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The Promotion Effect of Minimum Wage on Enterprise Digital Transformation

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Abstract: In the digital economy era, the factors influencing enterprise digital transformation have become the focus in the study. Based on the minimum wage perspective, this paper uses the data of China listed companies and minimum wage to study the impact of minimum wage on enterprise digital transformation. The results show that the rise of minimum wage has accelerated the process of enterprise digital transformation, and this conclusion still hold true after robustness test and endogenous treatment. Mechanism analysis shows that the rise of minimum wage promotes enterprise digital transformation through innovation incentive effect. The heterogeneity analysis shows that for non-state enterprises, high-tech enterprises and China eastern enterprises, the minimum wage plays a more significant role in promoting enterprise digital transformation. The conclusion provides a useful reference for enterprises to effectively promote digital transformation and the government to reasonably set the minimum wage standard in the digital economy era.

Keywords: digital transformation; minimum wage; corporate governance

JEL Classification: D21; G30; O30

1. Introduction

Nowadays, digital technology has led a new round of technological and industrial transformation, and digital economy has become a new direction of global economic development. According to the White Paper on the Development of Digital Economy in China (2022), the size of China's digital economy has reached 45.5 trillion yuan in 2021, with a growth rate of 16.2%, accounting for 39.78% of the GDP, showing a huge growth power and application space. Industry digitalization has become the main engine of the digital economy development, and the digital economy is increasingly driven by consumer Internet to industrial Internet. Enterprises as one of the most important micro-subjects of digital economy application, digital technology and digital services play an increasingly important role in enterprise governance. The ABCD structure of enterprise digital transformation, which is based on Artificial Intelligence, Blockchain, Cloud Computing and Big Data, has profoundly changed the production mode, organizational form and business model of traditional enterprises, showing excellent prospects and growth momentum, and is increasingly becoming the key breakthrough for global enterprises to gain competitive advantage. Especially under the background of COVID-19 pandemic and post-epidemic economic recovery, the enterprise digital transformation is more important and urgent:

contactless office and e-marketing became the main ways for enterprises to maintain operation during the epidemic, online office improved the efficiency of information transmission within enterprises, reduced the risk of income interruption for employee, and smart logistics ensured the smooth supply chain of enterprises under the epidemic. Facing the post-epidemic business recovery, digital technology plays a more critical role and has a broader application scenario. Mobile Internet technology breaks through the physical boundary of enterprise business expansion, which helps to expand the target market and gain a broader customer group. Big data and artificial intelligence help to accurately lock the target customers and accurately build user portraits. Industrial robot and smart customer service in the front and back end of production respectively prevent enterprises from falling into shutdown due to epidemic situation. In addition, commercial banks and other financial institutions make use of financial technology to precisely evaluate credit risk, give full play to inclusive finance's advantages, and can provide credit loan with low threshold and high efficiency, helping enterprises to realize post-epidemic recovery. In fact, in today's world, where all kinds of uncertainties are rising, data flow has become a production factor as important as capital flow, and the enterprise digital transformation has become an urgent issue that all kinds of enterprises must face.

The enterprise digital transformation not only has great affect in the field of practice, but also become the focus of academic attention. Tapscott (1996) put forward the concept of "digital economy" earlier, pointing out that the internet and information technology will reshape the traditional definitions of economy, wealth creation, business organization and institutional structure, and digital economy is a new economy that presents information flow digitally. As one of the most important micro-subjects of social and economic operation, enterprises play a key role in the tide of digital economy. Based on the connotation of Liu et al. (2021), this paper defines enterprise digital transformation as the change of enterprise management mode and thinking. Compared with the traditional industrialization system, enterprise digital system introduces digital technology into enterprise management structure, promotes the systematic reshaping of enterprise information structure, management mode, operation mechanism and production process, and finally realizes the change from industrialization management mode to digital management mode.

