Has the Establishment of FSSC Reduced Inefficient Corporate Investment? --A Test Based on a Two-way Fixed Effects Model

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Abstract. The digital economy has become increasingly prominent as the pillar of the national economy. Meanwhile Financial Shared Service Centre (FSSC), as an important integrated application of digital technology, has been gradually promoted by listed enterprises in recent years. Investment decisions, as an important part of corporate capital operations and financial management, have a great impact on the development of enterprises. Using panel data of 147 listed companies from 2010 to 2019, this paper empirically investigates the impact of establishing FSSC on inefficient investment through a two-way fixed effects model based on individuals and time. The study finds that: the current FSSC has not significantly reduced the inefficient investment of enterprises. On the one hand, the lack of investment control function of FSSC has not inhibited over-investment; on the other hand, the information-assistance function of FSSC has significantly reduced the under-investment behaviour of enterprises. This paper argues that the further development of the investment controlling function of the FSSC is the goal of future FSSC construction.

Keywords: FSSC; Inefficient Investment; Over-investment; Under-investment.

1. Introduction

1.1 Background

President Xi proposed to continuously strengthen and expand China's digital economy and pointed out that the digital economy is gaining its predominant role in restructuring global resources, reshaping the global economic structure, and changing the global competitive landscape. Since the 18th CPC National Congress, the digital economy has been elevated to a national strategy, and its share of GDP has grown from 21.6% in 2012 to 39.8% in 2021 [1], with its supporting role becoming increasingly apparent. FSSC is derived from digital technologies such as the most cutting-edge cloud computing, blockchain, and big data in enterprises. And FSSC itself in turn is one of the fundamental infrastructures of the digital economy. As an innovative mode for management, FSSC reshapes the boundaries between financial accounting and management accounting, redefines the model of business, and resets the human-machine boundary, which has a revolutionary impact on the financial work of enterprises. As investment is a critical part of finance and its efficiency has a significant impact on the development of enterprises, this paper firstly analyses the impact of establishing FSSC on the investing behaviour of enterprises at the theoretical level; on this basis, this paper uses a two-way individual-time fixed effects model to test whether the establishment of FSSC has reduced inefficient investment, then analysed the empirical results and gave a glimpse of its outlook.

1.2 Implications

For theoretical implications: This paper investigates the relationship between the establishment of FSSC and inefficient investment, expanding the research perspective on financial sharing. Most of the studies on FSSC in the existing literature are longitudinal case studies on changes in the performance related to FSSC of specific firms, so this paper enriches the research content related to financial sharing.

For practical implications: The research in this paper helps corporate decision makers establish the link between FSSC and corporate investment behaviour, and suggests what companies should fully develop is the controlling function of FSSC for investment decisions, which is of great practical significance.

1.3 Related research

1.3.1 Related research on FSSC

Current research on FSSC focuses on the construction and performance evaluation of FSSC themselves and their working processes. In terms of the construction of FSSC, Miao and Guo clarified the key factors and core procedures for the process-reengineering in FSSC based on the analysis of the mechanism of innovative resource allocation [2]. Some other scholars have made suggestions on specific processes of FSSC: Cheng and Wang proposed an RPA-based optimization of expense reimbursement in FSSC [3]. In terms of performance evaluation there are both types of research on FSSC as a whole, for example, Wu and Zhou used hierarchical analysis combined with the Delphi method to establish a performance evaluation system for FSSC based on the balanced scorecard [4], and performance evaluation of a particular process, for example, Cheng and Zhao constructed an expense control framework model for FSSC based on cloud computing [5].

In terms of form, most of the relevant literature adopts a case study approach: Some dismantle the structure and functions of FSSC in specific enterprises to analyse the underlying logic of its construction. Zhang et al. summarised the methodology for creating a FSSC through an in-depth study of the ZTE Group, providing theoretical guidance for other enterprises and a theoretical basis for subsequent research [6]. Hou et al. analysed the practice of FSSC in China Telecommunications from three aspects: the construction of financial accounting and payment systems, the transformation of financial functions, and the effectiveness of implementation [7]. He and Zhou designed an analytical model of key factors of FSSC based on a process-reengineering perspective, and empirically examined the key success factors of implementing FSSC and the relationship among these factors. Others evaluate the performance of an enterprise's FSSC [8]. Jin et al. clarified the specific path of FSSC to improve the working capital management performance through a longitudinal case study of Haier Group [9]. Zhang Min studied ZTE Corporation's financial sharing model and proposed evaluating the performance of FSSC in four aspects: standardization of financial processes, centralization of financial personnel, networking of financial management, and covering the full range of services, after analyzing the basis of its financial shared service model construction process [10].

