

Research on the Influence of Supply Chain Digitalization on Enterprise Value

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Abstract. With the help of the exogenous impact environment constructed by the pilot project of supply chain innovation and application, based on the data of listed companies in Shanghai and Shenzhen A-shares from 2008 to 2019, this paper systematically investigates the impact of supply chain digitalization on enterprise value. It is found that the digitalization of the supply chain has significantly improved the enterprise value. The intermediary effect test shows that the digitalization of the supply chain can enhance enterprise value by improving the internal control level of enterprises. The results of heterogeneity analysis show that the digitalization of the supply chain plays a more significant role in enhancing the value of non-high-tech enterprises and non-state-owned enterprises. In further research, it is found that government support and supply chain digitalization complement each other to enhance enterprise value. The conclusions provide important policy implications for promoting the effective transformation and efficiency improvement of supply chain digitalization of market enterprises.

Keywords: Supply Chain Digitalization; Enterprise Value; Internal Control.

1. Introduction

In recent years, the rapid development of digital technology has changed the way of value creation among enterprises in supply chain nodes and promoted the transformation of traditional supply chain to a higher level of modern digital supply chain (Büyüközkan and Göçer, 2018). The report of the 19th National Congress of the Communist Party of China emphasized the need to cultivate new growth points in the field of modern supply chains. As a typical representative of a modern supply chain, the construction of a digital supply chain can not only improve the modern circulation system, and promote the supply-side structural reform, but also provide strong support for building a new development pattern of double circulation. In order to accelerate the construction of a modern digital supply chain, the Ministry of Commerce and other eight departments jointly launched the pilot project of supply chain innovation and application in 2018, aiming at cultivating new growth points in the field of modern supply chain.

Whether supply chain digitalization can create value for enterprises has not yet reached a unanimous conclusion in academia. Previous studies believed that digitalization of the supply chain could drive enterprise value to jump. For example, Lizette Garay-Rondero (2020) systematically expounded the subversive influence of technological change from three aspects of the supply chain, that is, management mode, process, and structure, and believed that enterprises that refused to accept the change would be eliminated. Further, some scholars analyzed the impact of digital technology on procurement (Kosmol et al., 2019; Hallikas et al., 2021), production (Tziantopoulos et al., 2019), and distribution (Li, 2020) through case or model simulation. However, some scholars have questioned the effectiveness of supply chain digitalization. From the perspective of cost, Dolgui and Ivanov (2022) pointed out that the high-tech investment cost associated with the digitalization of the supply chain may make enterprises lose more than they gain. From the perspective of competitive advantage, Bhattacharya and Chatterjee (2022) proposed that the technological investment in the digital supply chain was easy to imitate, so it is difficult to form a long-term competitive advantage. In terms of risk, the digitalization of the supply chain may lead to the separation of organizational structure and organizational culture (Buyukozkan and Göcer, 2018), the destruction of the consistency of

organizational strategy (Ho et al., 2022), and the reconstruction of benefit distribution model, resulting in the formation of new conflicts (Wu et al., 2016).

To sum up, the existing research has not yet reached a consistent conclusion on the effect of supply chain digitalization. An important reason is that the related research are mostly theoretical explanation instead of empirical research (Ali and Govindan, 2021; Zouari et al., 2021; Srari and Lorentz, 2019). Therefore, it has become a hot topic for scholars to explore whether the digital transformation of enterprise supply chains can bring economic effects to enterprises.

The possible marginal contribution of this paper lies in the following aspects: firstly, this paper breaks through the limitations of existing literature in research methods and perspectives, and makes a systematic quantitative evaluation of the economic consequences of supply chain digitalization by using the data of listed companies through the method of differences in differences. Different from the existing logical deduction that stays at the theoretical level (Lizette Garay-Rondero et al., 2020; Bhattacharya and Chatterjee, 2022), this paper provides direct empirical evidence, responding to the calls of Srari and Lorentz (2019), Kosmol et al. (2019) and Hallikas et al. (2021) to strengthen the empirical research of supply chain digitalization. Secondly, this paper analyzes the mechanism of supply chain digitalization driving enterprise value promotion from the aspect of internal control and deepens the understanding of the supply chain digitalization empowerment mechanism. In addition, this paper compares and analyzes the similarities, differences, and reasons for the effect of supply chain digitalization on enterprise value promotion under different enterprise properties, which enriches the research on the heterogeneity of supply chain digitalization affecting enterprise value. Finally, based on the pilot working report, this paper investigates the influence of supply chain digitalization on enterprise value in different government support environments. This research conclusion provides important policy enlightenment for promoting the effective transformation and efficiency improvement of the supply chain digitalization of market enterprises.

