011-11 |
| PE | Tongchuang Weiye | Nanhai Growth Fund 3 | 2009-08 |
| PE | Hongyi Investment | Hongyi RMB Fund 2 | 2010-08 |
| PE | Dinghui Investment | Dinghui Weixin Weisen | 2010-05 |
| PE | Zhongke Investment | Changzhou Zhongke Jiangnan | 2011-08 |
| PE | Fosun Capital | Fuxing Chongfu | 2011-03 |
| PE | Chuangdongfang | Chuangdongfang Fuhong | 2011-04 |
| PE | CITIC Industry Fund | CITIC Equity Investment Fund 3 | 2011-10 |
| VC | Tiantu Capital | Tianjin Tiantu Xinghua Equity Investment | 2011-04 |

3.2. Variables

Table 3 summarizes the variables in this article.

Table 3. Variable definition

| Variable | Definition | Source |
|--------------|---|-------------------------------------|
| <i>Level</i> | The scale of importance that investment institution employees evaluate their institutions' focus on post-investment management. <i>Level</i> = 3 represents high level of importance, <i>Level</i> = 2 represents moderate level of importance, and <i>Level</i> = 1 represents low level importance. | Survey |
| <i>Team</i> | The number of post-investment management team in the investment institution. <i>Team</i> = 4 indicates a team size over 20. <i>Team</i> = 3 indicates a team size between 11-20. <i>Team</i> = 2 indicates a team size between 6-10. <i>Team</i> = 1 indicates a team size below 5. | Survey |
| <i>Fund</i> | The size of the equity investment fund measured in billions of yuan. | Tianyancha, PEDATA MAX and CVSource |
| <i>Inv</i> | The number of invested firms. | Tianyancha, PEDATA MAX and CVSource |
| <i>Exit</i> | The ratio between the number of exited firms and the total number of firms invested by the equity investment fund. The way of exited including IPO exit, acquisition exit, transfer exit. | Tianyancha, PEDATA MAX and CVSource |
| <i>IPO</i> | The percentage of firms that exited through IPO, out of the total number of firms invested by the investment fund. | Tianyancha, PEDATA MAX and CVSource |

3.3. The model

The article applies *Level*, i.e. the scale of importance of post-investment management evaluated by employees of the equity investment institutions, and *Team*, i.e. the number of post-investment teams in the equity investment institutions, to measure the importance attached to post-investment management. The performance of the equity investment institutions is measured by *Exit*, i.e. the exit rate of the equity funds. Generally, the higher the importance attached to post-investment management, the more human resources invested in post-investment management, the higher the perceived importance of post-investment management by employees in the equity investment institutions.

Using the exit rate *Exit* as the dependent variable, *Level* and *Team* as proxy variables to measure the level of post-investment management importance, and the fund size *Fund* and the number of invested firms *Inv* as control variables, the article applies the following regression models as in Equations 1, 2, 3, and 4.

$$Exit_i = c_1 + \beta_L Level_i + \beta_F Fund_i + \beta_I Inv_i + \varepsilon_i \quad (1)$$

$$Exit_i = c_2 + \beta_T Team_i + \beta_F Fund_i + \beta_I Inv_i + \varepsilon_i \quad (2)$$

$$Exit_i = c_3 + \beta_L Level_i + \beta_T Team_i + \beta_F Fund_i + \beta_I Inv_i + \varepsilon_i \quad (3)$$

$$Exit_i = c_4 + \beta_L Level_i + \beta_T Team_i + \beta_e Level_i Team_i + \beta_F Fund_i + \beta_I Inv_i + \varepsilon_i \quad (4)$$

where *i* refers to equity fund *i*, c_1 , c_2 , c_3 , and c_4 are constant intercept terms, $Level_i Team_i$ is interaction term, and ε_i is the error term. If coefficients β_L and β_T are significantly positive, it can

be concluded that post-investment management can enhance the investment equity funds performance.

4. Result

4.1. Descriptive statistics

Table 2 presents the descriptive statistical analysis of the variables. The equity investment fund size *Fund* exhibits a wide range, spanning from 30 million yuan to 11.896 billion yuan. The number of firms invested by the equity investment funds *Inv* varies from 9 to 42. The average exit rate of the research sample *Exit* is 0.366.

