RESEARCH-ARTICLE

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The Impact of Data Assets on the Growth of Information and Communication Enterprises

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Abstract

In the era of the digital economy, the progress and expansion of enterprises are intricately tied to the effective management and utilization of their data assets. However, there has been a notable lack of research directly investigating the influence of data assets on enterprise growth. This paper aims to address this research gap by developing a theoretical framework that correlates data assets with the growth of information and communication enterprises. By analyzing empirical data sourced from Shanghai and Shenzhen A-share listed information and communication enterprises spanning from 2010 to 2023, the study demonstrates that data assets play a significant role in promoting the growth of these enterprises. Sub-sample regression shows that, compared with computer, communication and other electronic equipment manufacturing enterprises, data assets play a more obvious role in promoting the growth of information transmission, software and information technology service enterprises. The conclusion provide empirical evidence and important enlightenment for information and communication enterprises to achieve sustainable growth.

CCS Concepts

• **Social and professional topic**; • **Computing / technology policy**; • **Commerce policy**;

Keywords

Data Assets, Information & Communication Enterprises, Growth, Data elements, Market value

ACM Reference Format:

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1 Introduction

According to the *Research Report on the Development of Chinas Digital Economy* released by the China Academy of Information and Communications Technology in 2024, the digital economy has become a key force to promote high-quality development. Through the deep integration of digital technology and the real economy, the connotative growth of the economy, the release of market vitality and the extended expansion of demand have been promoted. In recent years, the scale of the digital economy has grown steadily. In 2023, the scale of China's digital economy has reached 53.9 trillion yuan, accounting for 42.8% of GDP. The year-on-year nominal growth rate is higher than the nominal GDP growth rate in the same period, effectively supporting the steady economic growth. The construction of the data factor market accelerates, providing the core elements for the new quality productivity. As early as 2020, the CPC Central Committee and The State Council issued the Opinions on Building a More Perfect System and Mechanism for Market-based Allocation of Factors, which clearly took data as a production factor along with labor and capital, and proposed to accelerate the cultivation of data factor market. Yang Yan et al. (2021) pointed out that data elements not only have the characteristics of replication, low cost and non-competition, but also can integrate with other production factors to produce a multiplier effect.[1]

Data assets are the assets expression form of data elements. Enterprises need to strengthen the management and application ability of their data assets to enhance their core competitiveness and release the economic value of their data assets. Therefore, an in-depth analysis of the impact of data assets on enterprise growth can help enterprises to promote digital transformation and bring new economic growth points for enterprises.

According to the definition of accounting assets, enterprise data assets are measurable data resources owned or controlled by the enterprise and expected to bring benefits to the enterprise.[2–4] This paper follows the three basic principles of controllable, quantifiable, and realizable, and understands that data assets are generated from inside the enterprise or obtained from outside the enterprise for specific purposes. These data assets can be stored, processed, and used for transactions, or used to support production and operation activities.[5]

Scholars at home and abroad have conducted research on data assets. Xu Xiang and Zhao Mofei used the endogenous growth model to study the driving effect of data capital on economic growth.[6] Jones and Tonetti emphasize that data is produced as a factor of production together with the labor force, which will produce additional scale effects and thus promote economic growth.[7] Yang Yan et al. (2023) believe that data elements can play a multiplier effect and play a direct and indirect two-dimensional driving role in economic growth.[8] However, there are few studies directly discussing the impact of data assets on enterprise growth. The empirical research

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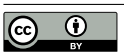

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to explore the impact of data assets on the growth of information and communication enterprises is even more scarce.