With the promotion of FSSC, the understanding of FSSC has been improved and deepened in both academic and practical fields. He et al. found through empirical research that the impact of FSSC on corporate performance has a delay effect, a differentiation effect, and a short-term fluctuation effect [11]. While recognizing the importance of FSSC and the consequential theoretical economic benefits such as cost reduction and efficiency improvement, scholars have also realised that FSSC is still immature and has urgent problems, as well as certain endogenous risks. Jiao and Wang argued that there is a misconception that the establishment of FSSC can solve all problems. In response, numerous scholars have made feasible suggestions [12]. Xu et al. found that the practice of FSSC in China has problems such as scale efficiency not being given full play, uneven development in different industries, and the overall development of FSSC entering a period of weak regression [13]. Wang argued that financial sharing has a greater risk of internal control and information security [14].

1.3.2 Related research on inefficient investment

The academic research on inefficient investment behaviour of enterprises has been relatively more mature and complete than the research on FSSC, and mainly focuses on the mechanisms and determining factors of inefficient investing behaviour. Regarding the causes of inefficient investment, many studies have come to a consensus—free cash flow is its precondition, the principal-agent theory is its basis for inefficient investment, and information asymmetry is a condition for inefficient investment.

Research on the factors determining inefficient investment has focused on topics such as shareholder characteristics, management characteristics, equity structure, financing constraints, environmental uncertainty, and policy and institutional context. Hao et al. found that managerial overconfidence is significantly and positively related to the investment level, and the more

overconfident the managent are, the higher the sensitivity to cash flow at the time of investment [15]; Biddle et al. argued that high-quality financial statements help to enhance investment efficiency; Fang and Jin found that corporate governance can effectively inhibit intentional inefficient investment, and internal controls, on the other hand, are effective in discouraging operational inefficient investments [16]. Xu found through an empirical study that environmental uncertainty reduces the efficiency of corporate investment, while equity incentives have a dampening effect on the inefficient investment behaviour caused by link uncertainty [17]. Lv and Zhang also verified that equity incentives help to suppress inefficient investment; Du and Liu found that financial flexibility exacerbates over-investment but can effectively mitigate under-investment, while the varied severity of agency problems and information asymmetry leads differently to how financial flexibility influences inefficient investment [18]. Yang and Pan found a reverse U-shaped relationship between financial flexibility and firm yield, in which investment spending plays a non-linear mediating effect [19], complementing Du and Liu's study. Wang found that firms' inefficient investment could not be improved by the implementation of industrial policy and elucidated the reasons for this [20].

There are various ways to classify inefficient investment behaviour, while over-investment and under-investment are most commonly used in research. Hao et al. found that overconfident management is more likely to over-invest under unrelated equity arrangements and governance structures. Shen et al. found that over-investment is commonly observed in state-owned enterprises while non-state-owned enterprises tends to under-invest [21]. Tian and Ye empirically tested that financial flexibility affect inefficient investment noticeably and has a double-edged sword effect: financial flexibility restrains under-investment while exacerbating over-investment [22]. The aforementioned study by Yang and Pan in 2019 explains the mechanism of this phenomenon from another perspective.

1.3.3 Comprehensive review

The existing literature on FSSC has gone through three angles, from the bottom - at the eye level - from the top, corresponding three stages from the design of the underlying architecture to the filling of the process content to the overall comprehensive understanding, gradually establishing an objective cognition of FSSC. However, there are still limitations in terms of research content and methods: In terms of content, the research focus is still confined to the FSSC itself, concentrateing on organisational structure design, business process reshaping, technological innovation breakthroughs, and KPI index construction, without establishing the connection between FSSC and the external economic activities of the enterprise; In terms of methods, case study based on the individual enterprise is the main focus, and the application of empirical methods is often complementary to the analysis of target group in the case study.