Table 2. Variable descriptive statistical analysis

| Variable | Mean | Median | Std | Max | Min | N |
|--------------|--------|--------|--------|--------|-------|----|
| <i>Level</i> | 2.194 | 2 | 0.873 | 3 | 1 | 31 |
| <i>Team</i> | 2.194 | 2 | 1.108 | 4 | 1 | 31 |
| <i>Fund</i> | 19.962 | 10 | 29.903 | 118.96 | 0.3 | 31 |
| <i>Inv</i> | 19.903 | 17 | 9.152 | 42 | 9 | 31 |
| <i>Exit</i> | 0.366 | 0.343 | 0.221 | 0.737 | 0.028 | 31 |
| <i>IPO</i> | 0.207 | 0.174 | 0.156 | 0.6 | 0 | 31 |

4.2. Correlation

Table 3 shows the Pearson correlation coefficients of the variables. First, the correlation coefficient between *Level* and *Team* is 0.684, indicating that as the number of post-investment managers increases, employees perceive a higher importance placed on post-investment management by their institution. Both variables can serve as proxy variables to measure the importance of post-investment management by investment institutions. Second, both *Level* and *Team* exhibit significant positive correlations with *Exit* and *IPO*. This preliminary observation suggests that post-investment management can enhance the exit performance of investment funds. Third, *Exit* demonstrates a strong correlation with *IPO*, which is attributable to IPOs being one of the exit mechanisms for equity investment funds.

Table 3. Correlations between variables

| Variable | <i>Level</i> | <i>Team</i> | <i>Fund</i> | <i>Inv</i> | <i>Exit</i> | <i>IPO</i> |
|--------------|--------------|-------------|-------------|------------|-------------|------------|
| <i>Level</i> | 1 | | | | | |
| <i>Team</i> | 0.684*** | 1 | | | | |
| <i>Fund</i> | -0.068 | -0.129 | 1 | | | |
| <i>Inv</i> | -0.010 | -0.054 | -0.241 | 1 | | |
| <i>Exit</i> | 0.578*** | 0.538*** | 0.013 | -0.293 | 1 | |
| <i>IPO</i> | 0.472*** | 0.536*** | -0.146 | -0.179 | 0.824*** | 1 |

Note: *** p<0.01, ** p<0.05, * p<0.1.

4.3. Estimating the model and illustrating the result

Table 4 presents the estimation results with *Exit* as the dependent variable. The key findings are as follows. First, the coefficient β_L of the level of importance attached to post-investment management *Level* is significantly positive. Specifically, in estimations (1) and (4), β_L is positive at a 1% significance level, while in estimation (3), it is positive at a 10% significance level. Second, the coefficient β_T of the number of post-investment personnel *Team* is positively significant at a 1% significance level in estimations (2) and (4). This indicates that investment institutions' emphasis on post-investment management (measured by employee perceptions and the number of post-investment managers) improves the exit performance of equity funds. Third, the coefficient β_F for the equity fund size *Fund* is not statistically significant, indicating no significant statistical

relationship between fund size and exit rates. Fourth, the coefficient β_{Inv} of the number of invested firms *Inv* is significantly negative. In estimation (3), it is significant at a 10% level, and in estimation (4), it is significant at a 1% level. This suggests that as the number of invested firms increases, investment institutions may struggle to effectively track all of them due to the significant effort required for post-investment management.

Notably, in estimation (3), the coefficients of *Level* and *Team* change from being significant in estimations (1) and (2) to becoming insignificant at a 1% significance level. This could be attributed to a masking effect (Spencer, 1989) since *Level* and *Team* are highly correlated, where the coefficients of two independent variables become insignificant simultaneously in a multiple regression model. Therefore, in estimation (4), the inclusion of the interaction term *Level * Team* shows a negative coefficient at a 1% significance level. This indicates that the exit performance of equity investment funds increases with the level of importance placed on post-investment management by investment institutions. However, this improvement is not indefinite, as the exit rate starts to decline after reaching a certain point. The findings demonstrate an inverse U-shaped relationship between the level of importance attached to post-investment management and the exit rate of equity investment funds.