2. Theoretical Analysis and Research Hypothesis

2.1. Supply Chain Digitalization and Enterprise Value

According to the resource-based theory, the fundamental reason for the difference in enterprise value lies in its different resources, and once it has resources that are difficult to copy, it can improve enterprise value. The application of a digital supply chain makes the frequency and depth of the enterprise's problem-solving increase, and the feasibility of external imitation decreases, thus forming a unique intangible asset of the enterprise, which has a great impact on the enterprise's operating efficiency and business management model.

In terms of operational efficiency, first of all, the digital transformation of the supply chain can improve the communication efficiency among enterprises, realize information sharing among organizations, flatten the organizational structure and supply chain structure, reduce the chain and time of information transmission, and alleviate the problem of message distortion. Secondly, the digital transformation of the supply chain can optimize the business process of enterprises (Cenamora et al., 2017), and the system can record and analyze the data in the process of production and operation of enterprises, so as to achieve the balance between production and operation according to demand, and find the optimal production process through the powerful data analysis function, so as to achieve refined and flexible production (Qi Yudong and Xiao Xu, 2020). Finally, the digital transformation of the supply chain can improve the efficiency of resource allocation. Through data analysis, enterprises can optimize the production process, have an intuitive impression of idle production materials, warehouses, etc., and can rent idle production lines and warehouses or other ways to improve economic benefits, so as to maximize the use of resources.

With respect to the business management mode, enterprises have changed from traditional industrialized management mode to digital management mode (Liu Shuchun et al., 2021). The digital transformation of the supply chain combines business operations with market demand, making it

possible for the consumer-to-business (C2B) model. By analyzing customers' consumption behavior, enterprises can adjust their business direction in time to satisfy customers' needs and improve customer loyalty. This can encourage enterprises to innovate iteratively, improve customer satisfaction, increase market share, and then enhance enterprise value. Based on this, this paper proposes hypothesis H1.

H1: Digitalization of the supply chain enhances enterprise value.

2.2. Digitalization of Supply Chain, Internal Control, and Enterprise Value

The digital transformation of the supply chain can improve the internal control level of enterprises. On the one hand, the digitization of the digital supply chain makes communication between enterprises smoother and finds unnecessary links in business processes in time and improves them. By constantly discovering and solving problems, enterprises can formulate perfect internal control systems. On the other hand, the application of supply chain digitalization makes enterprise data more open and transparent.

Empowered by the Internet of Things technology, the data of business flow, information flow, capital flow, and logistics in the supply chain can be recorded accurately and in real-time, and massive operation data and characteristic information can be analyzed through digital technology, thus truly depicting the operation status of enterprises, reducing the opportunities for managers to conduct illegal operations such as earnings management, and improving the internal control level of enterprises. A good internal control system reduces the communication cost and agency cost of enterprises, and at the same time reduces the risk of enterprises, thereby enhancing the value of enterprises. Based on this, this paper puts forward the following assumptions:

H2: Digitalization of the supply chain can enhance enterprise value by improving internal control levels.

2.3. Digitalization of Supply Chain, Government Support, and Enterprise Value

From the external view of enterprises, when discussing the digital transformation of the supply chain, existing studies often focus on the factors of enterprises themselves, but less consider external government factors (Kosmol et al., 2019; Lopez-Morales et al., 2022). The government's support for enterprise supply chains is mainly reflected in creating a good external environment for supply chain operation by optimizing the modern supply chain governance system, including strengthening supervision and improving services. In this context, enterprises can obtain higher quality supplies of supply chain elements, such as supply chain-related talents, supply chain industry-university-research base, and supply chain assistance projects. The supply of these resource elements can effectively make up for the shortage of resources faced by enterprises in the process of digital transformation, thus accelerating their transformation process. In addition, a good supply chain operation environment means that the government can supervise the node enterprises more effectively. Meanwhile, a complete supply chain public service platform can serve as a bridge connecting upstream and downstream enterprises and reduce the information barriers among enterprises in the supply chain node. All these factors provide strong support for the digital transformation of enterprises. Therefore, the influence of government factors on the digital transformation of enterprise supply chain cannot be ignored, so this paper puts forward the following hypothesis:

H3: The better the supply chain operation environment created by the government, the greater the role of supply chain digitalization in enhancing enterprise value.

3. Research Design

3.1. Sample Selection and Data Source

In this paper, the listed companies in Shanghai and Shenzhen A-shares from 2008 to 2019 are selected as the research samples, and the sample data are processed as follows: firstly, deleting financial and ST companies; secondly, deleting companies with missing data of main indicators and obvious anomalies in data; thirdly, truncating the main continuous variables at the level of 1% and 99% in order to eliminate the influence of extreme value. After the above processing, 19372 samples were finally observed. Relevant data related to listed companies are all from the CSMAR database, and the data analysis software is stata18.0.

3.2. Definition and Measurement of Variables

(1) Enterprise value. Based on the research of Li Zhenliang and Wang Jiao (2019), this paper uses *TobinQ* value to measure enterprise value. The greater the value, the greater the enterprise value.

(2) Pilot virtual variables. The virtual variable of the pilot enterprise (*Treat*): When the enterprise is a pilot enterprise of supply chain innovation and application, it is classified into the treatment group, and the *Treat* is assigned as 1; otherwise, it is regarded as a control sample, and the *Treat* is assigned as 0. Virtual variable before and after the pilot (*Time*): according to the development time of the pilot project of supply chain innovation and application, if the observation period of the sample is in 2018 or later, the value of *Time* is 1, otherwise it is 0.

(3) Control variables. In order to more accurately explore the impact of supply chain digitalization on enterprise value, this paper further controls other factors that may affect enterprise value, including enterprise size (*Size*), financial leverage (*Lev*), profitability (*Roa*), cash flow (*Cash*), dual chairmanship (*Dual*), board size (*Board*) equity concentration ratio (*Top1*), and enterprise age (*Age*). The specific definitions of the main variables are shown in Table 1.

Table 1. Definition Table of Main Variables

Variable	Description of variable definition
<i>TobinQ</i>	Enterprise value is equal to (market value of tradable shares + number of non-tradable shares × net assets per share + book value of liabilities) / total assets.
<i>Treat</i>	The virtual variable of the pilot enterprise. When the enterprise is a pilot enterprise of supply chain innovation and application, the value is 1, otherwise it is 0.
<i>Time</i>	The virtue variable before and after the pilot, and the value of the virtue variable is 1 when the sample is in 2018 and beyond, otherwise, it is 0.
<i>Size</i>	The scale of an enterprise is equal to the natural logarithm of the total assets of the company plus 1.
<i>Lev</i>	Financial leverage is equal to the company's asset-liability ratio.
<i>Roa</i>	Profitability is equal to the company's net profit divided by total assets.
<i>Cash</i>	Cash flow is equal to operating cash flow divided by total assets.
<i>Dual</i>	The two positions of chairman and CEO are combined, and the concurrent post of chairman and CEO is recorded as 1, otherwise, it is 0.
<i>Board</i>	The board size is equal to the number of board members.
<i>Top1</i>	The equity concentration ratio is equal to the shareholding ratio of the largest shareholder.
<i>Age</i>	The age of an enterprise is obtained by subtracting the year of establishment from the current year.
<i>Year</i>	Annual virtue variable
<i>Firm</i>	Enterprise virtual variable

(4) Intermediate variables. The intermediate variable chosen in this paper is the internal control (IC): based on the research of Li Zhiyuan and Huang Zheng (2022), the internal control of enterprises is measured by the natural logarithm of the internal control index plus 1 in the Dibo database.