The enterprise digital transformation will produce significant economic effects. Acemoglu (2003) found that the change of technological and the change of factor share will give new value to the data, which may cause a series of economic impacts on the operating cost, technological innovation and even capital market performance. Mikalef and Pateli (2017), using the survey data of 274 international companies, found that information technology has improved the adjustment agility of enterprise market value and operation, thus enhancing its market competitiveness. The above research focuses on the economic effects of enterprise digital transformation. However, what factors drive the enterprise digital transformation are also worthy of attention. Zeng (2022) divided the driving factors of enterprise digital transformation into three categories: technology-driven theory, organization-driven theory and environment-driven theory. First, Technology-driven theory holds that enterprise digital transformation is the result of technological progress, and it is a

highly dynamic process of continuous iteration in learning and practice (Chanias et al., 2019). The complexity, uncertainty, testability and observability of technology itself will all have an impact on enterprise digital transformation (Maroufkhani et al., 2020). Secondly, Organization-driven theory provides a possible explanation for digital transformation from the internal factors of enterprises. It has been found that the senior managers' support is the key factor that affects enterprise digital transformation (Maroufkhani et al., 2020). And enterprises' financial situation will also have an impact on the digital transformation. Higher financialization and high leverage ratio of enterprises will inhibit enterprise digital transformation (Huang et al., 2022; Du et al., 2022). These literatures are mainly based on the internal characteristics of enterprises to study the impact on digital transformation. However, the external environment faced by enterprises is also an important factor affecting the process of digital transformation, which corresponds to the environment-driven theory. Mao et al. (2022) found that the construction of transportation infrastructure represented by high-speed railway can significantly promote enterprise digital transformation, and the convenient transportation network can improve entrepreneurs' access to digital technology, alleviate the shortage of digital professionals, and accelerate enterprise digital transformation. Zeng (2022), taking forward-looking effective tax rate as the starting point, found that tax incentive policy can promote digital transformation by easing corporate financing constraints and strengthening entrepreneurial orientation.

As an important system design in the world's major economies for a long time, whether the minimum wage still meets the needs of enterprise operation and labor market in the digital economy era deserves attention. The existing literature on the economic effect of minimum wage mainly focuses on the influence of workers' income distribution, employment choice and enterprise behavior. Avram et al. (2019) discussed the influence of minimum wage on the competitiveness and employment of small and medium-sized enterprises under the background of digital technology change from the perspective of digital economy for the first time. It was believed that the application of digital technology and minimum wage growth could enhance the competitiveness of small and medium-sized enterprises, and had significant employment creation effect. In this paper, we discuss the impact of minimum wage on enterprise digital transformation, and one of the most closely related literature is the research on the minimum wage and the application of industrial robots. Lordan and Neumark (2018) found that the minimum wage reduced the employment share of low-skilled workers, and led enterprises to adopt industrial robots instead of low-skilled workers. Similarly, Freeman et al. (2020) found that the minimum wage significantly increased the usage rate of robots, and an industrial robot could replace about 15 workers, and this effect was more significant in labor-intensive enterprises and large enterprises. In fact, for enterprises, the increase of minimum wage will significantly change their preferences and constraints, affect their economic decisions, and then affect enterprise digital transformation.

The minimum wage's influence on enterprise digital transformation is mainly realized through innovation incentive effect. On the one hand, the increase of the minimum wage intensifies the business pressure of enterprises, forcing them to open up new profit margins through R&D and innovation. On the other hand, the increase of minimum wage can not

only increase the income of low-skilled labor and unskilled labor, but also have obvious synergistic growth effect: according to the theory of organizational justice, the wage gap within enterprises may remain relatively stable, and the increase of minimum wage will also raise the wage level of medium-skilled and high-skilled labor (Gregory & Zierahn, 2020). This overall increase in wage level caused by the increase of minimum wage has played an efficiency wage effect to a certain extent. Higher wage level can motivate employees to work harder, while avoiding the loss of high-skilled labor force (Shapiro & Stiglitz, 1984), which is helpful to improve the productivity and innovation of enterprises. In addition, the increase of workers' income caused by the minimum wage also has the demand creation effect. The propensity to consume of workers due to rising wages will be higher than that of profit-takers. The expansion of local market scale has improved the effective demand of enterprises and reduced the innovation risk of enterprises, so they will more actively carry out innovation activities (Li, 2017).

