Tax Incentives, Business Environment and Digital Transformation of Enterprises

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Abstract. Drawing on information from Shanghai and Shenzhen's A-share non-financial listed firms between 2013 and 2020,This study uses empirical research to investigate how tax incentives affect businesses' digital transformations and how the business environment influences such transformations. The findings indicate that: (1) Tax incentives significantly improve an organization's ability to undergo digital transformation. (2) The business environment can significantly positively regulate the relationship between tax incentives and enterprise digital transformation. (3)Additionally, this paper conducts a heterogeneity analysis based on the regional differences of the enterprises. The results show that, while the tax incentives of the enterprises in the central and western regions do not significantly affect the promotion of enterprise digital transformation, the analysis of the eastern region's enterprises is in line with the analysis of the sample as a whole. The results of this paper provide an important reference for standardizing tax policies and improving the business environment, and promoting enterprises to move towards digitalization.

Keywords: tax incentives; digital transformation of enterprises; business environment; Regulatory effect

1 Introduction

The report of the 20th National Congress of the Communist Party of China profoundly pointed out that ' the development of digital economy is of great significance and is a strategic choice to grasp the new round of scientific and technological revolution and new opportunities for industrial transformation '. In recent years, the state and the government have always attached great importance to the digital economy and the digital transformation of enterprises. But Chinese businesses are only now beginning to shift at a digital level. Due to many obstacles such as the external environment and its own technology in practice, there is a realistic dilemma that enterprises dare not transform or cannot transform. As an important means for governments to regulate the behavior of enterprises, tax incentive programs ought to be more effective in encouraging businesses to go digital due to its strong universality and clear policy orientation. In order to promote the digital transformation of enterprise innovation, the government also emphasizes the need to create a first-class business environment, create a good administrative and legal environment for enterprises, and stimulate the innovative vitality of enterprises. At the same time, the advantages and disadvantages of the business environment will also affect the differences in the effects of tax incentive policies among regions, thus in turn affects the efficiency and success rate of change activities.. Therefore, this

BDEDM 2024, January 12-14, Ningbo, People's Republic of China

DOI 10.4108/eai.12-1-2024.2347224

paper discusses the impact of tax incentives and business environment on the digital transformation of enterprises and its mechanism.It provides a decision-making reference for improving the business climate, comprehensively enhancing the development of digital economy and digital transformation.

2 Literature Review and Research Hypothesis

2.1 The impact of tax incentives on the digital transformation of enterprises

First, tax incentives are conducive to breaking the dilemma of resource constraints. In view of the limited resources, only when enterprises have sufficient and stable funds, professional technical developers and new equipment and other resources, can they ensure that enterprises invest resources in innovative research and development and digital technology development while maintaining normal production and operation activities[1]. As a necessary expenditure of enterprises, taxation will reduce the disposable funds of enterprises, coupled with the high cost of change activities, thus reducing the efficiency of digital transformation of enterprises[2]. Tax incentives can effectively reduce the tax cost of enterprises, increase the internal cash flow of enterprises and share some of the risks of enterprises, so as to stimulate the innovation vitality of enterprises, drive enterprises to increase investment in innovation and R & D, and ultimately help enterprises digital output [3]. Second, tax incentives are conducive to reducing corporate financing costs. When enterprises carry out external financing, they must bear the pressure of debt repayment or regular dividend payment and face high risks. The digital transformation activities themselves are high-risk. This double high-risk pressure will inhibit the company 's intention to change and is not conducive to the company 's digital transformation activities[4].Tax incentives can stabilize the endogenous funds of enterprises, reduce the financing costs of enterprises and reduce the risk of external borrowing due to insufficient internal cash, which in turn contributes to the smooth realization of digital transformation of enterprises. Third, tax incentives can promote the upgrading of enterprise equipment. Equipment upgrading is a key factor in the digital transformation of enterprises[5]. On the one hand, these policies can decrease investment costs , improve resource allocation efficiency,and encourage enterprises to upgrade their original equipment and increase their willingness to invest in R & D equipment, thus driving the digital transformation and upgrading of enterprises. In light of this, this work puts forward hypothesis 1: tax incentives can promote the digital transformation of enterprises.

2.2 Tax incentives, business environment and digital transformation of enterprises

Firstly, tax policy will be affected and restricted by the business environment. The high-quality business environment takes an open and transparent tax incentive policy, which affects the quality of tax information obtained by enterprises, and further affects the efficiency of enterprises in using policies to develop digital technology[6].At the same time, a good business environment helps to improve the efficiency of the implementation of tax policies, improve the implementation of tax policies, thereby lowering the business enterprise tax negative and increasing the after-tax profits of enterprises. So the business environment's optimization can enhance the tax policy's incentive impact in promoting firm innovation.Secondly,The high-quality business environment can create a good digital technology innovation atmosphere

for enterprises. The improvement of the business environment helps to simplify the approval process of the market department, shorten the approval cycle, open up a convenient way for enterprises, and shorten the innovation cycle of enterprises[7]. At the same time, a good business environment brings better tax service, which can reduce the tax cost and institutional transaction cost of enterprises, improve the efficiency of resource allocation, and drive the output of digital technology innovation[8]. The better the business environment, the more fair and equitable the market competition environment, and the stricter the law enforcement procedures.In this environment, the protection of intellectual property rights of enterprises is sufficient, which also helps to reduce the possibility of encroachment or theft of innovation achievements of enterprises, and the willingness of enterprises to carry out R&D and innovation is also stronger, thus helping enterprises to transform digitally[9]. In light of this, this work puts forward hypothesis 2 : the business environment can significantly enhance the role of tax incentives in promoting the digital transformation of enterprises.

