

Factors Influencing Private Equity in the Yangtze River Delta Economy

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Abstract. By the end of 2023, there were 21,625 private investment fund managers in mainland China, with 153,032 private equity funds on record, the scale of private equity funds reaching 20.32 trillion yuan. The development of private equity funds is rapid. Numerous studies indicate that private equity funds are emerging as a key vehicle for innovative capital formation. At the same time, the Yangtze River Delta economy achieves remarkable results. It accounts for 4% of China's land area, contributing approximately 30% of the country's national economic growth, and the private equity fund management scale accounts for around 40% of the country's total. As a result, the regional agglomeration of private equity funds examines the factors contributing to this phenomenon and its associated impacts. In this regard, this study selects data based on four driving factors: economy, innovation, finance, and foreign trade, and combines them with empirical analyses to assess the impact of regional factors on private equity in the Yangtze River Delta. Finally comes to the following conclusions: credit expansion, innovation, and foreign trade are the key driving forces that promote the establishment of funds and active investment. The stability of the macroeconomic conditions is the key to ensuring effective collection and smooth launch of private equity.

Keywords: Yangtze River Delta, Private Equity, Regional Factors, Empirical Analysis.

1. Introduction

Nowadays, China's economy is in the process of turning from high-speed operation to high-quality development. Private equity is gradually becoming an important force to support enterprise innovation and promote industrial optimisation [1]. Private equity can effectively support scientific and technological innovation, and at the same time promote the birth of related emerging industries. By investing in enterprises at different industrial stages, private equity can guide the transfer of resources from traditional industries to emerging industries and high-efficiency industries, promote the adjustment and upgrading of industrial structure, achieve industrial optimization. Private equity can ease the financial constraints of unlisted enterprises, help enterprises grow rapidly, which has a positive impact on the cultivation of outstanding enterprises. In addition, private equity investment is based on the vision of long-term investment return. Through the discovery of high-quality

enterprises, the capital will be invested in enterprises or industries with development potential, to promote the resource tendency of high-potential emerging industries and improve the utilization rate of social resources. Some studies also confirm that venture capital is the core factor driving the enhancement of regional innovation capacity [2]. The role of private equity is much higher than simply supplying capital. It can efficiently identify and promote the further development of the most promising innovation subjects, collating relevant information and optimizing the allocation of regional innovation resources, thus enhancing the overall vitality of the regional innovation system at the basic level. In summary, private equity plays a crucial role in promoting economic development. Although private equity plays a significant role in promoting economic development, its development is not isolated and is closely related to the regional environment.

However, the development of private equity is inextricably linked to the regional environment. The financial aggregation effect is a significant characteristic of venture capital, which is particularly evident in the spatial pattern of China's venture capital market, with its activities highly concentrated in the core region represented by the Yangtze River Delta (YRD) [3]. The Yangtze River Delta region, as a very representative economy in China, with its strong economic foundation and open financial environment, forms an obvious financial aggregation effect, and some studies point out that financial spatial agglomeration has a positive impact on the quality of urban economic growth [4]. According to the statistics of China's securities investment fund (AMAC), as of December 2024, the Yangtze River Delta's management scale is 7,677,101,000,000 yuan, and its scale occupies 39.1% of China's overall private equity management infrastructure scale [5].

In addition, the existing research mostly focuses on the role of private equity on corporate governance and innovation [1,6]. The other part mostly focuses on the impact of a single factor, such as the role of government guidance funds on the promotion of private equity funds [7]. Based on this, the purpose of this paper is to hypothesize the influence of regional economic scale, industrial structure, financial system, and other factors on the number, scale, investment activity, and exit path of private equity funds. The paper selects the sample data from January 2022 to December 2024, and carries out correlation and regression studies through multiple regression models. On the one hand, this study aims to fill the gap in the academic research on the regional environment for private equity; on the other hand, it comprehensively evaluates the role of the investment environment for private equity through the multivariate influencing factors, to provide references for the optimisation of the policies of the regional government and the designation of the strategic layout of the private equity funds.