Compared with previous literatures, the possible marginal contributions of this paper are as follows. Firstly, in terms of research perspective, the existing literature has not paid direct attention to the economic impact of minimum wage on enterprise digital transformation. Based on the perspective of minimum wage, this paper studies the influence and mechanism on enterprise digital transformation, enriching the existing literature. Secondly, in terms of data, we collect China cities' minimum wage data manually, and use the digital transformation data of enterprises based on text quantitative analysis. Compared with the previous qualitative research on enterprise digital transformation, the quantitative analysis in this paper provides a more reliable practical example. Thirdly, in terms of practical value, the research conclusion provides beneficial enlightenment for minimum wage standard setting and its economic effect evaluation under the background of digital economy era, and provides reference for enterprises' production decision-making and digital transformation.

2. Methodology

2.1 Data Source

The data in empirical part of this paper mainly involves three aspects: the minimum wage data of the city where the company is located, the digital transformation data of listed companies and other financial characteristics data of listed companies. As there is no ready-made database for the minimum wage data of China cities, this paper manually collects the minimum wage data from local government websites and official news announcements. The digital transformation data of listed companies comes from the keyword database of "digital transformation" constructed by Wu et al. (2021) based on Python crawler of enterprise annual reports, and the financial characteristic data of listed companies comes from CSMAR China listed company database. The time interval in this paper is from 2008 to 2020, excluding the financial industry and listed companies in ST state, as well as the companies with less than 5 years' listed time. And we have also dropped the sample with serious missing values. All continuous variables have been truncated (winsorize) at the level of 1% and 99% to avoid the influence of extreme values.

2.2 Indicator Selection

Explained variable. The explained variable in this paper is enterprise digital transformation (DTR). Traditional literature mainly describes enterprise digital transformation qualitatively, but it is difficult to investigate the quantitative characteristics. And some papers construct the dummy variable of whether enterprises are undergoing digital transformation, but it still can't describe the intensity and time varying trend of enterprise digital transformation. Most of the latest researches are based on the text mining of company annual reports to analyze enterprise digital transformation. Based on Wu et al. (2021) open-source database, this paper depicts the degree of digital transformation from the word frequency of "enterprise digital transformation" in the annual reports of listed companies, obtains the annual reports of China A-share listed companies through Python crawler function, and screens the character-words. We divide the source of character-words into "bottom technology application" (including artificial intelligence, blockchain, cloud computing and big data) and "technical practice application". Specific character-words are shown in Table 1. The above categories of character-words are summed up as the total word frequency of enterprise digital transformation. Considering that the word frequency data has obvious right-skewed feature, this paper adds 1 to the word frequency of enterprise digital transformation and then takes logarithm as the final explained variable.

Table 1. Character-words of enterprise digital transformation

	Characteristic words
Artificial Intelligence	Artificial intelligence, business intelligence, image understanding, investment decision support system, intelligent data analysis, intelligent robot, machine learning, deep learning, semantic search, biometric technology, face recognition, speech recognition, identity verification, automatic driving, natural language processing
Blockchain	Blockchain, digital currency, distributed computing, differential privacy technology, intelligent financial contract
Cloud Computing	Cloud computing, stream computing, graph computing, in-memory computing, multi-party secure computing, brain like computing, green computing, cognitive computing, converged architecture, billion-level concurrency, EB-level storage, Internet of Things, cyber-physical systems.
Big Data	Big data, data mining, text mining, data visualization, heterogeneous data, credit reporting, augmented reality, mixed reality, virtual reality
Application of digital technology	Mobile Internet, industrial Internet, mobile internet, Internet medical care, e-commerce, mobile payment, third-party payment, NFC payment, smart energy, B2B, B2C, C2B, C2C, O2O, network connection, smart wear, smart agriculture, intelligent transportation, smart medical care, smart customer service, smart home, smart investment, smart travel, smart environmental protection, smart grid, Intelligent marketing, digital marketing, unmanned retail, internet finance, digital finance, Fintech, financial technology, quantitative finance, open banking

Explanatory variable. The core explanatory variable in this paper is the minimum wage (Min_wage), which is expressed by the logarithm of the minimum wage in the city where the listed company is located. In order to alleviate the endogenous problem, and considering that the minimum wage may have a lag effect on enterprise behavior and decision-making, this paper processes the minimum wage data for a lag period.