3 Empirical study design

3.1 Data sources

The observation sample for this article is the data of A-share-listed businesses in Shanghai and Shenzhen from 2013 to 2020.The micro-level data source is the CSMAR database, and the macro-data business environment is taken from the statistical yearbooks of various regions, and here is how the data are handled. : (1) Excluding financial industry data ; (2) Eliminating ST enterprise data ; (3) Eliminate enterprises with missing data. Then the data are tailed to eliminate the interference of heteroscedasticity, and finally 9384 sample observations are obtained.

3.2 Model building

In order to study the relationship between tax incentives and digital transformation of enterprises, this paper constructs Model (1) -two-way fixed effect model.

$$DCG_{it} = \alpha_0 + \alpha_1 InTax_{it} + \beta_1 \sum X_{it} + \eta_i + \delta_t + \varepsilon_{it} \quad (1)$$

i denotes the individual enterprise and t denotes the time. DCG is the explained variable enterprise digital transformation degree, $InTax$ is the primary variable of explanatory, X_{it} represents a series of control variables, η_i stands for a single, fixed effect, δ_t stands for the fixed impact of time, ε_{it} represents random perturbation term.

In order to test the moderating influence of the business environment on the impact of tax incentives on the digital transformation of firms,the interaction term of tax incentives and business environment is added on the basis of Model(1).The model is (2), $Envir_{it}$ represents the business environment.

$$DCG_{it} = \alpha_0 + \alpha_1 InTax_{it} + \alpha_2 Envir_{it} + \alpha_3 InTax_{it} \times Envir_{it} + \beta_1 \sum X_{it} + \eta_i + \delta_t + \varepsilon_{it} \quad (2)$$

3.3 Variable definitions

The explained variable is enterprise digital transformation (DCG). Using the method of Wu Fei (2021)[10], this paper uses Python software crawler technology to collect the entries about digital transformation in the annual report of the enterprise, and then adds them to obtain the total word frequency. Finally, the total word frequency is added 1 and the logarithm is taken.

The primary variable of explanation is tax incentives (Tax). The tax return received by the enterprise is taken as the degree of tax incentive, and the logarithm is taken.

The business environment is the moderating variable (Envir). Using the entropy weight approach, the business environment index for each province is determined by gathering data on five macroeconomic environment indicators: GDP growth rate, average pay level, consumption rate, per capita fixed asset investment, and per capita GDP.

The control variables include asset-liability ratio (Lev) : year-end total liabilities divided by year-end total assets; total assets net profit margin (ROA) : net profit divided by the average balance of total assets; total asset turnover (ATO) : operating income divided by the average total assets;cash flow ratio (Cashflow) : net cash flow generated by operating activities divided by total assets;operating income growth rate (Growth) : this year 's operating income divided by the above year 's operating income minus 1;Tobin Q value (TobinQ) : (market value of tradable shares + number of non-tradable shares * net assets per share + book value of liabilities) / total assets;book-to-market ratio (BM) : book value divided by total market value; listing age (ListAge) :the year of the year minus the year of listing and add 1, and then take the logarithm of it;number of directors (Board):the number of the board of directors of the enterprise takes the natural logarithm.

4 Empirical results and analysis

4.1 Baseline regression

Table 1. Benchmark regression results.

variable	*DCG*		variable	*DCG*	
	(1)	(2)		(1)	(2)
Tax	0.1089***(0.0084)	0.0193**(0.0079)	ROA	-0.9879***(0.3068)	0.0706(0.1994)
ATO	0.0208(0.0379)	0.0323(0.0525)	BM	-0.0803***(0.0160)	0.0052(0.0139)
Growth	0.3837***(0.0499)	0.1237***(0.0273)	TobinQ	0.1305***(0.0144)	0.0167(0.0104)
Board	-0.3622***(0.0766)	0.3277***(0.0777)	_cons	0.4742**(0.2127)	0.0173(0.2589)
ListAge	0.1180***(0.0285)	0.1717**(0.0712)	N	9384	9384
Cashflow	-1.5526***(0.2683)	-0.3075*(0.1605)	individual effect	control	control
Lev	-0.8368***(0.1018)	0.1300(0.1065)	time effect	control	control

The regression results of the impact of tax incentives on the digital transformation of enterprises are as shown in Table 1. Whether or not double fixed, the regression coefficients of tax incentives are positive, and they are significant at the levels of 1% and 5%, respectively. It shows that enterprise digital transformation might be aided by tax incentives., which verifies hypothesis 1. This is because tax incentives can increase the cash flow of enterprises, ease financing constraints, raise R&D spending and the quantity of patent applications and promote the digital transformation of enterprises.