The research on inefficient investment is relatively more mature and complete, especially in terms of the factors and mechanisms that shape such behaviour. There is a large body of research on the determining factors inside and outside the enterprises and the interrelationship between them. And the research gives the panorama of inefficient investment from perspectives of theoretical basis, causal relationship, and working mechanisms. However, there is no research on the relationship between corporate investment behaviour and FSSC, so this paper takes this as a starting point to explore the relationship between the establishment of FSSC and corporate inefficient investment.

2. Method

2.1 Theoretical analysis

Establishing FSSC can reduce inefficient investment by strengthening capital supervision:

According to the free cash flow theory by Jensen in 1986 [23], the free cash flow held by a company has a direct effect on the governance structure on the one hand, and directly influences the investment behaviour of the company on the other, then Richardson verifies the validity of this hypothesis through an empirical study [24]. When a firm holds sufficient free cash flow, management

tends to over-invest for its benefit. In the context of information asymmetry, management is more likely to choose investments that are profitable in the short term but may not be beneficial or even harmful to the company's development in the long run to pursue higher personal compensation, which results in a substantial waste of corporate resources and leads to inefficient investment.

There are also agency problems between the group and its subsidiaries triggered by free cash flow. On the one hand, the return on investment in the same project is different at the group level from at the subsidiary level, and the subsidiary does not actively aim at maximising the group's interests from its own standpoint; On the other hand, there is also an information asymmetry between the subsidiary and the group, with differences in the level of understanding between the two parties regarding local investment projects. Coupled with the objective physical distance and personnel system isolation, there is a high cost for the group to examine the investment decisions of the subsidiaries, and the agency problem between the group and the subsidiaries will be more serious. The uneven professionalism and competence of the subsidiaries' finance staff is also an important reason why inefficient investments occur from the group level as a whole.

The most important initiative of FSSC in terms of funds management is centralised management. On the one hand, the cash income received by each subsidiary is handed over centrally, and the FSSC controls the budget and arranges the monthly disbursement of funds. The limited free cash flow held by subsidiaries directly reduces the scope for opportunistic behaviour by subsidiaries and management, thereby discouraging inefficient investments. On the other hand, the centralised management of funds reduces the information asymmetry between the group and the subsidiaries. Because of the FSSC, the investment information of the subsidiaries is more real-time, transparent, and monitorable, reducing the cost for the Group to examine the investment decisions of the subsidiaries. As the finance function is centrally recovered by the group, the group can directly make decisions in the best interest of the group through the FSSC, allocate funds to maximise their effectiveness at the group level, and prevent inefficient investments by subsidiaries with relatively redundant funds.

Establishing FSSC can reduce inefficient investments through the integration of accounting information:

Investment decisions are based on available information, of which accounting information plays a decisive role. The relevance and timeliness of accounting information are particularly important for decision-making, but under the traditional financial mode, it is difficult to harmonise the two, and decision-makers may not be able to grab suitable investment opportunities because the information is not up to date. However, through the standardisation of business processes and the specialisation of accounting functions, the FSSC has greatly improved the speed of processing, managing, and consolidating accounting information, making it possible for relevance and timeliness to go hand in hand, providing decision makers with more useful information to assist them in making better investment decisions and thus reducing inefficient investment behaviour.

Comparability of accounting information also has an impact on investment efficiency. Zhu examined the positive effect of comparability of accounting information on investment efficiency through an empirical study [25]. Deng et al. found that corporate tax avoidance may lead to inefficient investment, while the positive relationship between them is strongly mitigated by the quality of accounting information, adding further evidence that the comparability of accounting information affects investment efficiency [26]. The establishment of FSSC can rule absolute unification of accounting policies within the group, making comparability an endogenous feature of accounting information and helping enterprises to better understand their actual situation so that they can choose the most appropriate investment decision.

2.2 Research hypothesis

H: The establishment of FSSC has reduced inefficient investment.