Control variables. This paper also controls the following characteristic variables that may affect enterprise digital transformation: the age of the company (Age), which is expressed by subtracting the registered year of the company from the sample year and then taking the logarithm. The size of the company (Size), which is expressed by the logarithmic value of the company's total assets. Liquid ratio (Liquid), which is expressed by dividing the company's liquid assets by its liquid liabilities. Asset-liability ratio (Lever), which is expressed by dividing the total liabilities by the total assets. Cash abundance (Cash), which is expressed by dividing the balance of cash and cash equivalents at the end of the year by total assets. Return on assets (ROA), which is expressed by the ratio of net profit to total assets in the current year. Tobin's Q (Tobinq), which is expressed by dividing the company's market value by its total assets. P/E ratio (PE), which is expressed by the percentage of the company's stock price divided by earnings per share. Ownership concentration (Top1), which is expressed by the shareholding ratio of the largest shareholder. Proportion of independent directors (Indep), which is expressed by the proportion of independent directors to board members. Ownership nature (Soe), state-owned enterprises are assigned 1, and non-state-owned enterprises are assigned 0. Descriptive statistics include observation number, average, standard deviation, minimum value and maximum value. The detailed results are shown in Table 2.

Table 2. Descriptive statistics of variables

Variable	Observation	Average	Std. Dev.	Min	Max
DTR	29,030	2.5402	1.3930	0.0000	7.3119
Min_wage	29,030	7.2308	0.3480	6.2344	7.7915
Age	29,030	2.8754	0.3145	1.7918	4.1431
Size	29,030	22.1293	1.3188	19.2176	26.0591
Liquid	29,028	2.3348	2.4687	0.2352	17.3954
Lever	29,028	0.4425	0.2148	0.0508	1.0055
Cash	29,028	0.1589	0.1268	0.0074	0.6853
ROA	29,028	0.0338	0.0696	-0.3271	0.2127
Tobinq	28,336	2.1339	1.4901	0.8719	9.7412
PE	28,336	0.7503	1.3884	0.0000	9.4410
Top1	29,030	0.3446	0.1491	0.0880	0.7510
Indep	29,028	0.3749	0.0559	0	1
Soe	29,030	0.3928	0.4884	0	1

2.3. Model Building

In this paper, we set a two-way fixed effect model for benchmark estimation, and the specific form is shown in formula (1).

$$DTR_{it} = \gamma_0 + \gamma_1 Min\_wage_{j\,t-1} + \gamma_2 Controls_{it} + Ind + Year + \varepsilon_{it} \quad (1)$$

Among them, the explained variable *DTR* represents enterprise digital transformation, the core explanatory variable *Min_wage* represents the minimum wage, and the *Controls* represents the control variable matrix. In order to reduce the unobservable heterogeneity, this paper also controls industry fixed effect (*Ind*) and time fixed effect (*Year*), ε represents random error term. The subscript *i* denotes the sample enterprise, *j* denotes the city where the

enterprise is located, and *t* denotes the sample year. In addition, this paper uses robust standard error in regression. If the minimum wage accelerates the process of enterprise digital transformation, the regression coefficient γ_1 is expected to be significantly positive.

3. Results

3.1. Benchmark Regression Results

In order to investigate the impact of minimum wage increase on enterprise digital transformation, we use formula (1) for benchmark estimation, and the regression results are shown in Table 3. Columns (1)-(2) report the regression results without adding fixed effects, and columns (3)-(4) report the regression results after adding fixed effects of time and industry. It can be seen that the regression coefficient of minimum wage is significantly positive at the level of 1%, indicating that the rise of minimum wage has promoted enterprise digital transformation.