4.2 Regulatory effects

Table 2. Regression results of moderating effect.

variable	*DCG*		variable	*DCG*	
	(1)	(2)		(1)	(2)
Tax	0.0193**(0.0079)	0.0206***(0.0079)	Lev	0.1300(0.1065)	0.1302(0.1064)
Tax*Envir		0.1047**(0.0434)	ROA	0.0706(0.1994)	0.0576(0.1997)
Envir		0.2985(0.2832)	BM	0.0052(0.0139)	0.0012(0.0139)
ATO	0.0323(0.0525)	0.0373(0.0525)	TobinQ	0.0167(0.0104)	0.0149(0.0104)
Growth	0.1237***(0.0273)	0.1256***(0.0273)	*_cons*	0.0173(0.2589)	-0.1722(0.2815)
Board	0.3277***(0.0777)	0.3304***(0.0777)	*N*	9384	9384
ListAge	0.1717**(0.0712)	0.1850***(0.0718)	individual effect	control	control
Cashflow	-0.3075*(0.1605)	-0.3147*(0.1608)	time effect	control	control

It can be seen from Model (2) of Table 2 that tax incentives are extremely positive at the 1 % level, and the interaction between tax incentives and the business environment is extremely positive at the 5 % level, indicating that the business environment significantly enhances the positive growth of tax incentives and corporate digital transformation.The more the business climate in the area where the company is situated, the stronger the role of tax incentives in promoting the digital transformation of enterprises, which verifies Hypothesis 2. This is because : the more the business climate in the area where the company is situated, the more perfect the tax incentive policies implemented by the local government and the higher the efficiency of policy implementation, and the lower the institutional transaction costs, the more after-tax profits the enterprise can have. The high-quality business environment can increase the amount of external technology acquisition of the enterprise, thereby improving the efficiency and success rate of the digital transformation of the enterprise.

4.3 Heterogeneity analysis

This study separates the enterprise's location into three regions: the eastern, central, and western and analyzes the heterogeneity. From the results of Table 3, it shows that for enterprises in the eastern part, the impact of tax incentives on their digital transformation is

significantly positive, while for enterprises in the midland and western regions, the promotion effect of tax incentives on their digital transformation is not significant. This may be due to the superior geographical location of companys in the eastern part, developed business, strong ability to attract investment, and higher efficiency in the implementation of tax policies. As a result,the overall development of eastern enterprisesis relatively mature, and the innovation consciousness, innovation ability and digital technology development level are strong. However, the enterprises in the midland and western regions, are weak in transformation ability due to many restrictions such as location and degree of economic growth.

Table 3. Heterogeneity analysis regression results.

variable	DCG		
	the eastern	the central	the western
Tax	0.0212**(0.0093)	0.0102(0.0195)	0.0258(0.0213)
ATO	0.0202(0.0600)	-0.0649(0.1444)	0.3039**(0.1531)
Growth	0.1177***(0.0326)	0.1487***(0.0558)	0.1551*(0.0824)
Board	0.3883***(0.0914)	0.0646(0.1750)	0.3555(0.2359)
ListAge	0.1801**(0.0825)	0.3267*(0.1783)	-0.2727(0.2672)
Cashflow	-0.2335(0.1874)	-0.2599(0.4138)	-0.8604*(0.4843)
Lev	-0.0289(0.1230)	0.2326(0.2672)	1.1000***(0.3187)
ROA	0.0068(0.2254)	0.4124(0.5524)	-0.1145(0.7380)
BM	0.0030(0.0164)	0.0545*(0.0304)	-0.0673(0.0472)
TobinQ	0.0205*(0.0119)	0.0311(0.0245)	-0.0215(0.0396)
N	7168	1328	888
individual effect	control	control	control
time effect	control	control	control

5 Conclusions and implications

Drawing on information from Shanghai and Shenzhen's A-share non-financial listed firms between 2013 and 2020, a two-way fixed effect model and a moderating effect model are constructed to empirically test the influence of tax incentive policies and business environment about the digital revolution of businesses. The findings indicate that tax benefits have greatly aided enterprises in embracing the digital revolution.; the optimization of the business environment can strengthen the role of tax incentives in promoting the digital transformation of enterprises. According to the results of the heterogeneity study, the only businesses that agreed with the analysis of all the sample businesses were those located in the eastern area. Finally, the article gives two suggestions : First, further improve the tax incentive policy. For one thing we will continue to increase the intensity of tax incentives. For another we will shift the focus of the policy from the breadth of coverage to the depth. Specifically, the government formulates differentiated and diversified tax incentive policies based on geographical differences, so as to adapt to local conditions, be flexible and diverse, and keep pace with the times. Second, further optimize the business environment and create an excellent R & D innovation and digital technology development environment for enterprises.

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