Table 4. Regression results with *Exit* as the dependent variable

| Variables | (1) <i>Exit</i> | (2) <i>Exit</i> | (3) <i>Exit</i> | (4) <i>Exit</i> |
|---------------------|---------------------|---------------------|--------------------|---------------------|
| <i>Level</i> | 0.145*** (0.037) | | 0.103* (0.051) | 0.317*** (0.090) |
| <i>Team</i> | | 0.105*** (0.031) | 0.049 (0.040) | 0.405*** (0.134) |
| <i>Level * Team</i> | | | | -0.135** (0.049) |
| <i>Fund</i> | 0.0001 (0.001) | 0.0001 (0.001) | 0.00004 (0.001) | 0.0002 (0.001) |
| <i>Inv</i> | -0.007* (0.004) | -0.006 (0.004) | -0.007* (0.004) | -0.008** (0.003) |
| <i>c</i> | 0.190 (0.122) | 0.258** (0.120) | 0.163 (0.123) | -0.334 (0.211) |
| Obs. | 31 | 31 | 31 | 31 |
| Adj R-squared | 0.352 | 0.289 | 0.363 | 0.493 |

Note: Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

4.4. Robustness test

The exit strategies for private equity investments commonly include IPO, acquisition, and transfer. In Equations 1, 2, 3, and 4, *Exit* includes all these three exit strategies. In general, IPO exit is regarded as the most successful and profitable. Therefore, this article uses the percentage of firms that exited through IPO as a proxy variable to assess the performance of investment funds and conducts a robustness test.

The result in Table 5 confirms the findings in Table 4. First, when using *IPO* as a performance indicator for investment funds, the coefficients for *Level* and *Team* remain significantly positive at a 1% level of significance. Second, the interaction term *Level * Team* has a significant negative coefficient at a 5% level of significance, indicating an inverse U-shaped relationship between the importance of post-investment management and the IPO exit rate. Third, the coefficients for *Level* and *Team* are lower compared to Table 4. It may be due to the limited number of successful IPO firms.

Table 5. Regression results with IPO as the dependent variable

| Variables | (5) IPO | (6) IPO | (7) IPO | (8) IPO |
|---------------------|---------------------|---------------------|-------------------|---------------------|
| <i>Level</i> | 0.082*** (0.029) | | 0.038 (0.039) | 0.197*** (0.070) |
| <i>Team</i> | | 0.072*** (0.023) | 0.051 (0.031) | 0.316*** (0.104) |
| <i>Level * Team</i> | | | | -0.101** (0.038) |
| <i>Fund</i> | -0.001 (0.001) | -0.001 (0.001) | -0.001 (0.001) | -0.001 (0.001) |
| <i>Inv</i> | -0.004 (0.003) | -0.003 (0.003) | -0.003 (0.003) | -0.004 (0.003) |
| <i>c</i> | 0.117 (0.096) | 0.124 (0.087) | 0.089 (0.095) | -0.281* (0.163) |
| Obs. | 31 | 31 | 31 | 31 |
| Adj R-squared | 0.200 | 0.249 | 0.248 | 0.390 |

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

5. Discussion

The positive and significant coefficient of the level of importance attached to post-investment management in the regression models suggests that post-investment management contributes positively to exit rates of investment funds. This finding indicates that investment institutions that prioritize post-investment management tend to achieve better exit outcomes.

The positive and significant coefficient associated with the number of post-investment team in the investment institutions further supports the notion that having an adequate team dedicated to post-investment management positively impacts investment funds' exit rates. This highlights the importance of human resources in implementing effective post-investment management throughout the investment funds' lifecycle, for example in 7 to 12 years.

While fund size is often considered a significant factor in investment performance, the insignificant coefficient for equity fund size suggests that the size of the fund does not have a statistically significant impact on investment funds' exit rates. The negative and significant coefficient of the number of invested firms implies that as the number of investments increases, it becomes increasingly challenging for investment institutions to effectively manage and track all investments. This aligns with the investment industry and highlights a potential limitation in scalability, wherein investment institutions may face diminishing returns or increased operational challenges as they expand their investment portfolio.

The inclusion of the interaction term reveals how the joint impact of the level of importance and the number of post-investment personnel influences exit performance. The identified inverse U-shaped relationship suggests that post-investment management is beneficial up to a certain limit, excessive emphasis on post-investment management may lead to diminishing exit rates.