2. Research design

2.1. Data sources

The data in this paper is selected from the official websites of the People's Bank of China, the National Bureau of Statistics, the National Intellectual Property Rights, etc., and the public data selected by Private Equity, the China Securities Association, etc., from January 2019 to December 2024. The data are pre-processed: firstly, the unit of the amount of the unified indicator is 100 million yuan, and the number of the indicators is number, and the year-on-year is %; secondly, extreme outliers are deleted, such as the indicator of the missing rate of as high as 80%. Thirdly, delete the indicators with missing key quantities. There are 216 observations in the YRD data after pre-processing.

2.2. Definition of variables

Based on relevant studies, this paper selects independent variables from four dimensions: economic scale and growth, innovation and Research and Development (R&D), financial development level, and foreign economic trade based on the data of the Yangtze River Delta region, as shown in Table 1 [1,6]. Specifically, the consumption index reflects the level of social inflation, the value added of industry measures the production scale and growth rate of industry, the total retail sales of consumer goods characterizes the activity level of consumer goods, the balance of RMB loans of financial institutions and the number of listed companies indicate the level of financial development, the number of patents granted measures the level of innovation and R&D in the region, and the total amount of imports and exports characterises the level of foreign economic trade [8].

Table 1. Variable definition

Variable Type	Variable Name	Variable Symbol	Variable Construction
Dependent Variable	Number of new fund filings	fund_num	Extent of private equity fundraising
	AUM under management (billion yuan)	aum	Asset size of private equity management
	Number of investment cases	inv_cases	Private equity activity
	Total investment amount (billion yuan)	inv_amount	Total investment size of the private equity market
	Number of fund exits	exit_num	Private equity exits
	Consumer price index (same month last year = 100) %	cpi	Level of social inflation
	Industrial value added (year-on-year) %	gva	Scale and growth rate of industrial production
Independent Variable	Total retail sales of consumer goods (billion yuan)	trseg	The degree of activity in the consumer market, which determines the abundance of capital and the variety of projects in the market
	Closing balance of RMB loans to financial institutions (billion yuan)	loan_bal	Capacity of financial markets to supply funds
	Patents granted	patent_num	Innovation and R&D activity
	Number of listed companies	listco_num	Level of capital market development
	Total imports and exports (billion yuan)	trade	Level of foreign economic trade

In this paper, the dependent variables are selected based on four aspects: the number of funds, the fund size, the investment activity, and the exit situation. The number of fund filings reflects the number of funds, the management scale characterises the fund size, the investment activity is measured by the number of investment cases and the total amount of investment, and the fund exit situation indicates the exit situation.

2.3. Modelling

To investigate the impact of macroeconomic variables on the number of private equity fund filings, management scale, investment activity, and exit, this paper constructs a multivariate linear regression model in the following form:

$$Y_i = \alpha + \sum_{j=1}^k \beta_j X_{ji} + \varepsilon_i \quad (1)$$

Of which:

Y_i denotes the dependent variables, including the number of fund filings (fund_num), the size of fund management (aum), the number of investment cases (inv_cases), the total amount of investment (inv_amount), and the number of fund exits (exit_num), respectively. α is a constant term. X_{ji} denotes the number of j independent variable under the number of i observation. β_j is the regression coefficient of the corresponding independent variable, reflecting the direction and strength of the marginal effect of this factor on the dependent variable. ε_i is a random perturbation term reflecting factors not explained by the model.

2.4. Statistical methods

This study used Stata 17 software for statistical analysis. Firstly, examine the normal distribution characteristics of the variables, and then use Pearson and Spearman correlation analysis to explore the correlation between the dependent variable and macroeconomic variables such as the number of fund filings, asset management scale, number of investment cases, total investment amount, and number of fund exits. On this basis, variables with one-way significance ($P < 0.05$) are included in the multiple linear regression model to further explore the specific effects of each variable on the dependent variables. Considering the possibility of heteroskedasticity, the regression estimates are corrected by robust standard errors to ensure the robustness and reliability of the results.