As inefficient investment is divided into over-investment and under-investment, H is further divided into:

H_1: The establishment of FSSC has reduced corporate over-investment behaviour.
H_2: The establishment of FSSC has reduced corporate under-investment behaviour.

2.3 Research Design

2.3.1 Data sources and sample selection:

This paper takes A-share listed companies in Shanghai and Shenzhen that have established FSSC in the years 2010-2019 as the sample, and all relevant data involved are obtained from the CSMAR database. In further sample selection, to ensure the validity of the results, this paper adopts the following methods to pre-process the data: (1) excluding the sample with some relevant data missing; (2) excluding ST and *ST companies; (3) excluding companies that have been listed for less than one year, delisted or suspended. In the end, a total of 1218 observations for 147 sample companies were obtained.

The data in this paper were obtained from the CSMAR, and the data processing and statistical analysis software were Excel 2010 and Stata 17. In order to eliminate the influence of outliers, the continuous variables were Winsorized by 1% up and down in this paper.

2.3.2 Definition of variables:

Degree of inefficient investment:

Referring to Richardson (2006), Xu Qian (2014), Chen Xiaodong et al. (2016), and Li Wenwen et al. (2020) to measure the investment efficiency of companies, this paper establishes a model to estimate the level of normal investment of enterprises as follows [18,27,28].

$$Inv_t = \alpha_0 + \alpha_1 Growth_{t-1} + \alpha_2 Lev_{t-1} + \alpha_3 Cash_{t-1} + \alpha_4 Age_{t-1} + \alpha_5 Size_{t-1} + \alpha_6 Ret_{t-1} + \alpha_7 Inv_{t-1} + \sum Industry + \sum Year + \varepsilon \quad (1)$$

If the residual of the model (1) is greater than zero, it indicates over-investment and is represented by the symbol $OverInvestDegree$. Conversely, it indicates under-investment and is represented by the symbol $UnderInvestDegree$.

Other variables:

This paper draws on the existing literature and uses the nature of property rights, listed age, corporate scale, administration expense ratio, and shareholding concentration as control variables.

Table 1. Variables included in this paper

Type	Variables	Symbols	Definition
Dependent variables	Investment amount	Inv	Actual new investment expenses of the company = total investment - maintenance investment [29]
	Inefficient investment degree	InefficInvestDegree	Reflecting the degree of inefficient investment of the company. The residuals of the model are obtained by running OLS regressions on (1) by year, and the absolute value of the residuals estimated by the model is the degree of inefficient investment in the firm.
	Over-investment	OverInvestDegree	Positive residuals indicate over-invested
	Under-investment	UnderInvestDegree	Negative residuals indicate under-invested
Independent variables	Whether has established FSSC or not	is_established	1 if FSSC has already existed during the year, 0 otherwise
Control variables	Nature of property rights	State	1 if the corporate is state-controlled, 0 otherwise
	Market to book ratio	Mtbv	The ratio of market value to book value of an enterprise
	Tangibility	Tangibility	Net fixed assets/total assets =(Total Assets - Net Intangible Assets - Net Goodwill)/Total Assets
	Profitability	Profitability	EBITDA/total assets
	Growth opportunity	Growth	Tobin's Q = market capitalisation/total assets
	Listing time	Age	Age of company listing = year of the reporting period - the year of initial listing
	Corporate scale	Scale	Natural logarithm of total assets
	Administration expense ratio	Adm	Administrative expenses/operating income
	Asset-liability ratio	Lev	Total liabilities/total assets at the end of the year
	Return per share	Ret	Earnings per share
	Shareholding concentration	Shrcr	Percentage of shareholding of the largest shareholder
	Shareholding checks and balances	Shrz	First largest shareholder to second to fifth largest shareholder of the shareholding
	Inflation rate	Inflation	The inflation rate of China
Dummy variables	Annual dummy variables	$\sum EndDate$	1 when the data belongs to the current year, 0 otherwise
	Industry dummy variables	$\sum Industry$	Encode industries according to CSMAR

2.3.3 Empirical model

To test the hypotheses proposed in this study, drawing on the existing literature (Xu and Zhang, 2009; Zhang et al. 2011; Du and Liu, 2016), the following model was developed [27,28,18].