3.3. Model Setting

In order to test the effect of supply chain digitalization on enterprise value, this paper establishes a regression model (1):

$$TobinQ_{i,t} = a_0 + a_1Treat_i \times Time_t + a_2Control_{i,t} + \sum Year + \sum Firm + \varepsilon_{i,t} \quad (1)$$

Among them, i represents enterprise, t represents time, $TobinQ$ is the proxy variable of enterprise value, $Treat$ is the virtual variable of pilot enterprise, $Time$ is the virtual variable before and after the pilot, and the cross-product term $Treat \times Time$ is the core explanatory variable of this paper. If a_1 is significantly positive, it shows that the digitalization of the supply chain has improved the value of node enterprises. $Control$ represents the control variable, $Year$ and $Firm$ are the control year and enterprise effect respectively, and ε is the random error term.

4. Empirical Test and Analysis

4.1. Results of Basic Regression Analysis

Table 2 reports the regression results of supply chain digitalization on enterprise value, which verifies the influence of supply chain digitalization on enterprise value. In all regression results, the coefficient of $Treat \times Time$ is significantly positive, and all of them are significant at the statistical level of 1%. It shows that research hypothesis 1 is valid regardless of whether the control variables are added or whether the year and enterprise effects are controlled, indicating that the supply chain digitalization can effectively improve enterprise value. In addition, compared with column (1), the adjusted R^2 of columns (2) and (3) is obviously improved, which accords with the design idea of the stepwise regression method.

Table 2. Basic Regression Results

	(1)	(2)	(3)
	TobinQ	TobinQ	TobinQ
<i>Treat</i> × <i>Time</i>	0.672***	0.0420***	0.416***
	(4.906)	(2.511)	(3.028)
<i>Controls</i>	NO	YES	YES
<i>Year</i>	NO	NO	YES
<i>Firm</i>	NO	NO	YES
N	19372	19372	19372
adj.R ²	0.001	0.220	0.362

Note: ***, **, and * mean significance at the statistical level of 1%, 5%, and 10% respectively. The value of t is in brackets. The same is below.

4.2. Mechanism Analysis

It has been demonstrated that the digitalization of the supply chain significantly improves enterprise value, but it does not show the mechanism between them. Here, the intermediary variable of enterprise internal control is introduced, and the intermediary variable test model shown in the following formula is constructed to test whether the digitalization of the supply chain can enhance

the enterprise value by enhancing the internal control (IC) mechanism. The specific results are shown in Table 3.

$$TobinQ_{i,t} = a_0 + a_1Treat_i \times Time_t + a_2Control_{i,t} + \sum Year + \sum Firm + \varepsilon_{i,t} \quad (2)$$

$$IC_{i,t} = \beta_0 + \beta_1Treat_i \times Time_t + \beta_2Control_{i,t} + \sum Year + \sum Firm + \varepsilon_{i,t} \quad (3)$$

$$TobinQ_{i,t} = \theta_0 + \theta_1Treat_i \times Time_t + \lambda IC_{i,t} + a_2Control_{i,t} + \sum Year + \sum Firm + \varepsilon_{i,t} \quad (4)$$

Columns (1), (2), and (3) report the regression results of supply chain digitalization--enterprise internal control level--enterprise value. As shown in column (3), the coefficient of $Treat \times Time$ is 0.401, which is significant at the level of 1%, indicating that internal control plays a partial intermediary role in the influence of supply chain digitalization on enterprise value, that is, supply chain digitalization promotes the increase of enterprise value by improving the internal control level, indicating that H2 is confirmed.

Table 3. Regression Results of Intermediary Effect Test

	(1)	(2)	(3)
	TobinQ	IC	TobinQ
<i>Treat×Time</i>	0.416***	0.109***	0.401***
	(3.028)	(2.909)	(3.656)
<i>IC</i>			0.134***
			(10.208)
<i>Controls</i>	YES	YES	YES
<i>Year</i>	YES	YES	YES
<i>Firm</i>	YES	YES	YES
N	19,372	17,741	17,741
adj.R ²	0.3620	0.0950	0.3950

4.3. Robustness Test

(1) Parallel trend test. The premise of unbiased estimation of differences in differences model is that the enterprise value of the digital pretreatment group and control group has a covariant trend. In order to get a clearer estimate of causality and exclude the alternative explanation of the previous trend to the results of this paper, the present paper constructs the following regression model to test the parallel trend.