3. Empirical analyses

3.1. Correlation statistics for the main variables

In order to comprehensively examine the correlation between macroeconomic factors and private equity market indicators in the Yangtze River Delta region, this study will use Pearson's correlation coefficient and Spearman's correlation coefficient to conduct a double correlation analysis. The Pearson correlation coefficient can be used as an initial measure of the linear relationship, even if some of the variables do not conform to the normal distribution characteristics, and the double correlation analysis can further verify the robustness of the conclusions.

As shown in Table 2, the combined use of the two correlation coefficients can comprehensively characterize the correlation characteristics between variables from different angles, which can provide a more reliable basis for subsequent multiple linear regression analysis.

Table 2. Spearman correlation analysis

	Number of new fund filings	AUM under management (billion yuan)	Number of investment cases (number)	Total investment amount (\$ billion)	Number of fund exits
CPI	0.0282	-0.2490***	-0.001	-0.176***	-0.422***
P	0.680	0.0002	0.983	0.010	0.000
GVA	0.288***	-0.237***	0.362***	0.222***	0.099
P	0.000	0.001	0.000	0.001	0.146
TRSCG	0.601***	-0.760***	0.328***	-0.070	0.226***
P	0.000	0.000	0.000	0.309	0.001
Loan_b al	0.645***	-0.543***	0.127*	-0.151**	0.331***
P	0.000	0.000	0.062	0.027	0.000
Patent_ num	0.472***	-0.334***	0.176***	-0.055	0.411***
P	0.000	0.000	0.01	0.420	0.000
Listco_ num	0.415***	-0.129*	0.535***	0.349***	0.191***
P	0.000	0.058	0.000	0.000	0.005
trade	0.335***	-0.293***	0.393***	0.090	0.427***
P	0.000	0.000	0.000	0.187	0.000

Note: The values in the table are Spearman's correlation coefficients, *, **, *** indicate that the correlation is significant at 10 %, 5% and 1% level of significance, respectively.

Table 3. Pearson correlation analysis

	Number of new fund filings	AUM under management (billion yuan)	Number of investment cases (number)	Total investment amount (\$ billion)	Number of fund exits
CPI	-0.004	-0.220***	-0.068	-0.053	-0.368***
P	0.954	0.001	0.321	0.439	0.000
GVA	0.093	-0.054	0.157**	0.041	0.082
P	0.172	0.427	0.021	0.551	0.230
TRSCG	0.574***	-0.826***	0.286***	-0.053	0.134**
P	0.000	0.000	0.000	0.439	0.050
Loan_b al	0.531***	-0.607***	0.111	-0.119*	0.278***
P	0.000	0.000	0.104	0.081	0.000
Patent_ num	0.320***	-0.377***	0.168**	-0.115*	0.343***
P	0.000	0.000	0.014	0.092	0.000
Listco_ num	0.426***	-0.167**	0.496***	0.240***	0.129*
P	0.000	0.014	0.000	0.0004	0.059
trade	0.302***	-0.236***	0.452***	0.076	0.368***
P	0.000	0.001	0.000	0.268	0.000

Note: The values in the table are Pearson's correlation coefficients, *, **, *** indicate that the correlation is significant at 10% , 5 % and 1 % level of significance, respectively.

As shown in Table 3, the balance of RMB loans is significantly positively correlated with the number of fund filings and exits, suggesting that credit expansion has a driving effect on private equity fund formation and exits; the number of patents granted and the number of listed companies are both significantly positively correlated with the number of investment cases and exits, indicating that innovation activity and the maturity of the capital market can effectively enhance the opportunities for private equity fund investment and exits; the total amount of imports and exports is also positively correlated with the number of investment cases and exits, reflecting the impact of the foreign trade boom on private equity fund formation and exits. The total amount of imports and exports is also positively correlated with the number of investment cases and exits, reflecting the effect of promotion of foreign trade prosperity on the private equity investment environment. Overall, the above findings are consistent in terms of direction and significance level no matter how using the Pearson or Spearman method, which further enhances the reliability of the empirical results.