At present, the evaluation method of the value of data assets is still not unified. Hu Yaru et al. (2022) estimated the value of data assets by using the market method, cost method, and income method by referring to the value of data assets.[9–11] However, Li Jingping (2020) believes that the data trading market is not yet perfect, and it is difficult to estimate its future income, so the market method and the income method cannot be fully applied to the value evaluation of data assets.[12] At the same time, the value of data assets is usually far greater than the cost, and it is not suitable to measure by the cost method.[12]

This paper adopts the practice of Lu Zheng .[13] The value of enterprise data assets is the natural logarithm of the market value of the enterprise minus the net value of fixed assets minus the net value of financial assets minus the net value of intangible assets. Among them, financial assets = trading financial assets + derivative financial assets + net loans and advances + net financial assets available for sale + net hold-to-maturity investment and net investment real estate. [13]

Information and communication enterprises are data-driven enterprises, and data assets play an important role in information and communication enterprises. Information and communication enterprises mainly include electronic information equipment manufacturing, electronic information equipment sales and leasing, electronic information transmission services, computer services and software enterprises, other information-related services, as well as enterprises in the emerging industries brought about by the extensive integration and penetration of digital technology. In this paper, computer, communication and other electronic equipment manufacturing enterprises and information transmission, software and information technology service enterprises under the 2012 edition are selected as the research objects. Analyze the relationship between data assets and enterprise growth from a theoretical perspective. The sample of information and communication enterprises listed in Shanghai and Shenzhen A-shares in 2010-2023 is used to test the impact of data assets on enterprise growth.

2 RESEARCH METHODS AND DATA SOURCES

2.1 Proposal of Hypotheses & Source of Data

In the era of digital economy, data assets are becoming more and more important to the growth of enterprises, and enterprises dependence on data assets is also deepening. The large amount of information contained in data assets can provide the basis for enterprise decisions. Through the reprocessing of data assets, the value of data assets may be much more effectively enhanced. Information and communication enterprises are data-driven enterprises, and the impact of data assets on the growth of information and communication enterprises is crucial, so hypotheses are proposed in this paper.

Hypothesis 1: The more data assets, the faster the market expansion of the enterprise, and the faster the enterprise growth.

As the development and scale expansion of China's digital economy are mainly concentrated after 2010, and considering the availability of data, this paper takes the information and communication enterprises listed on Chinese A-share enterprises in 2010-2023 as the research sample. The data are mainly from CSMAR database and RESSET database.

2.2 Selection of Indicators

2.2.1 A measure of corporate growth. There are two types of indicators for enterprise growth. One is the growth rate indicator, such as the growth rate of total assets, which determines the speed of enterprise growth from the perspective of growth, and the growth status indicator, such as operating income, which measures the state of enterprise growth from a static perspective. This paper measures the growth of enterprises with static indicators, using the natural logarithm of business income to measure the state of enterprise growth.

2.2.2 Measurement of data assets. The accounting of data assets is currently in great difficulty. There are usually three ways to account for assets: market method, cost method, and income method. The use of the first two methods lacks the due conditions. First, the market method is not applicable, mainly because the current market transaction of data assets is not fully formed; second, the cost method is also not applicable, mainly because the cost of data assets is too different from the value of data assets to a large extent. However, the income method can more accurately evaluate the data assets of the enterprise according to the predicted income. Therefore, this paper chooses the income method to measure the data asset index. Drawing on the practice of Lu et al. (2023), this paper regards the measurement method of data assets as the natural logarithm after deducting the net value of fixed assets, financial assets, and the net value of intangible assets, namely:

Data assets = ln (market value-net fixed assets-financial assets-net intangible assets)

Among them, the market value of the enterprise is the sum of the stock market value and the total liabilities. Financial assets include trading financial assets, derivative financial assets, net loans and advances, net financial assets available for sale, net hold-to-maturity investment and net investment real estate.

2.2.3 Control variables. In order to avoid estimation bias caused by missing important variables. In this paper, the natural logarithm of listing years (lnage), enterprise size (lnsize), current ratio, long-term debt ratio, and basic earnings per share are selected as control variables.

All of the variables are shown in Table Table 1.

2.3 Descriptive Statistics

Table 2 reports the descriptive statistical results for the main variables. Unbalanced panel data for 6891 samples from 2010-2023 during the sample period. Among them, computer, communication and other electronic equipment manufacturing samples 3719, and information transmission, software and information technology service enterprise samples 3172.