$$TobinQ_{i,t} = a_0 + \sum_{n=-4}^2 a_n Treat_i \times Time_t^n + a_2 Control_{i,t} + \sum Year + \sum Firm + \varepsilon_{i,t} \quad (5)$$

Among them, n represents the time distance of the sample relative to the impact year of supply chain digital transformation, $Year^n$ is the virtual variable of year, and the assignment of $Year^{-4}$ is 1, which means that the sample is located in the first four years of the impact year of supply chain digital transformation (2018), that is, 2014, and so on. In this paper, the year before the pilot work is set as the base period. The coefficient a_n reflects the value difference between the pilot enterprises of supply chain innovation and application and the control enterprises in the n^{th} year of pilot work. Figure 1 shows the estimated results of the parallel trend test.

As can be seen from Figure 1, before the pilot work was carried out, the coefficient of a_n was not significantly different from 0 in the 95% confidence interval, thus supporting the parallel trend hypothesis, and the causal relationship of the above hypothesis was established.

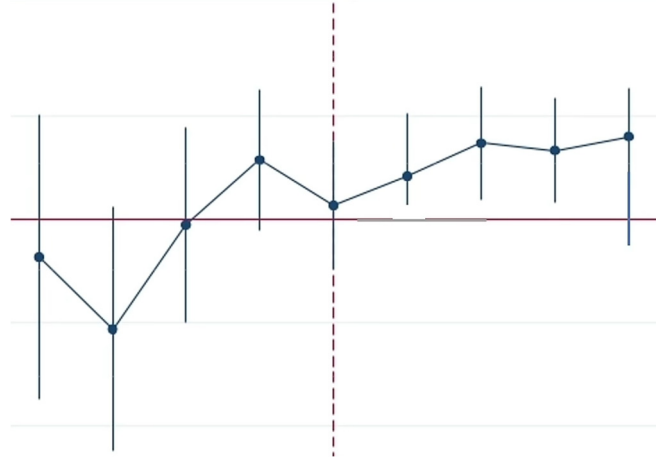


Figure 1. Parallel Trend Test

(2) Placebo test. First, this paper artificially advances the transformation time of supply chain digitalization by three years and five years. If the result of benchmark regression comes from the inherent differences between groups, then after setting a false transformation year, we should also be able to observe the role of supply chain digitalization in enhancing enterprise value. The results listed in columns (1) and (2) of Table 4 exclude the explanation of the results of this paper by the inherent differences between groups. Secondly, this paper generates a list of 54 pilot enterprises of supply chain innovation and application through computer random assignment, and then uses the formula (1) to estimate the net impact of participating in the transformation, and repeats the above process 500 times. Figure 2 shows the distribution of the estimated coefficient of $Treat \times Time$ obtained from this method. The average value of the estimated coefficient is 0.00225, and the distribution situation is concentrated around 0, far less than the true value of 0.416. The above results show that non-observation factors have no substantial influence on the estimation results in this paper, and the conclusion is robust.

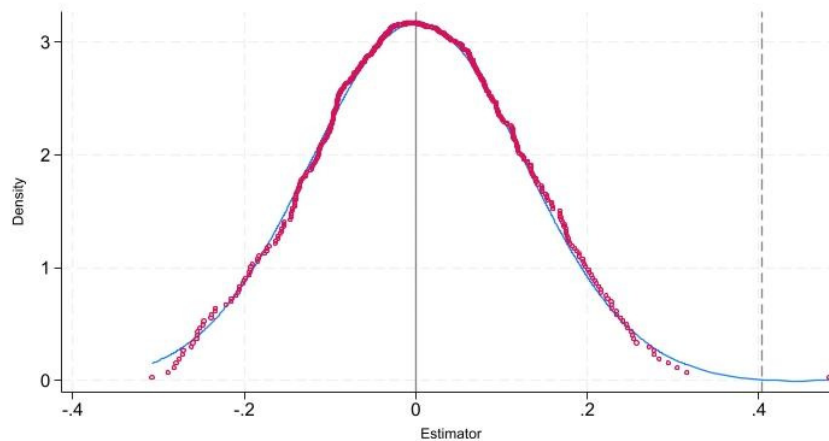


Figure 2. Placebo Test

Note: The thick line represents the distribution points of the estimation coefficient, and the thin line is the normal distribution curve drawn according to the mean and standard deviation of the sample. The mean value is 0.00225 and the standard deviation is 0.12568.