$$InefficInvestDegree_{i,t} = \beta_0 + \beta_1 is\_established_{i,t+1} + \beta_2 Scale_{i,t} + \beta_3 Lev_{i,t} + \beta_4 State_{i,t} + \beta_5 Mtbv_{i,t} + \beta_6 Cash_{i,t} + \beta_7 Ret_{i,t} + \beta_8 Shrcr_{i,t} + \beta_9 Inflation_{i,t} + \beta_{10} Shrz_{i,t} + \beta_{11} Growth_{i,t} + \beta_{12} Profitability_{i,t} + \beta_{13} Adm_{i,t} + \beta_{14} Age_{i,t} + \sum EndDate + \varepsilon \quad (2)$$

3. Result and analysis

3.1 Descriptive statistical analysis

The distribution of the core explanatory variables in this paper over time is shown in Figure 1.

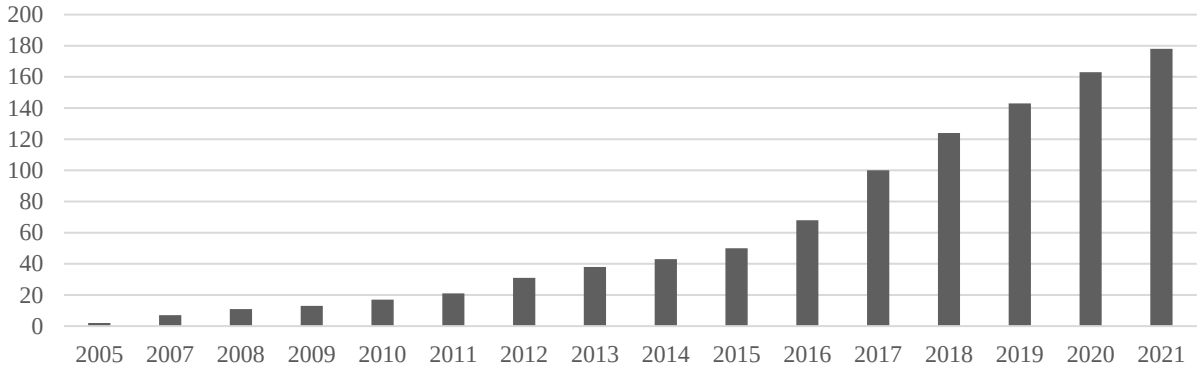

Figure 1. Cumulative number of companies that have already possessed FSSC

As can be seen from Figure 1, the number of listed enterprises implementing FSSC has increased year on year and started to enter a period of rapid growth in 2016. By 2021, a total of 224 listed and normally operating enterprises in Shanghai and Shenzhen have established FSSC.

The statistical description of the key variables in this paper is shown in Table 2.

As can be seen from Table 2, inefficient investment still exists among the enterprises listed in Shanghai and Shenzhen in China that have implemented FSSC. Overall, inefficient investment behaviour is manifested by more enterprises that under-invest, and a higher level of inefficient investment by under-investment than by over-investment.

The descriptive statistics of the core research variables in this paper are shown in Table 2.

Table 2. The statistical description of key variables

Variables	Obs	Mean	SD	Min	Max
InefficInvestDegree	1218	0.004	0.051	-0.113	0.207
OverInvestDegree	560	0.042	0.047	0.000	0.207
UnderInvestDegree	658	-0.288	0.025	-0.113	-0.000
is_established	1218	0.314	0.464	0	1
Scale	1,218	23.991	1.616	20.687	28.098
Lev	1,218	0.548	0.185	0.103	0.881
State	1,217	0.689	0.463	0	1
Mtbv	1,218	3.764	1.800	1.449	10.860
Tangibility	1,218	0.936	0.066	0.663	1.000
Ret	1,218	0.658	0.860	-1.093	3.987
Shrcr	1,218	41.942	16.299	9.310	80.870
Inflation	1,218	2.541	1.041	1.437	5.411
Shrz	1,218	0.568	0.496	0.0168	2.273
Growth	1,218	1.571	0.867	0.806	5.455
Profitability	1,218	0.034	0.059	-0.170	0.207
Adm	1,218	0.061	0.047	0.010	0.278
Age	1,218	13.055	6.272	2	26

3.2 Empirical tests

In this paper, a two-way fixed effects model with individual and time was chosen for the regression and robust standard deviation was used to eliminate the negative impact of heteroscedastic, while

explanatory variables with one-period lag were chosen for the regression to control for the effect of endogeneity.