As shown in Table 2, the mean of enterprise growth index is 21.02, the standard deviation is 1.32, the minimum and maximum values are 15.23 and 27.64 respectively, the mean of enterprise data asset index is 22.59, the standard deviation is 1.11, and the minimum and maximum values are 19.3 and 28.17 respectively, which indicates

Table 1: Data sources and Indicators selection

Indicators	Explanation
$Growth_{it}$	Business growth is measured by a static indicator, using the natural logarithm of operating income to measure the state of business growth.
Data $Assets_{it}$	Data assets = ln (market value-net fixed assets-financial assets-net intangible assets). Among them, the market value of the enterprise is the sum of the stock market value and the total liabilities. Financial assets include trading financial assets, derivative financial assets, net loans and advances, net financial assets available for sale, net hold-to-maturity investment and net investment real estate.
$Inage_{it}$	The natural logarithm of the number of years
$lnsize_{it}$	The natural logarithm of the total corporate assets
Current $Ratio_{it}$	Current ratio = current assets / current liabilities
$LTDR_{it}$	long-term debt ratio = long-term loan / total assets
BES_{it}	Basic earnings per share = net income / total equity

Table 2: Descriptive statistics of the main indicators of information and communication enterprises

variables	Mean	SD	Min	Max
$Growth_{it}$	21.02	1.32	20.91	15.23
Data $Assets_{it}$	22.59	1.11	22.48	19.3
$Inage_{it}$	1.83	0.92	1.95	0
$lnsize_{it}$	21.76	1.14	21.62	16.76
Current $Ratio_{it}$	3.58	4.84	2.23	0.08
$LTDR_{it}$	0.02	0.05	0	0
BES_{it}	0.37	0.86	0.28	-7.67

Table 3: Descriptive statistics of the main variables of the samples

variables	Mean		SD		Min		Max	
	hardware	software	hardware	software	hardware	software	hardware	software
$Growth_{it}$	21.2	20.8	1.35	1.25	21.02	20.72	15.23	16.55
Data $Assets_{it}$	22.67	22.51	1.15	1.05	22.52	22.44	19.3	19.38
$Inage_{it}$	1.81	1.86	0.92	0.9	1.95	1.95	0	0
$lnsize_{it}$	21.87	21.63	1.15	1.12	21.69	21.53	17.88	16.76
Current $Ratio_{it}$	3.49	3.68	4.97	4.69	2.18	2.31	0.08	0.16
$LTDR_{it}$	0.02	0.02	0.05	0.05	0	0	0	0
BES_{it}	0.43	0.31	0.77	0.96	0.31	0.25	-5.03	-7.67

that the growth status of enterprises and the value of data assets in the sample are quite different.

We divided the samples of information and communication enterprises into two types: computer, communication and other electronic equipment manufacturing enterprises refer to hardware manufacturing industry, and information transmission, software and information technology service enterprises refer to software service industry. As can be seen from the sample index comparison in Table 3, the growth of computer, communication and other electronic equipment manufacturing enterprises and their data assets are slightly higher than that of information transmission, software and information technology service enterprises, the standard deviation of computer, communication and other electronic equipment manufacturing enterprises is slightly higher than that of information transmission, software and information technology service enterprises, indicating that computer, communications and other electronic equipment manufacturing enterprises are growing better and have more data assets, while the differences between enterprises are greater.