3.2. Multiple linear regression analysis

To further verify the causal relationship between independent variables and dependent variables, linear regression analysis will be carried out in this section. From the above analysis, it can be concluded that the independent variables have a significant effect on the dependent variables and further use multiple linear regression to explore the precise relationship between the independent

variables and the dependent variables by taking the statistically significant factors in the single-factor correlation analysis as independent variables. The results of the specific analyses are shown in Table 4.

Table 4. Analysis of regression results

Variables	fund_num	aum	inv_cases	inv_amount	exit_num
cpi	2.143 (0.274)	-2267.125*** (0.000)	-2.620 (0.269)	-18.389*** (0.002)	-6.291*** (0.003)
gva	0.040 (0.686)	-24.079 (0.421)	0.056 (0.839)	-0.497 (0.160)	-0.058*** (0.789)
trscg	0.010* (0.071)	-18.531*** (0.000)	0.035*** (0.000)	0.030 (0.260)	-0.015*** (0.004)
loan_bal	0.001*** (0.000)	-0.014 (0.497)	-0.001*** (0.000)	-0.001*** (0.004)	0.0002 (0.268)
patent_num	-0.004** (0.044)	-0.155 (0.528)	0.003** (0.020)	-0.009** (0.029)	0.002 (0.283)
listco_num	6.607*** (0.000)	-259.422** (0.012)	4.800*** (0.000)	10.286*** (0.000)	1.804** (0.019)
trade	-0.002*** (0.000)	1.035*** (0.000)	0.004*** (0.000)	0.007*** (0.000)	0.001*** (0.003)
Constant	-225.366*** (0.266)	264957.5*** (0.000)	281.239 (0.248)	1899.656*** (0.002)	643.596*** (0.003)
N	216	216	216	216	216
R ²	0.529	0.882	0.547	0.132	0.242
F	43.84	197.86	36.00	10.32	13.15

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

The regression results in Table 4 show that different macroeconomic variables have differentiated impacts on the filing, scale, investment, and exit of private equity funds. Consumer price index has a significant negative correlation with fund management scale, investment amount, and exit number, indicating that rising inflation levels will weaken fund concentration and increase the difficulty of exit. On the contrary, loan balance, patent grant, number of listed companies, total import and export have positive effects on the number of fund filings, investment cases, and exits, suggesting that financial deepening, innovation output, and capital market maturity, as well as the boom in foreign trade, can effectively promote private equity fund activity and exit channels. Total retail sales of consumer goods. On the other hand, total retail sales of consumer goods have a negative impact on fund management scale while promoting fund filings and investment cases, indicating that consumption expansion may lead to the fund dispersion effect. It is worth noting that the impact of industrial value added is not significant, probably reflecting that the traditional industrial growth is more limited in promoting private equity on the economic structure of the Yangtze River Delta.

4. Conclusion

This paper reveals the impact of macroeconomic factors on private equity in the Yangtze River Delta (YRD) region. Specifically, financial depth and capital market sophistication have a significant impact on the private equity market in the YRD region, and they are key factors in fundraising and exits. In addition, the level of innovation and R&D in the region can effectively increase the activity of private equity funds. However, while highly developed foreign trade and market prosperity can create a wealth of investment opportunities, they can also significantly reduce the level of local capital raised in the YRD region. As well as fragmenting capital due to market prosperity, it limits

the size of private equity funds in the region. It is worth noting that higher inflationary pressures will inhibit the scale and exit of private equity funds, so maintaining price stability is a key factor in ensuring the expansion and smooth exit of funds. Finally, the correlation between the level of industrial development and private equity is weak.

For policymakers in the YRD region, they should focus on maintaining a stable price level in the region to ensure a stable macroeconomic environment. They should tilt their policies more in favour of innovation and R&D as well as foreign trade and credit expansion, while exercising effective and reasonable control over foreign trade and market prosperity. Meanwhile, market players in the region should be keen to capture the transformational trend of investment through the consumer market and make strategic adjustments at the same time. This study uses monthly data from the Yangtze River Delta region, but some of the data need to be briefly measured by estimation. At the same time, there is a limitation in using the number of patents granted as a proxy for innovation and R&D, and its generalizability and accuracy need to be verified.

Authors contribution

All the authors contributed equally and their names were listed in alphabetical order.

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