Table 3. Benchmark regression results

	(1)	(2)	(3)	(4)
Min_wage	1.7219***	1.2447***	0.2938***	0.2707***
	(0.0297)	(0.0420)	(0.0820)	(0.0788)
Age		0.2018***		-0.4637***
		(0.0558)		(0.0557)
Size		0.2678***		0.2233***
		(0.0173)		(0.0155)
Liquid		-0.0200***		-0.0168***
		(0.0050)		(0.0050)
Lever		-0.4602***		-0.3390***
		(0.0798)		(0.0739)
Cash		0.2530***		0.1855**
		(0.0791)		(0.0753)
ROA		-0.0739		0.1733*
		(0.1049)		(0.0985)
Tobinq		0.0143**		0.0029
		(0.0062)		(0.0067)
PE		-0.0093**		-0.0031
		(0.0041)		(0.0041)
Top1		-0.6155***		-0.2988***
		(0.1189)		(0.1069)
Indep		-0.2855*		-0.2871*
		(0.1612)		(0.1586)
Soe		-0.2454***		-0.1817***
		(0.0456)		(0.0413)
Cons_	-9.8588***	-12.2632***	-0.7526	-3.7420***
	(0.2144)	(0.3575)	(0.5705)	(0.6324)
Ind_fixed	NO	NO	YES	YES
Year_fixed	NO	NO	YES	YES
N	29,030	28,333	29,030	28,333
R^2	0.3403	0.3767	0.3839	0.4036

Note: ***, **, * are significant at the level of 1%, 5% and 10% respectively. Robust standard error is in parentheses. The following tables are the same.

3.2. Robustness Test

In order to enhance the reliability of the benchmark regression conclusion, we conducted a series of robustness tests. First, we use principal component factor analysis to replace the measurement of the explained variables. The enterprise digital transformation index used in the benchmark regression is obtained by simply adding up the word frequency and then taking the logarithm. This results in equal weight for each sub-indicator, which may lead to overestimation or underestimation of the importance of some indicators. Therefore, we use the principal component factor analysis method to construct enterprise digital transformation index. The average value of the five indicators KMO test is 0.7383, which indicates that the sample is suitable for factor analysis. According to the principle that the eigenvalue is greater than 1, this paper finally retains one factor as the proxy variable of digital transformation. The results are shown in the first column of Table 4. The coefficient is significantly positive at the level of 1%, which confirms the basic conclusion that the increase of minimum wage can promote enterprise digital transformation.

Secondly, considering that Poisson regression is a model for analyzing the dependent variable of count data, so we replace the measurement model with Poisson regression, and directly uses the original word frequency of enterprise digital transformation as dependent variable. As shown in the second column of Table 4, the coefficient is still significantly positive at 1%. Thirdly, in order to reduce the estimation error caused by the sample self-selection deviation, this paper uses Bootstrap estimation to realize the unbiased gradual population distribution. The estimation results of self-sampling 500 times are shown in column 3, and the regression results are consistent with the benchmark regression. Fourthly, considering the impact of the international financial crisis in 2008 on business operations, in order to eliminate the lasting impact of the financial crisis, we exclude the samples in 2008, 2009 and 2010. The results are shown in column 4 of Table 4, and the regression coefficient is still positive at the 1% level. The above robustness tests all confirm the credibility of the benchmark regression conclusion.

The endogeneity caused by missing variables may still affect the estimation results. So, we use the instrumental variable method to alleviate the endogenous estimation bias. Referring to Mayneris et al. (2018), we choose the minimum wage data with three lag periods as the instrumental variable. The estimation results by using the two-stage least square method are shown in Table 4. The first-stage estimation results show that instrumental variables are significantly positively correlated with core explanatory variables. The p value of the first stage F value is 0.0000, which rejects the null hypothesis of weak instrumental variables. The p value of Kleibergen-Paap rk LM statistic is 0.0000, which rejects the null hypothesis of under identification, indicating the effectiveness of tool variables. The estimation result of the second stage shows that minimum wage still significantly promotes enterprise digital transformation at the level of 1%. In a word, the conclusion of instrumental variable method is consistent with the benchmark regression.