(3) Replacing the dependent variable. Drawing on the practice of Miralles Quirós et.al (2018), the measurement indicators of enterprise value are replaced by stock market price (P) and price-to-book ratio (PB), and the regression results are shown in columns (3) and (4) of Table 4. The results show that the coefficients of $Treat \times Time$ are significantly positive, and the conclusion remains unchanged.

Table 4. Robustness Test

Variable	Three years in advance	Five years in advance	Replacement measure	Replacement measure
	(1)	(2)	(3)	(4)
	TobinQ	TobinQ	P	PB
<i>Treat×Time</i>	0.0210	0.0710	3.123**	3.309***
	(0.283)	(1.171)	(2.099)	(2.923)
<i>Controls</i>	YES	YES	YES	YES
<i>Fixed effect</i>	YES	YES	YES	YES
N	19,372	19,372	19,372	19,266
adj.R ²	0.3620	0.3620	0.3470	0.0380

(4) Small sample estimation deviation. In this paper, the observation value of the treatment group only accounts for 2.1% of all sample observations, so it is necessary to investigate whether the results of this study are affected by the estimated deviation of small samples. The specific methods are as follows: first, 45 enterprises were randomly selected from the treatment group and regressed with the control group. After repeating the above process 500 times, the estimated coefficients of 500 core explanatory variables were obtained. Figures 3 and 4 show the distribution of coefficients and *p* values respectively. Figure 3 shows that the estimation coefficients are clustered near the true value (0.416), and Figure 4 shows that most of the estimated coefficients have passed at least 10% of the statistical significance test. To sum up, the results of this paper are not due to accidental factors of small samples.

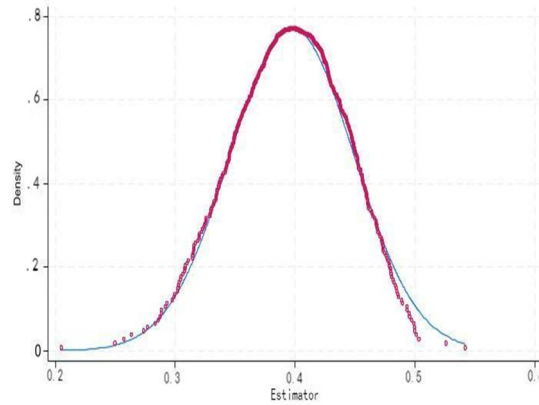


Figure 3. The Coefficient Distribution Diagram of Small Sample Estimation Deviation (Left)

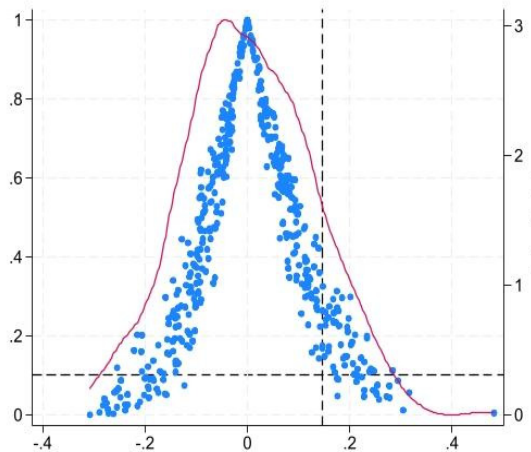


Figure 4. P-value Distribution Diagram of Small Sample Estimation Deviation (Right)