2.4 Model Setting

The paper sets up the following benchmark regression model:

$$Growth_{it} = \alpha_0 + \alpha_1 DataAssets_{it} + \beta X_{it} + \lambda_t + \varepsilon_{it} \quad (1)$$

$$Dataassets = ln \begin{pmatrix} marketvalue - financialassets \\ -netfixedassets - netintangibleassets \end{pmatrix} \quad (2)$$

Financial assets = trading financial assets + derivative financial assets + net loans and advances + net financial assets available for

Table 4: Benchmark regression

variables		(1)	(2)	(3)	(4)
Data $Assets_{it}$		0.9997**	0.1796***	0.0825***	0.2447***
		(59.96)	(10.23)	(3.91)	(10.15)
controlled variables	$Inage_{it}$		-0.0488***	-0.0507***	-0.0285**
			(-4.41)	(-4.34)	(-2.06)
	$lnsize_{it}$		0.8867***	1.0247***	0.7611***
			(54.28)	(52.42)	(37.31)
	Current $Ratio_{it}$		-0.0405***	-0.0404***	-0.0407***
			(-8.92)	(-23.64)	(-17.51)
	$LTDR_{it}$		-2.1027***	-2.6210***	-2.1259***
			(-11.52)	(-14.03)	(-9.67)
	BES_{it}		0.0819***	0.1057***	0.0588***
			(5.80)	(8.78)	(5.37)
	$Year_t$		-0.1977***	-0.2122***	-0.1853***
			(-5.27)	(-4.43)	(-2.99)
constant		-1.5678	-1.9345***	-2.6719***	-0.8115***
		(-6.09)	(-9.33)	(-12.86)	(-3.09)
N		6891	6887	3719	3168
r2_a		0.7007	0.8405	0.8712	0.8056

sale + net hold-to-maturity investment + net investment real estate (3)

In formula 1, the explained variable $Growth_{it}$ represents the growth of i enterprise in year t, and the core explanatory variable is Data $Asset_{it}$. X_{it} is a set of control variables, including: $Inage_{it}$,$lnsize_{it}$,Current $Ratio_{it}$,$LTDR_{it}$, BES_{it}. Furthermore, to control for the effect of time trends on the estimated results, the year fixed effect λ_t was added to the regression equation. The random error term is ϵ_{it}. This paper focuses on the sign and significance of the coefficient α_1, which measures the impact of data assets on growth.

3 MODEL SOLUTION AND RESULT ANALYSIS

3.1 Benchmark Regression Results

We first used all the information and communication enterprises listed in A-shares in 2010-2023 as samples, and after deleting the samples with missing data, we finally obtained the nonbalanced panel data of 6,891 samples for OLS benchmark regression. Table 4 reports the estimated results of the data assets affecting the growth of the ICT enterprises in the benchmark regression. Column (1) includes only the core explanatory variable data assets, and column (2) adds the control variables based on column (1). As the addition of the control variable to R2 becomes larger, it indicates that the explanatory role of the model is enhanced. As can be seen from Table 4, the regression coefficient of the data assets in all the regressions is significantly positive, indicating that all the data assets significantly promote the growth of the information and communication enterprises. In order to examine the impact of data assets on the growth of information and communication enterprises, we divided the samples of information and communication enterprises into two categories. The first category is information transmission, software and information technology service enterprises, and the second category is information transmission, software and information technology service enterprises. Column (3) of Table 4 examines the impact of data assets on the growth of computer, communication and other electronic equipment manufacturers, and column (4) examines the impact of data assets on the growth of information transmission, software and information technology service enterprises. Comparing the regression coefficients of data assets in columns (3) and (4) shows that the impact of data assets on the growth of information transmission, software and information technology services enterprises is significantly greater than its impact on the growth of computer, communication and other electronic equipment manufacturing enterprises.

Note: * * *, * * & * are significant at 1%, 5% and 10%, respectively, the t value based on the White in brackets; All the explained variables were all $Growth_{it}$ and were measured by the natural logarithm of operating income.The author calculated by using the Stata17.0