As shown in Table 3, the coefficients corresponding to the core explanatory variables are not significant at the 10% level and therefore the original hypothesis is rejected. At present, it appears that the establishment of FSSC has not reduced the overall level of inefficient investment in the business.

Table 3. The regression result of inefficient investment degree

Variables	InefficInvestDegree
$is\_established_{t-1}$	0.004
	(0.57)
$Constant$	0.701
	(0.71)
$Observations$	1,047
$Number\ of\ Symbols$	140
$R-squared$	0.046
$EndDate\ FE$	YES

3.3.1 Over-investment group regression test and analysis

Table 4. shows the regression results for the over-investment group. The regression coefficient of whether to establish FSSC was not significant so hypothesis H_1 was not tested. The establishment of FSSC has not significantly inhibited the over-investment behaviour of enterprises.

Table 4. The regression result of the over-investment group

Variables	InefficInvestDegree
$is\_established_{t-1}$	-0.007
	(-0.79)
$Constant$	0.477
	(0.57)
$Observations$	478
$Number\ of\ Symbol$s	126
$R-squared$	0.089
$EndDate\ FE$	YES

This result may be because FSSC controlling function for funds is only formal and does not play a role in supporting and monitoring the investment decisions of subsidiaries and project departments, which in turn leads to a lack of significant improvement in the phenomenon of over-investment. This indicates that the controlling function of FSSC for investment decisions has yet to be developed and explored.

3.3.2 Under-investment regression test and analysis

The regression results for the under-investment group are shown in Table 5. The regression coefficient of whether to establish FSSC is significant at the 5% level ($UnderInvestDegree$ is negative) in the under-investment group, and hypothesis H_2 is verified. The establishment of FSSC has a significant effect on reducing corporate under-investment behaviour.

Table 5. The regression result of the under-investment group

Variables	InefficInvestDegree
$is\_established_{t-1}$	0.007**
	(2.01)
$Constant$	-0.098
	(-1.23)
$Observations$	569
$Number\ of\ Symbols$	137
$R-squared$	0.120
$EndDate\ FE$	YES

Robust t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The establishment of FSSC has indeed greatly enhanced the relevance, timeliness, and reliability of the Group's accounting resources, helping the Group to seize appropriate investment opportunities and thus reducing under-investment. This indicates that the information-assistance function of FSSC for investment decision-making has become more mature and complete.

3.3 Robustness test

This paper uses the return on equity (ROE) to replace EBITDA/total assets, as a robustness test, and the test results do not change substantially (regression results are not shown due to space constraints). Therefore, this paper believes that the findings of this paper are relatively robust.

4. Conclusions

This paper theoretically explores the possibility of reducing inefficient investment through the establishment of FSSC, and performs a series of empirical tests sorted by over-investment and under-investment using a fixed effects model.

Based on the analysis of the results, this article draws the following main conclusions: first, the establishment of the current FSSC has not significantly reduced the extent of inefficient investment; second, the current FSSC lacks the controlling function for enterprises' investment decisions and has no significant inhibiting effect on over-investment behaviour; third, the current information-aid function of FSSC for investment decisions has played a better Third, the information-aid function of FSSC for investment decision-making has been effective and has a significant inhibiting effect on under-investment.

As an important product of the digital economy and the centralisation of accounting and finance functions, FSSC should be able to improve the inefficient investment phenomenon. However, the empirical results show that FSSC has not been fully utilised: while FSSC is a good information aid, it is not a gatekeeper for investment decisions. In other words, China's listed companies are currently using the FSSC only as a highly automated accounting information integration system, without recognising and exploiting its potential value for better guiding the decision-making process. Therefore, how to make full use of FSSC for investment decision-making under the premise of preserving motivation to reach the optimal efficiency for the overall company is what the constructors of FSSC should seek in the future.

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