5. Heterogeneity Test

(1) The heterogeneity of the nature of property rights. The nature of property rights is the main source of enterprise heterogeneity. According to the different nature of property rights, this paper divides the samples into two categories: state-owned enterprises and non-state-owned enterprises. The results of classification regression are shown in columns (1) and (2) of Table 5. The results show that the digitalization of the supply chain plays a more significant role in enhancing the value of non-state-owned enterprises. The possible explanations are as follows: first, from the perspective of transformation power, compared with state-owned enterprises, non-state-owned enterprises are at a disadvantage in resource acquisition. Driven by the competitive pressure of “either advancement or drawing back”, non-state-owned enterprises have a stronger subjective will to explore the mechanism of digital technology enabling high-quality development of supply chains. Secondly, Qian Yingyi’s (1999) research shows that from the perspective of corporate governance, compared with non-state-owned enterprises, the level of corporate governance in state-owned enterprises is often lower due to the absence of owners. Therefore, in the absence of supervision, managers of state-owned enterprises may be passive about the digital transformation of the supply chain, which will lead to the separation of managers’ digital ability from the reality of the digital transformation of the supply chain and reduce the transformation effect.

(2) Heterogeneity of enterprise nature. According to the *Classification Catalogue of Strategic Emerging Industries*, the *Classification of Strategic Emerging Industries (2012) (Trial)*, and the relevant documents of the *Organization for Economic Cooperation and Development (OECD)*, and in contrast to the *Guidelines for Industry Classification of Listed Companies (revised in 2012)*, this paper divides the samples into high-tech enterprises and non-high-tech enterprises, and the results of classification regression are shown in columns (3) and (4) of Table 5. The results show that the digitalization of the supply chain plays a more significant role in enhancing the value of non-high-tech enterprises. The possible explanation is that the digitalization of the supply chain improves the operational efficiency of enterprises, and non-high-tech enterprises can realize real-time monitoring and data analysis of the supply chain, thus quickly finding and solving problems, reducing inventory backlog and shortage, and improving the operational efficiency of the supply chain. In addition, digitalization of the supply chain can reduce costs, help non-high-tech enterprises to realize information sharing and cooperation among all nodes of the supply chain, decrease duplication and waste, and reduce logistics costs and operating costs.

Table 5. Heterogeneity Test

Variable	State-owned enterprise	Non-state-owned enterprises	High-tech enterprise	Non-high-tech enterprises
	(1)	(2)	(3)	(4)
	TobinQ	TobinQ	TobinQ	TobinQ
<i>Treat×Time</i>	0.153*	0.742***	0.216*	0.493**
	(1.724)	(2.974)	(1.748)	(2.454)
<i>Controls</i>	YES	YES	YES	YES
<i>Fixed effect</i>	YES	YES	YES	YES
N	7,044	12,217	10,184	9,188
adj.R ²	0.3600	0.3970	0.3430	0.3950

6. Further Analysis

The previous conclusion shows that the digitalization of the supply chain improves enterprise value, but it does not analyze whether external factors will affect the promotion of supply chain digitalization

to enterprise value. Therefore, this paper constructs the following regression model to verify whether the enterprise located in a government-supported supply chain digital city can affect the effect.

$$TobinQ_{i,t} = a_0 + \gamma_1 TreatCityY_{i,t} \times Time_t + \gamma_2 TreatCityN_{i,t} \times Time_t + \gamma_3 TreatCityY_{i,t} + \gamma_4 Control_{i,t} + \sum Year + \sum Firm + \sigma_{i,t} + \varepsilon_{i,t} \quad (6)$$

Among them, *TreatCityY* and *TreatCityN* were spun off from *Treat*, indicating the processing group enterprises located in and not located in the pilot cities of supply chain innovation and application, respectively. It should be noted that it is necessary to control the direct impact of urban pilot work in regression according to whether *Treat* is located in a pilot city or not, otherwise, it is difficult to explain whether the result comes from the impact of pilot cities or from the digital transformation of the supply chain. Therefore, this paper introduces the joint fixed effect σ of cities and years into the formula, and the definitions of other variables are consistent with the benchmark regression formula.