3.2 Results of the Robustness Regression

In order to further analyze the impact of data assets on the growth of information and communication enterprises, we use the fixed effect model to perform the robustness regression of the sample enterprises. According to the model in column (2) of Table 4, and the results are shown in Table 5. It can be seen from column (1) of Table 5 that the fixed effect regression results and the OLS regression results are consistent, and the data assets have a significant positive effect on the growth of information and communication enterprises. Column (2) in Table 5 controls the year based on column (1), and R2 increases, indicating that the model interpretation is stronger. It can be seen that the regression coefficient of data assets in all regression is significantly positive, indicating that data assets significantly promote the growth of information and communication enterprises. The regression coefficient of the data assets of the model increased after controlling the year variables, indicating that the effect of the year in column (1) underestimated the promoting effect of the data assets on the growth of information

Table 5: Robustness regression

Data Assets$_{it}$		(1)	(2)	(3)	(4)
		0.1064***	0.2107***	0.1323***	0.2629***
		(8.51)	(14.04)	(6.77)	(11.16)
controlled variable	Inage$_{it}$	0.0258**	-0.0177	-0.0046	-0.0218
		(2.45)	(-1.21)	(-0.26)	(-0.92)
	lnsize$_{it}$	0.8006***	0.7331***	0.9049***	0.6090***
		(63.90)	(52.32)	(45.77)	(30.56)
	Current Ratio$_{it}$	-0.0194***	-0.0197***	-0.0187***	-0.0205***
		(-15.51)	(-15.79)	(-11.71)	(-10.67)
	LTDR$_{it}$	-1.0822***	-1.1203***	-1.2566***	-1.2250***
		(-8.56)	(-8.96)	(-7.88)	(-6.29)
	BES$_{it}$	0.0884***	0.0753***	0.0715***	0.0759***
		(11.45)	(9.81)	(7.24)	(6.44)
	Year		-0.0282	-0.1977***	0.0758
			(-0.77)	(-4.26)	(1.34)
	constant	1.2085***	0.4049*	-1.4003***	1.7505***
		(5.99)	(1.77)	(-4.70)	(4.88)
	N	6887	6887	3719	3168
	r2_a	0.7388	0.7470	0.7925	0.7036

and communication enterprises. We divide the samples of information and communication enterprises into two categories. The first category is information transmission, software and information technology service enterprises, and the second category is information transmission, software and information technology service enterprises. Column (3) of Table 5 examines the impact of data assets on the growth of computer, communication and other electronic equipment manufacturers, and column (4) examines the impact of data assets on the growth of information transmission, software and information technology service enterprises. Comparing the regression coefficients of data assets in columns (3) and (4) shows that the impact of data assets on the growth of information transmission, software and information technology services enterprises is significantly greater than its impact on the growth of computer, communication and other electronic equipment manufacturing enterprises. The fixed-effects model and the benchmark regression results were consistent. The fixed-effects model and the benchmark regression results were consistent. We will also conduct the robustness test by changing the sample interval, changing the sample interval to 2013-2023,2015-2023, and the test results are consistent with the benchmark regression results(Results for future reference).

Note: * * *, * * & * are significant at 1%, 5% and 10%, respectively, the t value based on the White in brackets; All the explained variables were all Growth$_{it}$ and were measured by the natural logarithm of operating income.The author calculated by using the Stata17.0

4 CONCLUSIONS AND RECOMMENDATIONS

This study focuses on the impact of data assets on the growth of information and communication enterprises in the era of digital economy. Through research, it is found that data assets, as the key element of the core competitiveness of enterprises, have a significant positive effect on the growth of information and communication enterprises. Through the 2010-2023 China a-share listed information communication enterprise data analysis, using the natural logarithm of operating revenue as a measure of enterprise growth, and the income method to calculate data assets, established the benchmark regression model, and control including listed fixed number of year, enterprise scale, current ratio, long-term borrowing and total assets ratio, earnings per share. The results show that data assets have a significant role in promoting the growth of information and communication enterprises, especially in information transmission, software and information technology service enterprises. The research not only confirms the important role of data assets in promoting the growth of enterprises, but also provides practical guidance for the management and application of data assets for information and communication enterprises, and emphasizes the strategic significance of optimizing data asset allocation for the sustainable growth of enterprises in the context of digital economy.

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