Table 4. Robustness test results

	PCF	Poisson	Bootstrap	Change Year	IV	
					Min_wage	DTR
Min_wage	0.3124*** (0.0924)	0.7453*** (0.0626)	0.2707*** (0.0799)	0.3088*** (0.0786)	0.8735*** (0.0033)	0.6799*** (0.0504)
Controls	YES	YES	YES	YES	YES	YES
Ind_fixed	YES	YES	YES	YES	YES	YES
Year_fixed	YES	YES	YES	YES	YES	YES
N	28,333	28,333	28,333	25,507	21,629	21,629

3.3. Mechanism Analysis

The rise of minimum wage has promoted enterprise digital transformation, but its mechanism remains to be tested. Minimum wage reduces the enterprises' profit margin, forcing enterprises to increase R&D and innovation investment to seek new profit sources. Moreover, the increase of minimum wage leads to the improvement of the overall wage level in enterprises, which to some extent plays the role of efficiency wage, encourages employees to improve production efficiency, and is beneficial to R&D and innovation activities. In addition, the increase of minimum wage will also raise the workers' consumption demand, which will reduce the risk of enterprise innovation. And the increase of enterprise innovation investment will help to promote the process of digital transformation. In order to investigate this effect, this paper uses the ratio of enterprise R&D input to operating income (R&D Input) and the ratio of R&D Staff to the total number of employees (R&D Staff) to measure enterprise innovation input. The mechanism analysis results are shown in Table 5. The regression coefficients of minimum wage to enterprise innovation investment are all significantly positive at the level of 1%, indicating that the increase of minimum wage is helpful to stimulate enterprise innovation. Then, the minimum wage and enterprise innovation are included in the explanatory variables at the same time, and the regression coefficients are all significantly positive at the level of 1%. However, the coefficient of the minimum wage is lower than that without enterprise innovation. The results indicate that enterprises will tend to increase R&D innovation investment when minimum wage standard rises, which is helpful to promote the process of enterprise digital transformation.

Table 5. Mechanism analysis results

	DTR	R&D Input	R&D Staff	DTR	DTR
Min_wage	0.3102*** (0.0862)	1.0459*** (0.2968)	4.0693*** (0.9344)	0.2992*** (0.0857)	0.3041*** (0.0857)
R&D Input				0.0168*** (0.0030)	
R&D Staff					0.0038*** (0.0010)
Controls	YES	YES	YES	YES	YES
Ind_fixed	YES	YES	YES	YES	YES
Year_fixed	YES	YES	YES	YES	YES
N	21,832	21,832	21,832	21,832	21,832

3.4. Heterogeneity Analysis

The promotion of minimum wage to digital transformation may have different effects in different enterprises. We analyze the heterogeneity according to enterprise property rights, technological attributes and the economic development level of the region where the enterprise is located.

Heterogeneity caused by enterprise property rights. New institutional economics holds that the nature of property rights determines the resource allocation efficiency. There are some problems in state-owned enterprises, such as unclear definition of property rights and implicit guarantee provided by the government, and state-owned enterprises also undertake many non-market functions. In addition, leaders in state-owned enterprises shoulder political attribute and pay more attention to their own promotion prospects, and may not be keen on cultivating enterprise long-term competitive advantages through digital transformation. The above factors will inhibit digital transformation of state-owned enterprises. On the contrary, private, foreign-owned and other non-state-owned enterprises have clear property rights, and are facing more intense market competition. Therefore, they will more actively carry out digital transformation to gain competitive advantage. In this paper, sample enterprises are classified according to the property rights. If they belong to state-owned enterprises, Soe is assigned to 1, while non-state-owned enterprises are assigned to 0. The results of grouping regression are shown in column (1) of Table 6. The regression coefficient in state-owned enterprise group is 0.1068 and not significant, but the coefficient in non-state-owned enterprise group is as high as 0.4590 and significant at 1% level. It shows that facing the pressure of minimum wage, non-state-owned enterprises will take the initiative to carry out digital transformation, but the state-owned enterprises have insufficient motivation for digital transformation and the progress lags behind.

Heterogeneity caused by enterprise technological attributes. The influence of minimum wage on the digital transformation may also be different due to enterprises technology attributes. Subjectively, high-tech enterprises rely more on scientific and technological innovation to maintain their operations, with rapid product upgrading. On the objective level, the digital transformation itself also needs strong scientific and technological strength as its support. On the contrary, non-high-tech enterprises do not rely on technological innovation to maintain their competitive advantage, nor do they have enough technical reserves, so their motivation and ability of digital transformation are weak. Therefore, the promotion of minimum wage to the digital transformation of high-tech enterprises may be more significant. According to whether the industry belongs to high-tech industry, the whole sample is divided into two groups. The grouping regression results are shown in Table 6, column (2). The regression coefficient of high-tech enterprise group reaches 0.3076, which is significantly positive at 1% level, while the coefficient of non-high-tech enterprises is 0.0871 and not significant. It shows that minimum wage has a more obvious role in promoting the digital transformation in high-tech enterprises, but it does not have a significant impact on non-high-tech enterprises.