Table 6. Further Analysis

Variable	Government support
	TobinQ
<i>TreatCityY</i> × <i>Time</i>	0.662***
	(11.269)
<i>TreatCityN</i> × <i>Time</i>	0.012
	(1.138)
<i>TreatCityY</i>	-0.234*
	(1.775)
<i>Controls</i>	YES
<i>City</i> × <i>year</i>	YES
<i>Enterprise/year fixed effect</i>	YES
N	19,372
adj.R ²	0.402

Table 6 shows the regression results. The coefficient of *TreatCityY*×*Time* is significantly positive, but the coefficient of *TreatCityN*×*Time* is not significant, indicating that the value level of the treatment group enterprises located in the pilot cities has improved more obviously than that of the treatment group enterprises located in non-pilot cities, thus confirming the complementary role of government support, assuming that H3 verification is established.

7. Conclusion and Implications

Taking the listed A-shares companies in Shanghai and Shenzhen from 2008 to 2019 as the research object, this paper empirically analyzes the influence of supply chain digitalization on enterprise value and its pathway and draws the following conclusions. Firstly, supply chain digitalization can significantly enhance enterprise value, which has passed the robustness test. Secondly, the mechanism analysis shows that the digitalization of the supply chain promotes enterprise value by improving the internal control level. The results of the heterogeneity test show that the digitalization of the supply chain has a more obvious effect of enhancing enterprise value in state-owned and non-high-tech enterprises, but the effect is not obvious for non-state-owned enterprises and high-tech enterprises.

Therefore, this paper puts forward the following suggestions for promoting the digital transformation policy of enterprise supply chain:

First, we should fully grasp the opportunity of digital transformation of the supply chain, speed up the process of deep integration of digital technology and supply chain, and provide key support for promoting the reasonable growth of economic realization. In the context of China, constructing a digital supply chain can enhance enterprise value. Therefore, on the one hand, it is necessary to strengthen the guidance for enterprises to carry out the digital transformation of supply chain, cultivate modern supply chain management thinking of enterprises, encourage enterprises to deeply embed modern digital technologies such as Internet of Things, blockchain, edge computing and big data into all aspects of supply chain, promote the process transformation and re-engineering of procurement, R&D, production and transportation, and improve the efficiency and innovation ability of supply chain management in an all-round way. On the other hand, while steadily expanding the scope of the pilot project, we should give full play to the bench-marking role of outstanding pilot enterprises, summarize, copy, and popularize the successful experience of digital transformation of the supply chain in time, and speed up the formulation of operational standards for digital transformation of supply chain, so as to form the development potential of digital transformation of supply chain in a wider scope from point to surface, and lay a solid foundation for promoting the high-quality development of the real economy.

Second, the digitalization of the supply chain will promote the improvement of the internal control quality of enterprises, and then play a supporting role in promoting the economy to achieve high-quality and effective improvement. This paper finds that the digitalization of the supply chain can improve the internal control level of enterprises. Therefore, first of all, it is necessary to continue to play the role of information governance of modern digital technology, break the information islands among node enterprises by deeply embedding digital technology, establish dynamic procurement, warehousing, and transportation management systems, strengthen the tracking and monitoring of business flow and capital flow in the supply chain, and output the delay and interruption risks of each supply chain node in real-time through big data analysis, and establish an early warning system for supply chain interruption accordingly. Secondly, we can strengthen the collaboration among enterprises in the supply chain nodes by constructing a digital supply chain platform, enhancing mutual trust among enterprises, and establishing and improving the crisis response mechanism of resource sharing and risk sharing. Finally, the coverage of the supply chain network can be improved through the digitalization of the supply chain, and a nonlinear interactive structure can be created to avoid the paralysis of the whole supply chain due to the interruption of a certain link.

Thirdly, the impact of digital transformation of the supply chain on enterprises is obviously heterogeneous. Therefore, when guiding enterprises to participate in the digital transformation of the supply chain, the government should take measures to meet the needs of enterprises and make precise policies. On the one hand, it is necessary to strengthen the supervision of managers of state-owned enterprises, optimize the selection criteria of external directors, improve the supervision mechanism of the board of directors, and link the transformation performance with salary, so as to curb the lazy and short-sighted tendency of managers and stimulate the transformation motivation of state-owned enterprises. On the other hand, it is necessary to further strengthen the attention and guidance to high-tech enterprises, and follow up the policy support to non-high-tech enterprises, so as to form differentiated policy support standards for the economic growth brought about by the whole range of enterprise value enhancement.

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