The overall results suggest that post-investment management plays a crucial role in enhancing the performance of investment institutions, as indicated by investment funds' exit rates. This is primarily attributed to the allocation of a greater number of post-investment personnel, enabling institutions to provide value-added and supervisory services, effectively monitor risks from competitors, customers, and the supply chain, and facilitate strategic planning, introduction of additional investors, and increased financing for the invested firms. Consequently, the firms experience improved growth opportunities, enhanced operational capabilities, higher returns, and smoother exits. The findings are consistent with the findings of Han *et al.* (2020). They find that ventral capitals have a positive impact on the performance of invested firms, knowing as fostering effect. Investment institutions can contribute to the invested firms by enhancing operational efficiency, innovation, and providing industry experience and resources (Chemmanur *et al.* 2011).

The findings also correspond with those of Zhu *et al.* (2024), who highlight how investment institutions contribute to the sustainable development of invested firms.

However, by leveraging the empirical data from the investment industry in China, this article further indicates that the impact of post-investment management on the exit performance of equity investment funds is limited and follows an inverse U-shaped relationship. This implies that excessive resource allocation to post-investment management, such as excessive involvement in operational management, may yield diminishing returns. Therefore, it is beneficial for equity investment institutions to make a balance in their post-investment management practices.

6. Conclusion and future research

This article examines the impact of investment funds' emphasis on post-investment management on their performance by empirically analyzing the 31 equity investment funds. The findings indicate that both the level of importance of post-investment management as evaluated by investment institution employees and the number of post-investment management staff significantly contribute to enhancing the performance of equity investment funds. Increasing the emphasis on post-investment management leads to better exit rates, thus improving the performance of investment funds. However, the effect of post-investment management on the exit level of equity investment funds is limited and shows an inverted U-shaped relationship. Excessive emphasis on post-investment management can lower the exit rates of investment funds. The robustness analysis using the IPO percentage of invested firms as a proxy variable to measure investment firm performance confirms the result.

The findings of this article demonstrate that post-investment management activities have the potential to enhance the investment performance of private equity funds, as indicated by improved exit rates. The empirical analysis reveals an inverse U-shaped relationship between post-investment management and investment funds performance. Specifically, excessive post-investment management efforts may impede investment performance, while a moderate level of post-investment management can yield positive results.

These findings hold practical implications for both business operators and investment firms. During their growth phase, businesses may consider partnering with private equity investment firms to benefit from their supervision, value-added services, and support in areas, e.g. business development, strategic planning, marketing, and risk mitigation. Investment firms need to prioritize post-investment management activities and avoid solely focusing on increasing investment quantity or fundraising scale. Effective post-investment management plays a crucial role in improving the performance of invested firms and ultimately leads to higher investment returns.

However, it is beneficial for investment firms to strike a balance between post-investment management and the screening and selection of high-quality investment opportunities. Excessive post-investment management efforts can potentially decrease exit rates. Thus, it is beneficial for investment firms to adopt a holistic approach that integrates efficient post-investment management practices with the identification and cultivation of promising investment prospects. Future research can expand the sample size of investment funds, and examine investment funds across countries and areas, to strengthen the generalizability of the findings and conduct more comprehensive analyses. Given the inherent disparities among various industries, one avenue is to delve into certain industries, such as blockchain and cryptocurrencies (Wang *et al.* 2021), artificial intelligence (Mou, 2019). Additional economic and financial elements, such as taxation (Wang and Hausken, 2021), the emergence of central bank digital currencies (Wang and Hausken, 2022b, 2022d), interest rates (Wang and Hausken, 2022c, 2024a), the impact of cryptocurrencies like Bitcoin (Wang and Hausken, 2024b), can be incorporated into the analysis. Another area for future research involves analyzing the performance of investment funds in conjunction with firms' business models and innovations in business models (Yu and Wang, 2023). This line of inquiry could provide valuable insights into how different business models and innovations impact the overall performance of investment funds. Future research may explore the practical implementation of post-investment management by investment firms and optimize the

design of post-investment management strategies. This investigation will contribute to a deeper understanding of post-investment management practices and their impact on investment performance.

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