Heterogeneity caused by region economic development. The location characteristics of enterprises may also affect enterprise digital transformation. The more economically developed areas are usually areas with intensive high-tech enterprises and sufficient technology and talents. And local enterprises can not only enjoy the broad local market and sufficient financial resources, but also enjoy the benefit brought by technology and knowledge spillover. The eastern China is located at the opening-up frontier, where economic development level leads the whole country, and scientific research institutions and technological enterprises are concentrated. So, it is more likely to be in the leading position in the tide of digital transformation. On the contrary, enterprises in the central and western regions may be followers in the digital transformation. In this paper, the whole sample is divided according to whether the companies registered place is located in the east of China, and the grouping regression results are shown in Table 6, column (3). The regression coefficient of enterprise groups in eastern China is significantly positive at the level of 5%, while it is not significant in the central and western regions. It shows that facing the pressure of minimum wage increasing, enterprises in eastern China will more actively carry out digital transformation, while enterprises in central and western China are constrained by location and do not have the conditions and motivation for digital transformation.

Table 6. Heterogeneity analysis results

	(1)		(2)		(3)	
	Soe=1	Soe=0	High-Tec=1	High-Tec=0	East=1	East=0
Min_wage	0.1068 (0.1160)	0.4590*** (0.1009)	0.3076*** (0.1058)	0.0871 (0.1056)	0.2260** (0.1139)	0.1584 (0.1329)
Controls	YES	YES	YES	YES	YES	YES
Ind_fixed	YES	YES	YES	YES	YES	YES
Year_fixed	YES	YES	YES	YES	YES	YES
N	11,183	17,150	14,788	13,545	19,530	8,803

4. Discussion and Conclusions

Nowadays, the digital technology revolution has caused a new tide of industrial transformation, and digital transformation has become a necessary path for the development of modern enterprises. From the perspective of minimum wage, this paper discusses the economic impact of rising minimum wage on enterprise digital transformation. Based on the data of China listed companies and minimum wage, it is found that: (1) The rising minimum wage has promoted enterprise digital transformation, and this basic conclusion still holds robust after changing the estimation method, replacing the explained variables, excluding the financial crisis year and other robustness tests. We also use instrumental variable method to alleviate endogenous problems, and the results keep established. (2) The mechanism analysis shows that enterprises will actively increase R&D and innovation investment to cope with the pressure brought by the rising minimum wage, and then promote the digital transformation process. (3) The promotion of minimum wage to enterprise digital transformation may have different influences among different enterprises and different regions, which shows that in non-state-owned enterprises, high-tech enterprises and enterprises in eastern China, the promotion effect is more significant.

In the digital economy era, we need to re-examine the validity of minimum wage standard and the characteristics of enterprise transformation. Based on the conclusion, this paper puts forward the following suggestions. First, we should pay more attention to the assistance and guidance of enterprise digital transformation. The minimum wage has a positive role in promoting enterprise digital transformation. However, for state-owned enterprises, non-high-tech enterprises and enterprises in economic backward areas, this role is not significant. Therefore, it is necessary to strengthen technical assistance and guidance for the above-mentioned enterprises, establish and improve the market trading mechanism of digital technology, and urge them to actively integrate into the market competition and transformation in the digital economy era. Second, as a non-market pricing mechanism, the motive of setting up the minimum wage is to ensure the low-income people to maintain their basic livelihood and prevent the social income gap from being too wide. However, the rise of minimum wage has accelerated enterprise digital transformation, which may replace low-skilled labor. So, we should pay attention to the unemployment problem caused by this. It is necessary to further improve the system design of minimum wage and the protection policy for workers, and at the same time prevent enterprises from abusing digital technology.

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